Center for Economic Studies, University of Munich, 80539 Munich, Germany

CENTER FOR ECONOMIC STUDIES

INTERNATIONALLY MOBILE FIRMS AND TAX POLICY

Guttorm Schjelderup
Kåre P. Hagen
Petter Osmundsen

Working Paper No. 96

UNIVERSITY OF MUNICH

CES

Working Paper Series

CES Working Paper Series

INTERNATIONALLY MOBILE
FIRMS AND TAX POLICY

Guttorm Schjelderup
Kåre P. Hagen
Petter Osmundsen

Working Paper No. 96

1995

Center for Economic Studies
University of Munich
Schackstr. 4
80539 Munich
Germany
Telephone & Telefax:
++49-89-2180-3112

We thank Ulf Pedersen and Alfons J. Weichenrieder for helpful comments. We are grateful to Lars Håkonsen for assistance with diagram design.

CES Working Paper No. 96
November 1995

INTERNATIONALLY MOBILE FIRMS AND TAX POLICY

Abstract

This paper attempts to analyse how the government from a social point of view should handle firms that demand preferential tax treatment on grounds of being internationally mobile. A revelation mechanism is constructed taking into account that migration decisions by firms have negative fiscal effects and also affect national industrial clusters. Some important and seemingly counter intuitive results are: (1) Information rent is acquired by immobile (inefficient) firms, (2) The optimal allocation is implementable within the framework of a corporate income tax system, where mobile firms will selfselect more unfavourable depreciation allowances as compared to immobile firms, and (3) In relative terms, the immobile sector will expand at the expense of the mobile sector.

Guttorm Schjelderup
Kåre P. Hagen
Petter Osmundsen
Norwegian School of Economics
and Business Administration
Helleveien 30
5035 Bergen-Sandviken
Norway

1. Introduction

Long term effects of the new GATT-treaty and the accelerated European integration are removal of world trade barriers and increased mobility of factors internationally. The new era of international integration will render national fiscal systems more exposed to tax induced market reactions, including commodity trade, capital movements, labour migration, and the location decisions of the firms. This paper focuses mostly on the latter. Differences in national fiscal systems may instigate firms to direct their investments to low tax countries. Such behaviour creates problems for national governments as well as for the global economy because scarce resources should be allocated according to the principle of comparative economic advantage rather than the principle of tax minimisation. Also worrisome is the fact that national tax bases become internationally mobile. If governments want to sustain the level of public expenditure, they must raise taxes on more immobile bases.

There are several options open to a government that wants to counter the negative effects of tax base flight. One is to engage in tax competition. Another is to partly prohibit capital exports by imposing quantitative restrictions (Bjerksund and Schjelderup (1994)). The first option is not very appealing because it may restrict national autonomy in fiscal matters. The latter approach may not be feasible. To see this, consider how capital controls actually work. A government agency must screen applicants. If agents are suspected to locate abroad for pure tax reasons, they are likely to have their export licences rejected. The long-term effects of such a policy, however, is to make a country less attractive as an alternative for location. The idea is that the government - when evaluating applicants for exports licences - may err. Firms whose decisions to locate abroad are driven by differences in national productivity

will, therefore, run the risk of being locked in and thus become less competitive. To counter these problems there is a need to develop a more sophisticated approach to deal with tax base mobility.

In this paper we attempt to analyse how the government from a social point of view should handle firms that demand preferential tax treatment on grounds of being internationally mobile. It is commonly assumed that mobility of tax bases calls for taxing mobile activities at lower effective tax rates in order to keep them in the country. The problem facing the government, however, is that the companies are likely to have private information about their true mobility. In this case immobile companies have an incentive to imitate mobile companies to obtain favourable tax treatment.

