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Direct Investment, Economic Integration and the Welfare State: The Case of European Integration

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Direct Investment, Economic Integration and the Welfare State: The Case of European Integration

Torben Dall Schmidt

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Abstract

It has been argued, that economic integration casts serious doubts on the efficiency of welfare state policies and the ability to finance these. As integration proceeds, factor of production become more mobile and less vulnerable to local shocks, and integration at the same time results in a footlose tax base - all effects pointing to the death of the welfare state.

Recent advances in European integration has especially added to the mobility of capital. Using direct investment activities as a benchmark, the present paper explores potential effects of a number of mechanisms, that may critically alter the conclusions on economic integration and the welfare state. These mechanisms include such aspects as risk diversification, risk-shifting and elastic local returns - aspects that are vital in answering questions on the efficiency of welfare state activities and questions on the ability to finance these activities in an international setting with the potential of shifting the tax burden abroad. The results indicate, that the situation may indeed be less critical for the welfare state, than expected from the "traditional" arguments.

1 Introduction

European integration is by now high on the agenda in most European countries, and economic literature has focused on a wide range of aspects concerning economic integration. It ranges from the extensive literature on economic geography to the literature on tax competition. Recent contributions have

questioned the ability of the welfare state to survive in an ever more integrated world. It is argued that integration may result in the death of the welfare state, as stated in Sinn (1990). A similar line of thought is reflected in Wildasin (1995). Economic integration renders the tax base footloose reducing the ability to finance welfare state activities, and potentially making such activities superfluous. The present paper adds to these arguments, and questions the general validity of such strong stylized statements on the survival of the welfare state in an increasingly integrated world.

The present paper focuses on the consequences for the welfare state of removing barriers to investments within the internal market. What are the consequences of reducing the obstacles to invest in countries different than the place of residence of the capital owners, measured by reduces mobility cost of moving capital goods? There would potentially exist two dimensions in such an analysis. Integration of goods markets may have an important impact on the investment decision of capital owners along the lines proposed in the literature on economic geography, i.e. where do firms locate/invest? Furthermore, there are a number of mechanisms that are traditionally present in portfolio choice problems, i.e. risk diversification and elastic returns to investment. The present paper will focus on the last of these dimensions.

A basic problem of increased integration originates from tax competition. As capital becomes more mobile relative to labor, tax competition implies a shift in the tax burden of various policies towards labor. The policies considered here are social insurance policies, that are traditionally associated with the welfare state, see Sandmo (1995). Given incomes are risky, social insurance implies that the government collects taxes from the lucky factor owners to redistribute the revenues to the unlucky. Integrating economies changes the efficiency of such policies, to the extent that factors are able to move when experiencing a bad state. Mobility becomes a substitute for social insurance policies.

Still, if there are local asymmetries with respect to the mobility of different factors of production, there may be a case for social insurance policies¹. The problem is, that maintaining such social policies may not be feasible, as tax competition reduce the taxes collectable from the mobile factor, i.e. capital. In this sense, the social insurance activities of the welfare state become superfluous, as it can only collect tax revenue to finance social insurance policies from owners of the immobile factor, i.e. labor, that due to their immobility experience similar local adverse effects on income. There will therefore be no gains from risk pooling or risk shifting. These gains from

¹ Given the government feels strongly for the owner of the relatively immobile factors, i.e. gives them a higher weight when evaluating social welfare.

social insurance policies may though be reestablished, if countries are able to coordinate² on such social policies and on tax policies.

Yet, European integration has carried little consent on such subjects. Only the most recent of the treaties on European integration, has coordination of social policies on the agenda. A crucial point is though that the Amsterdam treaty leaves the ...ght of unemployment at the level of the individual countries. This indicates that the coordination on social policies is in its infancy. Rather than analyzing the effects of coordinating policies, the present paper therefore points to some alternative mechanisms, that may alleviate the problems of tax competition in respect to social policies. These effects are based on the fact that adverse effects to local economies are most likely not identical across the economies. This introduces such aspects as risk diversi...cation to the owner of the mobile factor, i.e. capital. Furthermore, returns may be locally elastic, which may further reduce the response of capital to tax arbitrage motives.

Implicit to such arguments is an assumption of ex ante allocation. The agents have to optimize before shocks have occurred. This is a crucial difference relative to some of the few previous contributions on the subject. In Wildasin (1995) all decisions are taken ex post to the realization of the shocks to the return of some mobile factor³. In addition, the owner of the mobile factor has an outside option, simplifying the analysis considerably. It is always possible for the owner of the mobile factor to move his resources to some world market, at some exogenous return. In this setup, it is therefore only the government that face uncertainty, because it has to ...x policies ex ante⁴. Rodrik (1997) also analyses the interdependence of economic integration and the welfare state. Rodrik (1997) has the same timing of events, implying that agents make decisions ex post. The major difference is that the uncertainty is on the goods market, as it is the term of trade that is un-

²Following Oates (1972) the problems of tax competition will be less important, if policies are centralized. On the other hand, this implies a loss in efficiency in the sense that policies can no longer be made contingent upon local characteristics. There obviously exists institutional setups in-between these polar cases. For some thoughts on the possible problems and solutions in a setup with a mix of centralized and decentralized government policies, see e.g. Boadway and Keen (1996) and Boadway and Flatters (1982).

³This has the important implication, that equilibria are defined by a migration equilibrium. These equilibria simply define, when it is worthwhile to move, as a function of the magnitude of the realized shock, the elasticity of local factor demand and mobility cost.

⁴It should also be noted, that Wildasin (1995) never specifies an objective function for the government. Rather, it is assumed that the government is risk averse, in that it ...xes policies to reduce variance and increase the mean of the income to the owners of some mobile factor and the owners of some immobile factor. This has the implication, that no explicit optimal policy is specified in the analysis.

certain. In this sense, the outside option to the owners of the mobile factor is eliminated in Rodriks model.

The following section will shortly review some empirical observations on direct investments in European countries to underline the importance of analyzing the effects of increased mobility of capital for the functioning of the welfare state. Next, section 3 presents the model used to analyze the effect of increased integration on the welfare state. It basically contains a portfolio choice problem. In section 4, the symmetric equilibrium is derived, and the comparative statics of the key parameters around the symmetric equilibrium are presented and interpreted. Section 5 focuses on the problem of the government, and derives the optimal tax. Finally, section 6 contains a discussion of the results obtained in the paper, and some possible directions for future research on the subject.

2 European Integration and Direct Investment

The ongoing process towards European integration was initiated by the signing of the Rome treaty in 1957. Yet, not much progress could be observed the following years in respect to central issues like free movement people, goods, services and capital⁵. Progress seems to have been moderate until the Single Market Programme was launched in 1985. The ambition of this program was to establish an all comprehensive single European market. The starting point of the program was, that a considerable amount of local legislation represented barriers to trade. The European Commission accordingly setup a number of directives to be incorporated into local legislation, to eliminate these problems to free movement.

Formal obstacles to the free movement of capital and people were soon abolished. Yet, there has been a considerable lag in implementing directives to ensure the free movement of goods and services. This is most clearly seen from the "Single Market Scoreboard"⁶, which is published by DG XV under the Commission. These figures reveal that 26,7 % of the directives stated by the Commission concerning the internal market were not implemented in all

⁵Although the customs union of 1968 may be seen as a step in the direction of establishing an internal market, closing a number of market to the exterior is not in general enough to ensure a well functioning internal market.

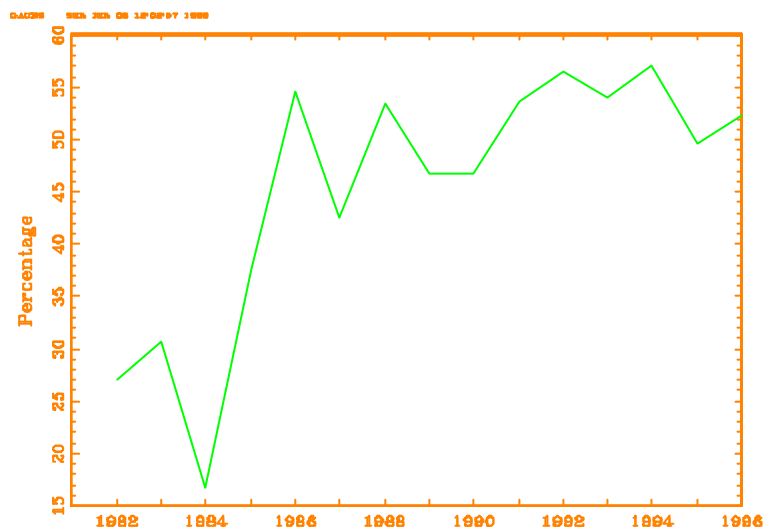
⁶For an update on the "Single Market Scoreboard", see the web-page:

[europa.eu.int=com=dg15=en=update=action=128:htm](http://europa.eu.int=com=dg15=en=update=action=128.htm)

member states by November 1997⁷.

To what extent has the initialization of the Single Market Programme influenced the investment activities within the countries of the single market? Figure 1 indicates the answer to this question. It illustrates the inflow of direct investments to a group of reduced-EU⁸ countries from other countries within the same group as a percentage of the total inflow to this group of reduced-EU countries.

Figure 1: Percentage of inflows of direct investments from other Reduced-EU countries



Source: OECD (1997) and own calculations

Although there are few observations before 1986, the figure indicates that there has been a shift to a higher level. An increasing amount of the total inflow of direct investments to countries belonging to the reduced-EU group has accordingly come from other reduced-EU countries. This may be taken to indicate, that the integration process initiated by the Single Market Programme has successfully reduced the restrictions from local legislation on the

⁷Note, that the number of directives to be implemented will vary over time, as the commission directs attention to more areas of legislative coordination.

⁸The group of reduced-EU countries includes Belgium, Luxemburg, Denmark, France, Germany, Italy, Netherlands, Spain and UK. The remaining countries are excluded due to the lack of reasonably reliable data.

mobility of capital⁹. Yet, Figure 1 reveals a pattern of an initially large effect around the introduction of the Single Market Programme, upon which the effect has been moderate. Recall that the initiatives directed at integrating the markets for goods and services have only been implemented gradually, as reflected by the "Single Market Scoreboard". The moderate effect during later years may therefore indicate a moderate effect on the localization of investments from the liberalization of trade in goods and services.

The empirical evidence for the effect of the "Single Market Programme" may appear convincing, but a number of additional aspects must be mentioned. First of all, the figures published as the inflow of direct investments only measures the investments activities of foreign companies to the extent that the funding is obtained abroad. Given that the foreign companies finance their investments through domestic loans, these investments are not included. These figures will accordingly be sensitive to such aspects as spreads in interest rates in-between the countries. Still, the figures are indicative of the extent of investments activities from abroad.

Another aspects of importance in respect to foreign (direct) investment is the exchange rate risk. Exchange rate risk will imply a risk on the return to be repatriated. It is in this respect notable, that the functioning of the EMS was signified by uncertainty until March 1983, upon which the system became increasingly stable, see Østrup (1992). From the spring of 1983, an increasing number of countries committed themselves to a fixed exchange rate policy. The change in investment activities from 1984 and onwards may reflect this political development. Although this cannot be ignored, it does not appear to falsify presumption that the "Single Market Programme" has had an effect. A central question in explaining the changes in Figure 1 by referring exclusively to the exchange rate uncertainty is, that there has been periods of considerable exchange rate risk since then, without having correspondingly detrimental effects in Figure 1. There has therefore without doubt been an effect from the reduction on the exchange rate risk, but this does not preclude an effect of the "Single Market Programme".

The above strongly indicates an increase in the mobility of capital across reduced-EU countries, as measured by direct investments - an increase that is probably based on both increased legislative coordination and an increasingly stable exchange rate system.

⁹The Single Market Programme formally ensures that individuals and companies can invest in any currency and market within the single market. It also includes a considerable liberalization in terms of the supply of financial services, e.g. financial services can be offered across the single market on the basis of a authorization from local authorities in one of the countries. This may have added to transparency and reduced cost in international investment decisions.

As proposed by Zodrow and Mieszkowski (1986), mobility of the tax base may lead to tax competition and a loss in efficiency. In their analysis, tax competition implies an underprovision of local public goods and thereby a loss of efficiency. As argued above, the integration process in Europe has increased the mobility of capital. This should accordingly be expected to result in tax competition in respect to business taxation. Such problems have actually received an extensive amount of attention in the most recent work of the European Commission. On November 5, 1997, the Commission adopted a package to prevent harmful tax competition, including a code of conduct in respect to business taxation¹⁰. The aim of this package from the Commission is to reduce the erosion of tax revenues and the tendency of shifting the tax burden from capital to labor, making tax systems less orientated towards employment objectives.

The importance of such considerations finds further support in the empirical results obtained in Rodrik (1997). Rodrik arrives at two sets of conclusions. First, Rodrik finds strong evidence supporting, that the tax burden of social insurance schemes shift from capital to labor as economic integration proceeds. As economies become more and more open, there will accordingly be a shift in the tax burden from capital to labor. Second, the analysis by Rodrik points to the importance of distinguishing between the exposure to external risk and the openness of the economy, when analyzing social insurance¹¹. An increased exposure to external risk increases government activities on social insurance, whereas social insurance activities decrease as an economy becomes increasingly open¹². Rodrik interprets these results as reflecting a paradox. Integration leads to a higher demand for social insurance, but these activities also become harder to finance, due to tax competition.

The above indicates that European integration has had a substantial effect on the investments activities within Europe. This may be expected to lead to problems of tax competition, which is also reflected in the latest initiatives on the coordination of tax policies taken by the Commission. The results by Rodrik furthermore points to an important paradox in the process of integration, when considering social insurance policies. Having observed such drastic empirical development and considerable focus in the literature,

¹⁰The work on coordination of taxation was initiated on the ECOFIN meeting in Verona, April 1996

¹¹Exposure to external risk is measured by the volatility of the terms-of-trade, whereas openness is measured by the sum of imports and exports relative to GDP.

¹²Note that a tempting interpretation of this is, that a strong correlation between shocks in different countries tend to increase government activities on social insurance, whereas lower mobility cost (more openness) results in lower activities. This would indicate the importance of considering the correlation of shocks between countries.

the problems in respect to the interdependence between economic integration and social policies are clearly important, and must be subject to further analysis. The following sections will therefore present a theoretical model of the consequences of economic integration, i.e. increased mobility of capital, on local social policies. The question is, why the welfare state has not been abolished, considering the strong process towards an integrated Europe - is there any hope for the European welfare states to survive?

3 The Portfolio Choice Problem

This section focuses on the portfolio choice problem of the owner of the mobile factor, which is here interpreted as capital. It furthermore analyses the symmetric Nash equilibrium (SNE) of this problem.

Unlike Wildasin (1995), the present model will not depend on a small open economy assumption¹³, but operates within a symmetric two country world. It is essentially static. Each country is inhabited by two types of agents separated by the ownership of factors to be used in production. The first type owns an immobile factor, labor, which is supplied inelastically. As such, the workers (OL) do not face any allocation decisions. The other type owns a mobile factor of production, which is in elastic supply. The owner of capital (OC) in country i allocates his initial endowment (\bar{K}) across two countries - k_i to the domestic economy and k_i^* to the foreign economy, i.e. $\bar{K} = k_i + k_i^*$. When allocating the mobile factor to the foreign economy, the owner has to pay a unit mobility cost of μ . Returns to the mobile factors in country i and country j ; r_i and r_j respectively, are stochastic, elastic and imperfectly correlated across the two countries. Both types of agents are assumed to be representative¹⁴. Furthermore, a government is present in each country. A more detailed characterization of the government will be left to the following section.

Including uncertainty in the model makes timing a crucial characteristic. First, the government chooses an optimal tax scheme, according to some objectives described in the following section. Next, the OC decides on the portfolio choice problem, choosing k_i and k_i^* . Finally, shocks are realized. There are no information problems in the process. This timing implies, that the allocation decision will have to be undertaken before the shocks are revealed, using information on the distribution of the shocks. Here, the government and the

¹³That is, the existence of an outside option.

¹⁴Implicitly leaving out any considerations to the composition of the population. We are assuming an equal share of the two types of agents in the population.

OC will accordingly both have to make decisions under uncertainty¹⁵. The assumption, that the OC has to make decisions *ex ante* can be justified by the fact, that capital is hard to move around, once the investment decision has been taken. In practice, it will not be possible to make instantaneous adjustments of the allocation to realizations of shocks¹⁶. It may be argued that this does not to the same extent apply to labor. Still, labor typically enters contracts with employers that include a fixed term of notice. This makes instantaneous redeployment a less obvious candidate for labor¹⁷. Rather, one would probably have to motivate the observable immobility of labor by socio-economic factors.