The solution to the problem of tax induced migration is to find a tax incentive mechanism that takes into account the difference in mobility among firms. In designing the optimal tax policy a government must bear in mind that decisions to exit from a country do not depend on tax rates alone. Conditions such as infrastructure, industrial cluster[1], proximity and access to markets, as well as the provision of public services are important factors underlying migration decisions. In its welfare considerations, the government must take into account (when choosing its policy parameters) that migration decisions by firms have negative fiscal effects and also affect national industrial clusters.

The perspective of this paper is to incorporate such factors into the analysis by designing a revelation mechanism that accounts for the welfare effects and the various parameters affecting migration decisions. The discussion is partial in the sense that it does not consider possible reactions in the tax policies of other countries, neither does it consider the effects that changes in the national tax policy have on the migration decisions of firms in other countries.

[1] For a definition and elaboration on the cluster concept, see Porter (1990). For a study on the importance of clusters see Caballero and Lyons (1990).

Since the government is unable to observe the mobility of companies, companies have private information about the opportunity cost of locating in the home country. We find that the information rent accrues to immobile companies. To enhance rent exctraction it is optimal for the government to reduce investments (i.e., to induce capital flight) for all types but the least mobile.[2]

In section 2 we build a model where we show how the government should treat firms that are internationally mobile. The aim of the government in this section is to find a revelation mechanism that maximises social welfare. Section 3 examines alternative implementation mechanisms with respect to taxes, and section 4 provides a numerical example. Section 5 provides some extensions to the model, and section 6 concludes the paper.

2. The Model

The economy that we envisage is one where there are three categories of firms: highly internationally mobile, partly mobile, and immobile firms. The government can separate the highly internationally mobile and the immobile group, but does not know the exact mobility of companies in the partly mobile group. Internationally mobile firms can be found in many industries. We will use the shipping industry to illustrate the problem. A ship is in itself an internationally mobile capital investment as its operation is to a limited extent dependent on national resources. Various segments of the shipping industry, however, have quite different degrees of mobility. These can be broken down into three categories: (*i*) large bulk carriers and tankers at the high mobility end, (*ii*) domestic freight at the low mobility end, and (*iii*) industrial shipping

[2] In Lewis and Sappington (1989) there is pivate information about marginal costs and fixed costs, and the latter is assumed to be a decreasing function of the former. The fixed cost component may be interpreted as an opportunity cost of operating in the regulated sector. When the company's incentive for overstating the fixed cost dominates the incentive to understate marginal costs, information rents accrue to inefficient companies. Optimal regulatory response, however, differs from our model: it is optimal to expand output.

in between. Bulk and tank freight make use of standard technology and are not dependent on technological environment and competence in any particular country. Consequently, they are highly mobile. Domestic freight on the other hand, is often immobile due to national regulations, vessel type and carbotage, while industrial shipping is less mobile since it relies on a high-tech environment and proximity to customers.

The industrial shipping fleet depends to some extent on national clusters and infrastructure, and a variable part of investments are tied up in less mobile human capital.[3] The authorities face the problem that within the group of industrial shipping they are not able to distinguish mobile from less mobile activities. The analysis will focus on this segment with asymmetric information about mobility and migration costs. The analysis, however, is general in the sense that it applies to all problems of this kind.

Let θ be a continuous parameter that belongs to the interval $\theta \varepsilon \left[\underline{\theta}, \bar{\theta}\right]$. We denote $\underline{\theta}$ as the mobile and $\bar{\theta}$ as the immobile company type. There is a continuum of companies independently drawn from the same distribution $F(\theta)$. The exact mobility is known to the company, whereas the government only knows the support and the distribution. Define a firm's private type-dependent opportunity cost for locating in a given country as

$$(1) \qquad C(\theta, K(\theta)) \equiv I(K(\theta)) - M(\theta, K(\theta)),$$

where K is capital invested by the firm, I is the alternative revenue from investing abroad, and M is type-dependent migration costs. A company may invest in the home country and abroad, and at the optimal allocation of capital it is indifferent between the two sectors at the margin. Hence, in optimum there is a wedge between the marginal rate of return at home and abroad, equal