The OC accordingly has to decide under uncertainty, with the possibility of diversifying the portfolio across the two countries. Risk diversification is therefore a possibility for the OC, but comes at the cost of τ - the cost of investing in the other country. Another important aspect, with regards to the returns to the OC, is the elasticity of local returns. This should be expected to favor a symmetric distribution of the mobile factor across the two countries.

Two tax principles are generally available in international taxation. Based on Razin and Sadka (1989), these can be described as follows. One is the residence principle, where the local government only taxes the income of the residents in its jurisdiction, at a rate independent of the location in which, income is earned. The income earned in the domestic economy by foreign residents will not be taxed. A source based tax system implies that income is taxed according to its place of origin. All income earned in the domestic production is taxed uniformly irrespective the residency of the owner¹⁸. These

¹⁵ Recall, that in Wildasin (1995), it was only the government that had to make decisions under uncertainty.

¹⁶ It would usually be costly, as one would have to operate at an inefficient level of capital until time had allowed for the necessary adjustments. Note, that there is no second hand market in the model. Even with a second hand market a loss would still occur from a shock in the form of reduced market value of capital.

¹⁷ Yet, the argument does admittedly not have the same bite for labor. The mentioned arrangements are presumably more or less formal contracts not modelled here. These contracts would in most countries contain an agreement on wages, which to some extent is fixed. Fixed wages imply that risk is shifted towards the employer. For a reference on models with labor contracts and risk shifting, see Lejour and Verbon (1996).

¹⁸ The residence principle is shown to be the efficient outcome under tax competition in Razin and Sadka (1989). This result would though depend on the model setup used. In Razin and Sadka (1989) the result are based on some tax arbitrage conditions and the presence of a world market. This implies that there are no effects from uncertainty, and that there is no government operating in the "world market". Both of these important assumptions may be expected to alter the result. This may preferably be analyzed in a more traditional setup, i.e. one (representative) type of agent and a public good to be

principles are obviously strongly stylized, as real world tax systems consists of a mix of these. A precondition for these principles is some degree of co-ordination, in the sense that the local governments must be able to observe the income obtained abroad by its residents, see Razin and Sadka (1989) for some further notes. This type of perfect information will also be assumed here.

In the present setup, income of the OC can be expressed as:

$$c_i^{OC} = (r_i - t_i^s - t_i^r)k_i + (r_j - t_j^s - t_i^r - \tau)k_j^a \quad (1)$$

where r_i and r_j are stochastic and correlated returns to the mobile factor in country i and country j , and t_i^s ; t_j^s ; t_i^r and τ are taken as given. The three tax parameters are t_i^s , t_j^s and t_i^r , which are the source based tax in country i , the source based tax in country j and the residence based tax in country i . As the OC is assumed to be risk averse, it will be assume that his expected utility function has the following form¹⁹:

$$u(c_i^{OC}) = E(c_i^{OC}) - \frac{1}{2} \text{Var}(c_i^{OC}) \quad (2)$$

Notice that the taxes in equation (1) are unit taxes on the mobile factor²⁰. This has important implications for the effect of taxation. Taxation leads to two kinds of effects. First, there will be an effect on the mean income level, $E(c_i^{OC})$: Increasing taxation in one country reduces the expected after-tax return on capital allocated to this country. The OC will accordingly change the portfolio weights in an attempt to do tax arbitrage. Taxation will therefore have a direct effect on $E(c_i^{OC})$ by changing the expected after-tax return locally, and an indirect effect on $E(c_i^{OC})$ from the following change in the portfolio weights. The second effect of taxation is its effect on the variance of income. Given the portfolio changes resulting from the effect of

...nanced by taxation. This should accordingly be addressed in another paper.

¹⁹This specification corresponds to the expected utility given an exponential utility function of the form:

$$U(c) = -\frac{1}{\gamma} e^{-\gamma c}$$

where c is stochastic and normally distribution.

²⁰If the problem included (proportional) taxes on the return of the mobile factor, the income of the OC could be expressed as:

$$c_i^{OC} = (1 - \tau_j^s)(1 - \tau_i^r)r_i k_i + ((1 - \tau_j^s)(1 - \tau_i^r)r_j - \tau)k_j^a$$

Stating the problem in this way, there will be a direct effect of taxation on the variance of income, in the sense that the variance on pre-tax income will be different from the variance of the after-tax income (a Domar-Musgrave effect). The problem as stated in the text will therefore abstract from this aspect of taxation.

taxation on $E(c_i^m)$; the weights on the variance and covariance of r_i and r_j in the expression for the variance of income changes. Taxation therefore also has an indirect effect by changing the variance of the income. Yet, there will be no direct effect on the variance of income in the sense, that there is no Domar-Musgrave effect.

The OC in country i will choose the optimal portfolio according to the following maximization problem:

$$\begin{aligned} \max_{k_i} \quad & u(c_i^{OC}) \\ \text{s.t. } c_i^{OC} = \quad & (r_i - t_i^s - t_i^r)k_i + (r_j - t_j^s - t_i^r - t_j^r)k_j^* \\ k_i = \quad & \bar{K}_i - k_j^* \end{aligned} \quad (3)$$

As we assume complete symmetry in the model, the OC in country j will face a similar problem.

Local production is described by a Cobb-Douglas production function with a multiplicative productivity shock, μ_i , that has capital, K_i , and labor, L_i , as arguments. Labor is assumed to be in inelastic supply, and labor supply will be scaled to unity. The local production function can therefore be written as:

$$y_i = \mu_i K_i^\alpha \quad (4)$$

The input of the mobile factor, capital, is in elastic supply. The total input in country i can be written as $K_i = k_i + k_j^*$, where k_i is the amount of capital kept at home by domestic OC's and k_j^* is the amount of capital sent abroad by foreign OC's.

As factor markets are assumed to be competitive, the local return to capital in country i can be written as:

$$r_i = \alpha \mu_i K_i^{\alpha-1} \quad (5)$$

Both types of agents are assumed to be representative, why the OC takes the rate of return to capital in both countries as given. The OL supplies its resources inelastically to local production, and will accordingly receive a payment given by the residual:

$$w_i = (1 - \alpha) \mu_i K_i^\alpha \quad (6)$$

On top of this payment, the OL is assumed to receive a transfer corresponding to the tax revenue, i.e. from source based taxation, $t_i^s(k_i + k_j^*)$, and residence based taxation $t_i^r \bar{K}$:

$$c_i^{OL} = (1 - \alpha) \mu_i K_i^\alpha + t_i^s(k_i + k_j^*) + t_i^r \bar{K} \quad (7)$$

The OL will also be assumed to have an expected utility function similar to the one of the OC, i.e.:

$$u(c_i^{OL}) = E(c_i^{OL}) - \frac{1}{2} \text{Var}(c_i^{OL}) \quad (8)$$

From this description of the OL, one important aspect must be stressed. Taxation obviously affects the expected utility through the mean income. More importantly, taxation also influences the variance term, leading to of risk shifting as a possible consequence of taxation. As noted previously, taxation may change the portfolio weights, and thereby the amount of capital available in country i ; i.e. K_i . As K_i enters the variance term of the utility function of the OL's, this will change the risk faced by the OL and thereby the utility. Notice, that the utility functions of the OC and OL do not differ across countries.

Solving the model, implies letting the owners of the mobile factor, i.e. capital, choose their optimal allocation across countries. The optimal allocation is obtained from the maximization problem (3). Assuming that the OC exhibits Nash behavior²¹ and takes tax rates as given, the first order condition is²²:

$$E(r_i) - E(r_j) + t_j^s - t_i^s + \frac{1}{2} (k_i^2 \sigma_{r_i}^2 - k_j^2 \sigma_{r_j}^2 + (k_i^2 - k_j^2) \text{Cov}(r_i; r_j)) = 0 \quad (9)$$

This equation reflects a mean-variance trade off. Increasing k_i will be advantageous in terms of mean income to the extent that the expected return in country i lies above the expected return in country j . At the same time, an increase in k_i will increase the variance in income, if the variance on the return in country i is higher than in country j , adjusted for the possible covariance in between these returns.

The equilibrium condition is obtained by substituting equation (5) and the corresponding equation for the return in country j into equation (9). This results in a non-linear equilibrium condition, that has no general explicit

²¹ i.e. $\frac{dk_i}{dk_j} = 0$

²² The second order condition is:

$$- \frac{1}{2} (2k_i \sigma_{r_i}^2 + 2k_j \sigma_{r_j}^2 - 2 \text{Cov}(r_i; r_j)) < 0$$

Substituting for the variance and covariance of the returns in the two countries, one obtains the following expression:

$$- \frac{1}{2} (2k_i^2 \sigma_i^2 + 2k_j^2 \sigma_j^2 - 2k_i k_j \rho_{ij}) < 0$$

This inequality will always be fulfilled.

solution. Rather, the symmetric equilibrium will be determined next. The following section contains some comparative statics around this symmetric equilibrium.

A symmetric equilibrium is obtained by imposing the following condition on the equilibrium condition²³:

$$t_i^s = t_j^s \quad (10)$$

$$\frac{1}{4} \sigma_i^2 = \frac{1}{4} \sigma_j^2 = \frac{1}{4} \sigma^2 \quad (11)$$

$$E(r_i) = E(r_j) = r \quad (12)$$

To obtain a symmetric equilibrium, there must be no differences in the taxation of the two countries, and there can neither be differences in the mean-variance trade off. Furthermore, capital will be equally distributed across the two countries in a symmetric equilibrium, why $K_i = K_j = \bar{K}$: Using these restriction in the equilibrium condition, the following symmetric equilibrium is obtained:

$$k_i^e = \frac{1}{2} \bar{K} + \frac{\frac{1}{4} \sigma^2 (1 - \frac{1}{2} (r_i - r_j))}{4 - \frac{1}{2} \sigma^2 (1 - \frac{1}{2} (r_i - r_j))} \quad (13)$$

If the OC is to deviate from an equal distribution of his resources across countries, mobility cost will have to take some positive value. Given there are no mobility cost, the OC will choose to spread capital equally across the countries, as this induces the maximum reduction in risk through risk diversification²⁴. For positive values of mobility cost, there will be a home bias. A larger share of the capital endowment will be kept at home. The effect of mobility costs will though depend on the extent of the risk diversification incentives and the welfare gains to the OC from such diversification. Negatively correlated shocks and large local shocks to the return on capital will reduce the effect of mobility cost as will the extent of risk aversion²⁵.

The importance of risk diversification in the allocation decision of the OC, point to a set of crucial aspects²⁶, that may counter some of the concern

²³Note that no restrictions need to be imposed on the residence based tax rates, as they will not change the portfolio weights. This can easily be seen from the equilibrium condition.

²⁴Assuming that $\frac{1}{4} \sigma_i^2 = \frac{1}{4} \sigma_j^2$ and $E(r_i) = E(r_j)$ obviously simplifies the mean-variance trade off considerably. The only remaining incentive is to pursue risk diversification.

²⁵The elasticity of returns will also be of importance, as it enters the expression of the variance of income. These effects will not be straightforward, as the elasticity enters non-linearly. The elasticity would also play a role in the mean-variance trade off. Here this trade off has been simplified considerably, why the elasticity has no effect in this respect.

²⁶I will elaborate on these in the discussion.

about the survival of the welfare state. As economies integrate, there will undoubtedly be some adjustments in the allocation of production resources, as indicated in Figure (1). Still, this does not imply a corner solution. The presence of incentives to spread resources across countries continue to influence the allocation of the mobile factor. To indicate the importance of such effects in the presence of tax competition, it will be necessary to analyze the effects of taxation more closely. Condition (10) was used, to determine the symmetric equilibrium. The following section will take us a first step in the direction of analyzing the effects of tax competition. It will focus on the effects of deviating from condition (10) in the OC's choice problem.

4 Comparative Statics

This section contains some comparative statics for the OC's choice problem from unilateral changes in the tax rates. The comparative statics are evaluated at the symmetric equilibrium. The analysis will indicate the effects of moving away from the symmetric equilibrium of the OC's problem, although the results are only valid in the neighborhood of the symmetric equilibrium.

Doing comparative statics implies the simultaneous usage of the equilibrium condition for both countries. Define the function $\phi_i(k_i; k_j; \mu)$ as the left hand side of the equilibrium condition, where μ is a vector of parameters. The function $\phi_i(k_i; k_j; \mu)$ implicitly defines the solution to k_i for given k_j . Define the derivatives $a_i = \frac{\partial \phi_i(\cdot)}{\partial k_i(\cdot)}$, $b_i = \frac{\partial \phi_i(\cdot)}{\partial k_j}$ and $\phi_i^\mu = \frac{\partial \phi_i(\cdot)}{\partial \mu}$. The comparative statics of the equilibrium system can be obtained from²⁷:

$$\begin{pmatrix} dk_j \\ dk_i \end{pmatrix} = \begin{pmatrix} a_j & b_j \\ a_i & b_i \end{pmatrix}^{-1} \begin{pmatrix} \phi_j^\mu \\ \phi_i^\mu \end{pmatrix} d\mu \quad (14)$$

The comparative static in the neighborhood of the symmetric equilibrium is determined by evaluating these expression using the symmetric equilibrium conditions, i.e. condition (10), (11) and (12). The focus of the present analysis is the potential threat to the welfare state from tax competition, why μ only includes the tax parameters in the present analysis²⁸.

²⁷

$$\Phi = a_i a_j - b_i b_j$$

²⁸Note that doing comparative statics on ϕ_i , ϕ_j^2 and $\text{Cov}(\phi_i, \phi_j)$ under the condition (10), (11) and (12) would imply a change from one symmetric equilibrium to another. This would add little insight on the effects of tax competition.

The comparative statics may either be thought of as changes in an equilibrium to be implemented²⁹, or as changes from an already implemented equilibrium. In the later case, the adjustment process from one equilibrium to another will be of importance. I will use the last of these interpretations. The details on the adjustment process and stability can be found in appendix 1.

There are two types of taxes in the present model - residence based taxation and source based taxation. The comparative statics reveal some crucial differences in the effects of these types of taxation. Turning to the source based taxation, it will be necessary to distinguish between the domestic tax rate and the foreign tax rate. The comparative statics for the domestic rate is:

$$\begin{aligned} \frac{dk_i^e}{dt_i^s} &= \frac{1}{\phi^e} (a_j^e + b_i^e) \\ &= \frac{1}{4^{\otimes}(\otimes_i - 1) \overline{K}^{\otimes_i - 2} \otimes_i - 4^{-\otimes} 2 \overline{K}^{2(\otimes_i - 1)} \frac{1}{4} 2^{\otimes} (\otimes_i - \frac{1}{2}(\otimes_i; \otimes_j) \otimes_i - 1)} \end{aligned} \quad (15)$$

Using the stability conditions obtained in appendix 1, this expression is assumed to be negative. An unilateral increase in the domestic source based tax leads to a reduction in the domestic portfolio weight. To disentangle the effects embodied in the denominator of equation (15), it will be helpful to proceed in steps - the mean effect and the variance effect.

The ...rst component of the denominator in equation (15) reflects the mean effect of adjusting the portfolio weights due to tax arbitrage. Increasing the domestic source based tax will lead to a tax arbitrage incentive, that tends to increase the foreign investment activity. Yet, as the return to capital are elastic in both countries, these tax arbitrage incentives are counteracted. An unilateral marginal reduction in the domestic position leads to an increase in mean income from tax savings, but it also increases the domestic return and reduces the foreign return. These adjustments in the domestic and foreign returns tend to reduce the mean income, if the domestic position is reduced unilaterally. The importance of the elasticity of the return to capital is revealed by the fact, that the ...rst component of the denominator can be rewritten as $4 \frac{dE(r_i)}{dK_i} \big|_{K_i = \overline{K}}$, which measures the sensitivity³⁰ of

²⁹Leaving out any considerations to the adjustment process of moving from one equilibrium to another. Before the model unfolds, agents consider how shifts in parameters change equilibria. After these considerations that the model then unfolds, and the equilibrium is implemented.

³⁰Measured by the curvature of the production function. As the comparative static analysis is performed in the neighborhood of the symmetric equilibrium, the expression is evaluated at this equilibrium.

the mean return from any reallocation of capital evaluated at the symmetric equilibrium.