[3] Industrial shipping has been pointed out as one of the most likely examples of the cluster concept.

to the marginal migration cost. We assume that the type-dependent opportunity cost for location in the home country has the properties

$$(A1) \qquad \frac{\partial C(\theta, K)}{\partial \theta} < 0.$$

$$(A2) \qquad \frac{\partial^2 C(\theta, K)}{\partial \theta \partial K} < 0.$$

The assumptions state that the low-mobility type firm - having fewer investment options - has a lower opportunity cost of location on average, (A1), and at the margin, (A2). Put differently, companies with low mobility have by definition higher migration costs both on average and at the margin.[4]

Let $\{R(\theta), K(\theta)\}$ be a direct revelation mechanism that induces truthful revelation of the firm's mobility parameter, where $R(\theta)$ is the tax scheme. It is assumed that the investment level, K, can be observed by the government. Hence, if the firm announces a mobility parameter $\hat{\theta}$, it will be instructed to invest $K(\hat{\theta})$ and pay net taxes equal to $R(\hat{\theta})$, thus realising a private locating cost of $C\left(\theta, K(\hat{\theta})\right)$.

Denote $N(K, P)$ as the company's net domestic revenue, where P is a measure of national industrial cluster, defined by aggregate domestic investment in the industry, $P \equiv \int_{\underline{\theta}}^{\bar{\theta}} K(\theta) dF(\theta)$. The inclusion of P reflects that firms benefit from the existence of national clusters of technology. We assume that N is increasing in both its arguments. For a company of type θ announcing $\hat{\theta}$, we may now define net country specific profits as:

$$(2) \qquad \pi(\hat{\theta}, \theta) = N(K(\hat{\theta}), P) - C(\theta, K(\hat{\theta})) - R(\hat{\theta}),$$

[4] That is, $\partial M / \partial \theta > 0$ and $\partial^2 M / \partial \theta \partial K > 0$.

that is, the excess profit the firm of type θ obtains by locating in the home country rather than abroad.

We focus on a domestic industry that is price taker in the global market, so that there will be no effects on consumer surplus generated from changes in domestic production. The net welfare effect from a company moving its operations abroad, therefore, is the value of the loss in tax revenue (fiscal externality) and loss of producer surplus, corrected for net real externalities. Obviously, the assumption that the producer surplus is lost when the firm migrates has strong implications. Albeit the firm is taxed according to the source principle (which is the convention if the firm is a separate and independent entity), the assumption implies that the owners of the firm also migrate. One can perceive of this as dividends not being repatriated, or as if the firm is owned by a single individual who migrates together with the firm. In the case of the firm being a shareholding company with many shareholders, the assumption of a loss of producer surplus may seem too strong. It implies that the government (from a social standpoint) does not value foreign-source income. For our purpose this worst case assumption may serve as a benchmark, and a relaxing of it will modify the results but not change them in a qualitatively significant way.

The object function of the utilitarian government is assumed to be a weighted sum of tax revenue R and the company rent accruing to domestic owners (social rent) Π, corrected for a net externality L:

$$(3) \qquad W = (1+\lambda)R + (1-\mu)\Pi - L,$$

where μ is the foreign ownership share in the domestic firm, $(1+\lambda)$ is the general equilibrium shadow cost of public funds [5], and L is a country specific

[5] To finance public expenditure the government must resort to distortive taxes, yielding $\lambda > 0$. The cost of public funds will be taken as exogenously given in this partial model.

net external cost caused by the firm. We have $\Pi \equiv \pi + C$, since the domestically earned profit is equal to the excess profit π plus the net profit that could be obtained by moving abroad C (that is, the company's locating cost does not, directly, represent a domestic social cost). The net external cost $L(\theta, K)$ can be interpreted as a consolidated cost element comprised of the cost to society of mobility type θ's use of the national infrastructure, correcting for the social value of a firm's net contribution to a national industrial cluster.[6] Using shipping as an example, $L(\theta, K)$ may be perceived of in the following way. The cost to society from domestic shipping activities may be that they cause strain on national public services and infrastructure. For example, the international orientation of shipping companies makes them more difficult to monitor and control. Hence the tax authorities must devote more resources to check their income statements. On the benefit side are the positive spillover effects to related industries such as shipping equipment, brokers, and shipbuilders, captured by the cluster effect P.