It would potentially be of interest to check how the parameter of the production functions curvature, θ , influences this effect. Although desirable, this is not a straightforward task. Calculating the derivative of the denominator in equation (15) with respect to θ results in no clear-cut conclusions³¹. The case of a linear production function, i.e. $\theta = 1$, may though be analyzed. The limit value of equation (15) as θ moves to unity and γ^2 approaches zero is given by:

$$\lim_{\theta \rightarrow 1} \lim_{\gamma^2 \rightarrow 0} \frac{a_i^e + b_i^e}{\phi^e} = i - 1 \quad (16)$$

That is, with a completely inelastic return to capital and no uncertainty, the only aspect of importance is tax arbitrage. A marginal increase of the domestic tax above the foreign will accordingly reduce the domestic investments to zero.

The variance effect can be sub-divided into two mechanisms that interact in the model. These mechanisms refer to a risk-diversification effect and a risk-shifting effect. The risk-diversification effect enters because the shocks in the two countries may not be independent. Choosing the allocation of capital across the two countries accordingly opens for the possibility of reducing the risk on income by pursuing risk-diversification. On the other hand, the OC also faces an incentive to shift risk to the OL. This is possible, because the return to capital in a given country is a convex function of the total amount of capital in that country. The function becomes flat as the amount of capital in a country accumulates, i.e. $\lim_{K_i \rightarrow 1} \frac{dr_i}{dK_i} = 0$. It is perhaps most clearly seen from the fact, that the variance of the return to capital in a given country is a decreasing function in capital, i.e. $\frac{d\gamma_{r_i}^2}{dK_i} < 0$. The return to the OL is on the contrary increasing concave function in the amount of capital available in a given country, i.e. $\frac{d\gamma_{w_i}^2}{dK_i} > 0$. The OC is accordingly able to shift risk to the OL. There are accordingly gains in terms of reduced risk to be recouped by the OC, if the endowments of capital is concentrated in one country. The variance effect therefore consists of two mechanisms, that point in each their direction - risk diversification that makes spreading the endowment desirable to the OC and risk-shifting that makes concentrating the endowment desirable. These effects will obviously interact, as is reflected in the second term of the denominator in equation (15). This may be seen by considering two

³¹ Even in the case of no uncertainty, i.e. $\gamma^2 = 0$, the monotonicity of the denominator in θ will depend on the size of \bar{K} . Note, that \bar{K} determines the sensitivity of the return at the initial equilibrium, and thereby the potential losses in return from a marginal move towards the country with the lower tax.

cases. Consider a situation, where θ is fixed and $\frac{1}{2}$ increases. By derivation of equation (15), one finds that $\frac{d^2 k_i^e}{dt_i d\frac{1}{2}(\theta_i, \theta_j)} < 0$. The responsiveness of the domestic position to a unilateral tax change increases, as shocks become more closely positively correlated. As shocks become close to perfectly positively correlated, the incentive to pursue risk diversification is weak, and the dominating mechanism in terms of variance is the risk-shifting effect. The OC will accordingly have a strong incentive to concentrate the endowment of capital, thereby adding to the incentives to do tax arbitrage, if confronted with an unilateral tax change. Next, consider a situation, where there are strong incentives to pursue risk diversification, i.e. $\frac{1}{2}(\theta_i, \theta_j) = \frac{1}{2}$, and where θ changes. Ignoring the mean effect, i.e. $\theta^1 = 0$, one obtains clear-cut conclusions on the monotonicity with respect to θ . In this case, one finds that $\frac{d^2 k_i^e}{dt_i d\theta} > 0$. As θ increases, the responsiveness of the domestic position to an unilateral tax change decreases. This reflects that risk-shifting incentives become less outspoken, as the linear case is approached, i.e. the return to capital becomes inelastic. These incentives of the OC to shift risk to the OL will therefore not add to the incentive to concentrate the endowment of capital, why the domestic position becomes less responsive to unilateral tax changes.

There are obviously a number of intermediate cases of these extremes, in which the interaction between the two mechanisms behind the variance effect will be of consequence. Yet, the monotonicity of the denominator of equation (15) with respect to the parameters will not be unambiguous in these intermediate cases.

The present notes on the mechanisms behind equation (15) should have given some insight into the effects present in the model and their consequences. These mechanisms can be expected to be crucial in respect to the real world process towards more integrated economies, like the recent development in Europe. Investors do presumably not just respond to tax arbitrage incentives, which is the impression one might get from the vivid discussion on the subject. There will be a number of other mechanisms that are crucial to the investors, and this may alter the traditional view on the consequences of integration for local governments ability to pursue active local policies.

Before analyzing how such mechanisms may change the traditional views on tax competition in an ever more integrated world, a brief analysis of the effects of residence based taxation is presented. Using the system given in equation (14), the comparative statics of an unilateral change in the residence based tax can be expressed as:

$$\frac{dk_i^e}{dt_i} = 0 \quad (17)$$

The allocation of capital insensitive to changes in the residence based tax in the present setup. This reflects, that the residence based tax does not enter the equilibrium condition, which is obtained by substituting equation (5) and the corresponding equation for country j into equation (9). The reason is that the residence based tax is levied on both the foreign and domestic income of the domestic OC. It will accordingly have no effect on the allocation decision of the OC. Recall from the previous discussion, that taxes in the present setup only influence the variance of the OC to the extent that taxation affects the allocation through the (net) mean return³². Although the residence based tax changes the (net) mean return to the OC, it changes it on both foreign and domestic positions, why it will not lead to adjustments in the allocation of capital. There will accordingly neither be an effect running through the variance. So residence based taxation will have no effect on the allocation of capital, if modelled as an unit tax on the return to capital. Residence based taxation modelled as an unit tax will therefore add no new mechanisms in the analysis of integration and international taxation, why the following optimal tax analysis focuses exclusively on the source based tax. A further justification for focusing on the source based taxation is, that this to a higher extent seems to be in consent with real world taxation of returns to direct investment activities. Direct investments abroad are often subject to local corporate taxation. Source based taxation is accordingly of interest, when analyzing the effect on the allocation of capital in an integration process.

Having focused on some of the effects that are not traditionally present in the literature on public finance and economic integration, it seems natural to proceed to analyze how these effects affect the optimal tax of governments. This may lead to some insight on the question, why economic integration need not lead to the complete breakdown of the welfare state - a breakdown not observable in any of the European states participating in the integration process in Europe, in spite of the fact that this process has not included coordination of fiscal policies.

5 Government Insurance

The title indicates that the subject of this section is the insurance aspects of government activities - especially in the context of the welfare state. Yet, the insurance modelled here deviates from the normal perception of insurance activities, where payments are contingent upon some adverse event. Rather, the government here pursues social insurance by taking into account the

³² As opposed to a proportional tax on the return on capital, that affects the variance directly through the Domar-Musgrave effect.

expected return and variance of the income of the two types of agents, when designing tax schemes. As such, any aspect of contingency will be absent, and taxation leads to pure redistribution. Still, it should be stressed that taxation has an insurance effect. This is partly due to the fact that taxation pools risk across individuals. Furthermore, taxation influences the risk-shifting incentives of the OC, and thereby the distribution of risk amongst the two types of agents. Both of these effects lead to changes in the risk faced by a given type of agent, and taxation may therefore be considered as a social insurance instrument.

Government policies may either be determined cooperatively or non-cooperatively. In the situation considered here, non-cooperative behavior seems especially relevant. European integration has proceeded in recent years, which has led to a considerable increase in direct investment activities within Europe, as discussed in section 2. Still, this process has not been accompanied by serious attempts to coordinate on fiscal policies³³, and the design of tax schemes is at the discretion of local governments. In modelling corporate taxation, the non-cooperative behavior of governments therefore seems adequate. Focusing on non-cooperative behavior amongst governments may also be more appropriate, in analyzing the extent to which tax competition is a problem in an integration process. This section therefore considers the case of a non-cooperative source based tax. The main focus will be on the symmetric equilibrium, as it is not possible to obtain explicit solutions for the optimal tax outside the symmetric equilibrium.

There are two governments worldwide, one government in each country. These interact in a non-cooperative manner, and are assumed to exhibit Nash-behavior. The governments are furthermore assumed to maximize a weighted sum of the utility functions of each type of agent. One may have strong opinions on the proper route to proceed, but using a social welfare function has the advantage of being rather flexible. Furthermore, it seems to be in line with the idea that different groups attempt to influence the government and thereby change their weight in the social welfare function³⁴. The objective function of the government will have the following specification:

$$\hat{A} = u(c_i^{OL}) + \gamma u(c_i^{OC}) \quad (18)$$

As mentioned previously, the governments exhibit Nash-behavior. The tax rate of the other country will therefore be taken as given by the gov-

³³The attempts initiated at the ECOFIN meeting in Verona in 1996 are still in their very infancy.

³⁴See e.g. Grossman and Helpman (1994), where the political process is modelled as groups lobbying for political influence. This approach results in an objective function of the government, that closely resembles a social welfare function.

ernment in each country. Yet, governments take into account that changing taxes alters the optimal choice of the OC. The first order condition is³⁵:

$$\frac{du(c_i^{OL})}{dt_i^s} + \lambda \frac{du(c_i^{OC})}{dt_i^s} = 0 \quad (19)$$

Substituting for the derivatives of the utility functions and imposing the symmetry conditions in equation (10), (11) and (12), the following expression for the optimal source based tax in a symmetric equilibrium is obtained:

$$t_i^{se} = \frac{\lambda}{2} + (\lambda - 1)^{\frac{1}{2}} (\frac{1}{2} - 1) \bar{K}^{\frac{1}{2}} + 2^{-\frac{1}{2}} (1 - \frac{1}{2})^{\frac{1}{2}} \bar{K}^{\frac{1}{2}} + (2 - \frac{1}{2})^{-\frac{1}{2}} \bar{K}^{\frac{1}{2}} (2 - \frac{1}{2})^{\frac{1}{2}} (2 - \frac{1}{2})^{\frac{1}{2}} \quad (20)$$

The crucial aspect to note from equation (20) is that the optimal tax increases (subsidy decreases) as economies integrate, i.e. λ is reduced. This indicates that the traditional arguments against taxation of mobile factors in the presence of increased economic integration may not be that watertight. Economic integration will not necessarily lead to the abolishment of active policies, such as redistributive policies.

Interpreting equation (20) implies additional complexities relative to the interpretation of equation (15), as it includes components reflecting the incentives of both the OC and OL. Still, the base line effects are similar to the ones presented, when interpreting equation (15). These effects includes the utility effects of redistribution, tax arbitrage incentives, the effects of local elastic returns, risk shifting incentives and risk diversification incentives. Each of these effects will influence the optimal policy. To give a more accurate interpretation, it may be helpful to separate into the effects that relate to the utility of the OL and the utility of OC, i.e. $\lambda = 0$ and $\lambda > 0$.

Starting out with the effects that relate to the utility of the OL, i.e. $\lambda = 0$, three term enter the expression for the optimal policy. The first has to do with the mean effects of taxation. Taxation will have two effects on the mean term of the utility of the OL. Unilaterally higher taxes in one country tend to concentrate capital in the other country. With less capital present, the income to the OL is reduced ($\frac{dW_i}{dK_i} < 0$). At the same time, higher taxes tend to reduce the local tax base, which reduces the tax revenue to be redistributed to the OL. This reduction is small, if the local returns are very sensitive to skewed distributions of capital, i.e. if the domestic return increases and foreign return is reduced extensively from concentration abroad. This was denoted the mean effect, when interpreting equation (15), and reflects that

³⁵ The second order condition will be assumed fulfilled, as is standard in the optimal tax literature.

the tax burden of local policies can more easily be shifted to foreign OC's. The first of these effects should be expected to reduce taxation, whereas the second should be expected to increase taxation, if the government favors the OL. The term $\frac{1}{2}(\frac{1}{2} - \frac{1}{2})\bar{K}^{(1)}_{i-1}$ consolidates these effects, and the last of these effects therefore dominates in total³⁶.

The second term has to do with risk shifting. Unilateral increases in taxes lead to a reduction in the amount of capital available locally, which reduces the variance of the income of the OL. Large reduction in the variance of the income of the OL from concentration of capital will therefore tend to make unilateral tax increases advantageous to the local government, given $\gamma = 0$. This will result in comparably higher equilibrium taxes, i.e. $\frac{1}{2}(\frac{1}{2} - \frac{1}{2})\bar{K}^{(1)}_{i-1} > 0$.

Finally, the last term refers to the changes in the tax base from an unilateral tax change - the variance effect in the interpretation of equation (15). As already mentioned, an unilateral tax change reduces the local tax base. This reduction will be modest, if the amount of risk shifting from the concentration of capital is modest - in the limit case of a linear production function absent ($\gamma = 1$). As the risk shifting incentives become less outspoken, the tax will accordingly tend to be higher (less negative), as the loss of tax base from tax arbitrage will be smaller. The same line of argument applies, when considering the risk diversification incentives of the OC. In situations, where risk diversification incentives are strong ($\gamma = 1$), taxation will tend to be higher, as the response in the tax base to unilateral tax increases is smaller. If on the other hand, risk diversification incentives are absent ($\gamma = 0$), taxation will tend to be at a lower level, potentially being a subsidy.

Having explained the effects in the case of $\gamma = 0$, the incentives in connection to the utility of the OC will now be included ($\gamma > 0$). The first effect refers to the mobility cost of moving capital, $\frac{1}{2}$. An unilateral tax increase leads to tax arbitrage incentives and concentration of capital abroad. If mobility cost are high, this will lead to a loss in the OC's mean income. Concerns of the government for the OC, therefore makes the government less eager to pursue tax increases to redistribute income to the OL, if mobility cost are high. The equilibrium tax will be lower for high mobility cost. Secondly, concentration of capital in one country due to tax arbitrage incentives will also affect the risk faced by the OC. Concentration will shift risk from the OC to the OL. If such risk shifting is considerable, the government will

³⁶This is due to its two-sidedness. Concentrating capital abroad leads to a reduction in domestic returns and an increase in foreign returns. The direct effect on the OC income from less capital being available is one-sided from the perspective of the local government - although on a global level it is not.

6 Discussion

Recent contributions have focused on the consequences of economic integration, measured by an increased mobility of factors of production, for the ability to finance welfare state policies and the efficiency of such policies. The conclusions seem to be that economic integration makes financing the welfare state increasingly difficult, and furthermore questions the efficiency of such policies - all together gloomy predictions for the welfare state. These contributions accordingly implicitly point to the necessity of major reform within government activities. Adding uncertainty to a two country model with redistribution (social insurance), the present paper points to some mechanisms, that may to some extent rescue the welfare state. While economic integration will presumably affect the functioning of the welfare state, it need not lead to the "death" of the welfare state. Economic integration may be consistent with a positive tax on mobile factors of production, such as capital. Risk diversification, risk shifting and elastic returns to capital may imply that efficient taxation on capital increases in an ever more integrated world. Apart from rescuing the welfare state, the result may furthermore be of interest in the context of traditional optimal tax results. Optimal taxes should be levied on the tax base that is the least elastic in supply. The present results point to caution in applying such results in an international tax setup. Factors that are at a first glance in elastic supply, may not react strongly to taxation due to the above mentioned indirect effects.

It is obviously difficult to present exact empirical evidence on the importance of the effects covered in the present paper. Still, the European experience indicates that these effects are of importance. The initiatives initiated during the process of European integration has resulted in an marked increase in the share of investments activities, that are "internal" to Europe. This may be taken as indicating increasing difficulties of financing the welfare state. Yet, the correlation of the business cycle component of GDP amongst European countries point to mechanisms that must be considered together with the simple tax arbitrage incentives. As such, the analysis in this paper to some extent counteracts the concerns on the financing of the welfare state. This furthermore finds support in the fact, that although the welfare state has been reformed in some European countries, it in general continues to be a sizeable factor within government activities and thereby the economy. Although the political aspects of the welfare state must not be forgotten - see the arguments in e.g. Rodrik (1997) - it still leads to the conclusion that the welfare state seems far from dead.