By using equation (2), the social welfare function can now be restated as

$$(4) \qquad W = (1+\lambda)N - (\lambda+\mu)\Pi - L$$

The second term in (4) clarifies the government's object of rent extraction; capturing an extra unit of rent increases welfare by $(\lambda+\mu)$.[7]

The regulatory problem is to maximise expected welfare

$$(5) \qquad \underset{K(\theta),R(\theta)}{Max} \int_{\underline{\theta}}^{\bar{\theta}} \{(1+\lambda)N(K(\theta),P) - (\lambda+\mu)\Pi(\theta) - L(\theta,K)\} dF(\theta)$$

[6] The contribution to a national industrial cluster is considered an external effect since all companies benefit from the cluster. The individual company only takes into account the effect that increased cluster has on its own net revenue.

[7] The marginal welfare gain is equal to the difference between the welfare weights for income accruing to the government and the companies: $(1+\lambda) - (1-\mu) = (\lambda+\mu)$.

subject to a set of participation and incentive constraints

$$(6) \qquad \pi(\theta,\theta) = N(K(\theta),P) - C(\theta,K(\theta)) - R(\theta) \geq 0, \ \forall\theta,$$

$$(7) \qquad \pi(\theta,\theta) \geq \pi(\hat{\theta},\theta), \quad \forall\hat{\theta},\theta,$$

where $\pi(\hat{\theta},\theta)$ is defined as the rent for type θ when he reports type $\hat{\theta}$. Restriction (6) - the participation constraints - makes sure that all types want to locate in the home country. Restriction (7) - the incentive compatibility condition - makes it a dominant strategy for the firms to reveal their true type.[8]

Following conventional procedure[9], the first order condition for incentive compatibility and the participation constraints generate the information rent

$$(8) \qquad \pi = \int_{\underline{\theta}}^{\theta} \left\{ -\frac{\partial C(\theta,K(\theta))}{\partial\theta} \right\} d\theta.$$

From (8), then:

PROPOSITION 1: *Information rent is acquired by firms that are immobile.*

Another interpretation of proposition 1 is that information rent is acquired by inefficient firms. The marginal opportunity costs of location are lower for immobile firms since their options are restricted to domestic investments. Put differently, activities that are country specific are inefficient in a global sense. In the model this is captured by the marginal migration costs that create a wedge between the rate of return on investments at home and abroad. By

[8] The revelation principle states that the principal - without loss of generality - can restrict his attention to the class of mechanisms in response to which the firms report their types truthfully. For a more precise definition, see Dasgupta et al. [1979].

[9] For a technical survey of principal-agent theory, see Guesnerie and Laffont (1984).

assumption, this wedge is higher for immobile than for mobile firms. The optimal allocation of capital between investments at home and abroad, therefore, implies lower rates of return for immobile companies.