The present work was set in a context that interpreted direct investments, i.e. physical capital, as the footloose tax base, that was to be taxed to finance

the welfare state. There are obviously other factors of production, that may be crucial tax bases in connection to the financing of the welfare state. Labor is probably the factor, that contributes the most to this financing. European deregulations have also added extensively to the potential mobility of labor. A central question is accordingly, if the mechanisms of the present paper apply to labor. This essentially depends on the divisibility of labor. If the work effort of labor can be divided between spatially distinct areas, within the period described by the model, the mechanisms of the model would equally apply to labor. Here, it will be argued that such divisibility to some extent apply to labor. Although the model is static, labor will be spatially divisible within the period described by the model. For Danish craftsmen, it is common to be temporarily employed in Germany. In this way, they take advantage of business opportunities in spatially separated areas. Another example would be the possibility of working at home, facilitated by the strong development in IT. A problem in these examples is, that for the mechanisms of the paper to work, the allocation decision by workers will have to be taken ex ante to shocks. Extensive contracting on such jobs would though imply, that these contracts have to be signed initially, such that the allocation decision occurred ex ante. Yet, there has been very few signs of the extensive use amongst workers of these opportunities. European integration has not lead to massive cross-border employments. Two aspects may help to explain this. Such arrangements imply considerable costs for the workers in sense of leaving families behind (social cost) or of moving families frequently (economic cost), making such activities less attractive. Next, there may be information problems. Workers may not have information on job opportunities and contractual conditions for employment abroad. Although deregulation has formally removed obstacles, the lack of coordination and exchange of information on institutional aspects may effectively limit the real mobility of labor. Such institutional obstacles may be less of a problem for companies in their choice of allocation of investments, as they would typically have specialized advisers dealing with the acquisition of such information.

To complete the list, there still remains the question of portfolio investments, i.e. debt and equity. The mechanisms included in the modelling of the present paper are highly relevant for these types of tax bases, as several of the incentives behind the mechanisms of the paper basically originate from the literature on optimal portfolio choice.

Although the contributions until now have included some crucial aspects of economic integration, there are still a number of aspects, that needs to receive attention in future research. One is the analysis of tax systems in a world that becomes increasingly integrated. Especially the interaction between taxation on the goods market and taxation on returns of factors of

production should be of interest, considering the recent anxiety in the public debate on the problems of collecting tax revenue from VAT. The present paper has the obvious problem of abstracting from the potential effects on the goods market. Yet, it falls outside the scope of the present work to do such an analysis, as it would take a different setup to analyze these questions.

Another aspect that may be of interest concerns the possible effects of extending the set of countries beyond two. The base line mechanisms presented above will still be present, but these may increase in complexity. An example lies in the possible interaction between economic integration and the degree of correlation between local shocks. It is possible, that economic integration does not only increase the mobility of factors of production in-between countries, but furthermore adds to the channels through which local shocks spillover onto other countries. Potential candidates to such mechanisms may be geography proximity or transmission of shocks on the demand side of the economy through international trade in goods and services. If such mechanisms are important, extending the analysis beyond the two country model may add important issues. The present paper has focused on the two country case to make the analysis tractable.

Are the mechanisms stressed in the present paper, the only ones to save the welfare state, or are there other effects that adds to the survival of the welfare state? Luckily for the strong believers of the welfare state, other aspects of international factor allocation point to the continued presence of extensive tax bases in local economies. In Tesar and Werner (1995), it is found that equity investments have a strong home bias. Such a home bias implies a home bias of the tax base, and therefore limits tax competition and the financing problems associated with the welfare state. Later contributions have elaborated on this home bias, and a possible explanation lies in the information problem of cross border factor allocations. There may be significant asymmetries in the information of local factor owners and foreign factor owners, see e.g. Assaf Razin and Yuen (1999).

References

- Assaf Razin, E. S., and C.-W. Yuen (1999): Implications of the Home Bias: A Pecking Order of Capital Inflows and Corrective Taxation chap. 4, pp. 85–122. Cambridge University Press.
- Boadway, R., and F. Flatters (1982): "Efficiency and equalization payments in a federal system of government: a synthesis and extension of recent results," *Canadian Journal of Economics*, vol. 15, pp. 613–633.

- Boadway, R., and M. Keen (1996): "Efficiency and the Optimal Direction of Federal-State Transfers," *International Tax and Public Finance*, vol. 3, pp. 137–155.
- Grossman, G. M., and E. Helpman (1994): "Protection for Sale," *The American Economic Review*, vol. 84, no. 4, pp. 833–850.
- Lejour, A. M., and H. A. A. Verbon (1996): "Capital Mobility, Wage Bargaining, and Social Insurance Policies in an Economic Union," *International Tax and Public Finance*, vol. 3, pp. 495–514.
- Oates, W. (1972): *Fiscal Federalism*. Harcourt, Brace, Jovanovich, New York.
- OECD (1997): "International Direct Investment Statistics Yearbook," .
- Østrup, F. (1992): *The Development of the European Monetary System*. DJØF Publishing, Copenhagen, Denmark.
- Razin, A., and E. Sadka (1989): "International Tax Competition and Gains from Tax Harmonization," NBER Working Paper No. 3152.
- Rodrik, D. (1997): "Trade, Social Insurance, and the Limits to Globalization," NBER, Working Paper no.5905.
- Sandmo, A. (1995): "The Welfare Economics of the Welfare State," *Scandinavian Journal of Economics*, 97(4), 469–476.
- Sinn, H.-W. (1990): "Expected Utility, Mu-Sigma Preferences, and Linear Distribution Classes: A Further Result," *Journal of Risk and Uncertainty*, 3, 277–281.
- Tesar, L. L., and I. M. Werner (1995): "U.S. Equity Investment in Emerging Stock Markets," *World Bank Economic Review*, 9, 109–30.
- Wil dasin, D. E. (1995): "Factor Mobility, Risk and Redistribution in the Welfare State," *Scandinavian Journal of Economics* Vol. 97, No. 4, pp. 527–546.
- Zodrow, G. R., and P. Mieszkowski (1986): "Pigou, Tiebout, Property Taxation, and the Underprovision of Local Public Goods," *Journal of Urban Economics*, 19, 356–370.

Appendix 1

The OC's are assumed to exhibit Nash behavior in the game determining the equilibrium. To ensure stability of the process leading to an equilibrium, some restrictions must be imposed on the problem. Let the first order condition of the OC's, i.e. equation (9), implicitly define the following functions:

$$\begin{aligned} k_i &= \tilde{A}(k_j; \mu) \\ k_j &= \tilde{A}(k_i; \mu) \end{aligned} \quad (21)$$

where μ is a vector of the parameters of the model. Stability is ensured by the following two conditions:

$$\begin{aligned} \frac{dk_i}{dk_j} &= \frac{\partial \tilde{A}(k_j; \mu)}{\partial k_j} < 1 \\ \frac{dk_j}{dk_i} &= \frac{\partial \tilde{A}(k_i; \mu)}{\partial k_i} < 1 \end{aligned} \quad (22)$$

Due to the symmetry of the problem faced by the OC in country i and j , the following analysis will focus on the stability of the problem of the OC in country i . To determine the slope of reaction function implicitly defined by equation (9), use implicit differentiation to arrive at an expression for $\frac{dk_i}{dk_j}$. Using the notation already introduced in section 4, the slope is given by:

$$\frac{dk_i}{dk_j} = -i \frac{b_i}{a_i} \quad (23)$$

As we are concerned with the stability of the symmetric equilibrium, the stability condition is evaluated at the symmetric equilibrium:

$$\frac{dk_i^e}{dk_j^e} = -i \frac{b_i^e}{a_i^e} \quad (24)$$

Using this expression for the slope of the reaction function of the OC in country i , the stability condition can be written as:

$$-i \frac{b_i^e}{a_i^e} < 1 \quad (25)$$

Substituting for the expressions of a_i^e and b_i^e , the stability condition can be expressed as:

$$-i \frac{2^{2(\theta_i - 1)} \bar{K}^{\theta_i - 2} + 4^{-\theta_i} \bar{K}^{2(\theta_i - 1)} \frac{1}{4} 2^{(\theta_i - 1/2)(\theta_i - 1/2)}}{2^{2(\theta_i - 1)} \bar{K}^{\theta_i - 2} - 2^{-\theta_i} \bar{K}^{2(\theta_i - 1)} \frac{1}{4} 2^{(\theta_i - 1)}} < 1 \quad (26)$$

To analyze the stability of the process, it will be necessary to check the parameter restrictions, that ensure the fulfillment of this inequality. In the following, this is pursued, and possible restrictions ensuring stability will be compared. To analyze the condition in equation (26), it will be necessary to distinguish between the case of a positive and a negative value of the expression of which the absolute value is taken. The two cases will be analyzed separately below:

$$2 \leq \frac{b_i}{a_i} > 0$$

In this case taking the absolute value can be ignored. Two sub cases must be checked, if this inequality is fulfilled:

– Case 1: $a_i < 0$ and $b_i > 0$. The stability condition is fulfilled if:

$$1 - \frac{1}{2}(\alpha_i; \alpha_j) > 0 \quad (27)$$

This will always be fulfilled, unless $\frac{1}{2}(\alpha_i; \alpha_j) = 1$. It will though be necessary to check, that this condition does not collide with the conditions on a_i and b_i , and that these conditions on a_i and b_i do themselves not collide. The condition $a_i < 0$ implies that:

$$1 > 2^{-\alpha_i}(\alpha_i - 1)^{i-1} \overline{K}^{\alpha_i} \frac{3}{4}^2 (\alpha_i - \frac{1}{2}(\alpha_i; \alpha_j)) \quad (28)$$

while the condition $b_i > 0$ implies that:

$$\frac{3}{4}^2 < 1(2^{-\alpha_i} \overline{K})^{i-1} \quad (29)$$

It is seen that condition (27) is not inconsistent with the implications of condition (28) and 29), why it remains to check, that the two last are neither. Condition (29) will be fulfilled, if $\frac{3}{4}^2$ is assigned the following value:

$$\frac{3}{4}^2 = \frac{1 - \alpha_i x}{2^{-\alpha_i} \overline{K}^{\alpha_i}} \quad ; \quad x > 0 \quad (30)$$

Substituting for $\frac{3}{4}^2$ in condition (28) results in the following inequality:

$$(1 - \frac{1}{2}(\alpha_i; \alpha_j))^{i-1} < (\alpha_i - \frac{1}{2}(\alpha_i; \alpha_j))x \quad (31)$$

Although possible, the parameter restrictions needed to ensure the fulfillment of condition (31) are rather restrictive. Especially, the condition will never be fulfilled given $\alpha_i < \frac{1}{2}(\alpha_i; \alpha_j)$.

- Case 2: $a_i > 0$ and $b_i < 0$. Stability implies that:

$$1 - \frac{1}{2}(\alpha_i; \alpha_j) < 0 \quad (32)$$

As this will never be fulfilled, this case can be ignored all together.

$$2 - \frac{b_i}{a_i} < 0$$

In this case taking the absolute value matters, and we will have to reverse the sign of the expression of which the absolute value is taken. Two sub-cases must be checked, if this inequality is to be fulfilled:

- Case 3: $a_i > 0$ and $b_i > 0$. The stability condition now implies:

$$-\frac{1}{2}K^{\alpha} \frac{1}{4}^2(\alpha_i - 1)^{i-1}(2^{\alpha_i - 1} - \frac{1}{2}(\alpha_i; \alpha_j)) > 1 \quad (33)$$

Assuming that $1 > 0$, this will only be fulfilled if $\alpha < \frac{1}{2}(1 + \frac{1}{2}(\alpha_i; \alpha_j))$ and $\frac{1}{4}^2$ is large relative to 1 . It will furthermore have to be checked, that this inequality and the conditions $a_i > 0$ and $b_i > 0$ do not collide. The condition $a_i > 0$ implies that:

$$1 < 2^{-\alpha}(\alpha_i - 1)^{i-1}K^{\alpha} \frac{1}{4}^2(\alpha_i - \frac{1}{2}(\alpha_i; \alpha_j)) \quad (34)$$

Both condition (33) and (34) impose restriction on the magnitude of 1 , but the most restrictive is condition (34). For condition (34) to be fulfilled it must furthermore be the case that $\alpha < \frac{1}{2}(\alpha_i; \alpha_j)$, which also ensures that $\alpha < \frac{1}{2}(1 + \frac{1}{2}(\alpha_i; \alpha_j))$. Condition $b_i > 0$ implies that:

$$\frac{1}{4}^2 < 1(2^{-\alpha}K^{\alpha})^{i-1} \quad (35)$$

Once again setting $\frac{1}{4}^2 = \frac{1-x}{2^{-\alpha}K^{\alpha}}$, $x > 0$, condition (34) implies that:

$$(1 - \frac{1}{2}(\alpha_i; \alpha_j))^{i-1} < (\alpha_i - \frac{1}{2}(\alpha_i; \alpha_j))x \quad (36)$$

This cannot be fulfilled, as it must be the case that $\alpha < \frac{1}{2}(\alpha_i; \alpha_j)$. This possibility must accordingly be disregarded.

- Case 4: $a_i < 0$ and $b_i < 0$. Stability implies that:

$$-\frac{1}{2}K^{\alpha} \frac{1}{4}^2(\alpha_i - 1)^{i-1}(2^{\alpha_i - 1} - \frac{1}{2}(\alpha_i; \alpha_j)) < 1 \quad (37)$$

This may very well be satisfied. Yet, it will have to be checked that there are no internal inconsistency between this condition

and the condition that $a_i < 0$ and $b_i < 0$. The condition $a_i < 0$ implies that:

$$\gamma^1 > 2^{-(\theta_i - 1)} \gamma^2 (1 - \frac{1}{2}(\gamma_i; \gamma_j)) \quad (38)$$

Both condition (37) and (38) impose restrictions on γ^1 , but the most restrictive is condition (37). Condition $b_i < 0$ implies that:

$$\gamma^2 > \gamma^1 (2^{-(\theta_i - 1)} \gamma^2)^{\frac{1}{\theta_i - 1}} \quad (39)$$

Condition (39) is satisfied, if γ^2 is assigned the following value:

$$\gamma^2 = \frac{\gamma^1 + x}{2^{-(\theta_i - 1)} \gamma^2}, \quad x > 0 \quad (40)$$

Substituting for γ^2 in condition (38), the following condition results:

$$\gamma_i (1 - \frac{1}{2}(\gamma_i; \gamma_j))^{\frac{1}{\theta_i - 1}} < (2^{-(\theta_i - 1)} \gamma_i (1 - \frac{1}{2}(\gamma_i; \gamma_j)))^x \quad (41)$$

which always holds if $\theta_i > \frac{1}{2}(1 - \frac{1}{2}(\gamma_i; \gamma_j))$. This condition also ensures that condition (37) is fulfilled, and thereby all the restriction to be imposed in this case.

In total, two cases are of relevance - case 1 and 4. It is especially case 4, that is helpful in signing the derivative (15), as condition (38) ensures that this derivative is negative. In case 1, the conditions leave the derivative ambiguous. The paper accordingly focuses on the parameter restrictions of case 4.

Appendix 2

To indicate the importance of risk diversification incentives of factor owners, it may be of interest to check the extent to which the business cycles are positively or negatively correlated. The present analysis has focused extensively on the consequences of European integration. Table A.1.1 presents a set of correlations for the business cycle component of real GDP per capita within the group of pseudo-EU countries. The raw data are obtained from the Penn World Tables 5.6, and the chosen variable is real GDP per capita (current international prices) with the code cgdp. The business cycle component is obtained from filtering, using the Hodrick-Prescott filter. The group of pseudo-EU countries covers Belgium, Luxembourg, Denmark, France, Germany (west), Italy, Netherlands, Spain and UK.

Table A.1.1: Correlation of cyclical real GDP per capita - 1960-1992

	Bel	Lux	Dnk	Fra	Deu	Ita	Nld	Esp	Gbr
Bel	1	0.69	-0.05	0.88	0.64	0.85	0.77	0.86	0.68
Lux	0.69	1	-0.03	0.62	0.35	0.54	0.57	0.53	0.45
Dnk	-0.05	-0.03	1	0.01	0.42	0.06	0.32	-0.14	-0.30
Fra	0.88	0.62	0.01	1	0.66	0.83	0.74	0.84	0.73
Deu	0.64	0.35	0.42	0.68	1	0.78	0.75	0.60	0.33
Ita	0.85	0.54	0.06	0.83	0.78	1	0.76	0.76	0.52
Nld	0.77	0.57	0.32	0.74	0.75	0.76	1	0.67	0.33
Esp	0.86	0.53	-0.14	0.84	0.60	0.76	0.67	1	0.70
Gbr	0.68	0.45	-0.30	0.73	0.33	0.52	0.33	0.70	1

Source: Penn World Tables and own calculations