Note how proposition 1 compares to the traditional literature where the focal point so far has been on private information about operating costs. In this literature information rent is derived from a potential strategy of mimicking producer-types with higher costs. In the present model, reporting a high migration cost will reveal the firm as a dependable tax base since capital is country specific (locked-in). To obtain an information rent, therefore, the firm must follow the opposite strategy: it imitates companies with low migration costs, i.e., companies with higher alternative returns abroad, thereby signalling a higher tax elasticity (propensity to migrate) in order to obtain favourable tax treatment.[10] Instead of revealing its true mobility θ and invest accordingly, the firm may choose to camouflage as a type with a marginally higher mobility $\theta - d\theta$. The mimicking is done by selecting the combination of investment level and net taxes intended for this type; $[K(\theta - d\theta), R(\theta - d\theta)]$. By inserting into the profit function (2), we see that *relative* to type $\theta - d\theta$, this strategy yields an information rent equal to the difference in the private locating cost:

$$(9) \qquad \pi(\theta - d\theta,\theta) - \pi(\theta - d\theta) = C(\theta - d\theta, K(\theta - d\theta)) - C(\theta, K(\theta - d\theta)).$$

From this it follows that the *total* rent of a producer of type θ must be given by a cumulation of cost differences, as in (8).[11] An interpretation of this seemingly counter intuitive information rent, therefore, is that to get incentive compatibility, the firm - when revealing its true type - is rewarded with the net

[10] Technically, the information rent is reversed since the participation constraint binds in the opposite direction.

[11] Technically, the information rent is found by using conventional procedure: taking the limit of (9), letting $d\theta$ approach zero, we get the incentive constraint. Integrating this constraint and applying the participation constraint, give us the information rent.

tax relief it would get if it instead were to mimic a marginally more mobile type.

Inserting for the rent expression (8) in the object function (5) and integrating by parts, yield the expected welfare

$$(10)\quad EW=\int_{\underline{\theta}}^{\bar{\theta}}\left\{(1+\lambda)N(K(\theta),P)+(\lambda+\mu)\left[\frac{\partial C(\theta,K(\theta))}{\partial\theta}\right]\frac{(1-F(\theta))}{f(\theta)}\right.$$
$$\left.-(\lambda+\mu)C(\theta,K(\theta))-L(\theta,K)\right\}dF(\theta).$$

An implicit expression for the optimal investment level is obtained by pointwise differentiation of (10) over $[\underline{\theta},\bar{\theta}]$ with respect to $K(\theta)$ and equating to zero:

$$(11)\quad \left[\frac{\partial N(K(\theta),P)}{\partial K}+\frac{\partial N(K(\theta),P)}{\partial P}\right]-\frac{\partial L(\theta,K)}{\partial K}/(1+\lambda)-\left(\frac{\lambda+\mu}{1+\lambda}\right)\frac{\partial C(\theta,K(\theta))}{\partial K}$$
$$=\left(\frac{\lambda+\mu}{1+\lambda}\right)\left[-\frac{\partial^2 C(\theta,K(\theta))}{\partial\theta\partial K}\right]\left(\frac{1-F(\theta)}{f(\theta)}\right).$$

To interpret the first order condition (11), it is useful to think of optimal corporate taxation in three different situations: 1) A closed economy, 2) An open economy with symmetric information about mobility, and 3) An open economy with private information about mobility. Moving from 1) to 3) gradually reduces the potential for taxation and makes it optimal to design increasingly more distortive taxes.

In a closed economy neutral corporate taxation will be optimal in the absence of externalities. Facing neutral taxes, companies maximise net domestic revenue, i.e., they invest until $[\partial N(K(\theta),P)/\partial K+\partial N(K(\theta),P)/\partial P]=0$. It is in the interest of the government that net domestic revenue is maximised, since under symmetric information the government is able to capture all rents by lump sum taxes.

In an open economy with symmetric information with respect to θ, the solution is given by setting the left hand side of (11) to zero. This means that it will be optimal to invest until the marginal benefit, corrected for net externalities and the difference between private and social location costs, is equal to zero. One may note that the optimal solution entails a distortionary profit tax even in the absence of externalities. This is due to the following facts: 1) The firm maximises its country specific excess profit, whereas the net location costs are included in the national profits (i.e., the difference between marginal social profit and marginal private profits is equal to $\partial C(\theta,K(\theta))/\partial K$), and 2) There is a premium on public tax income as compared to private profit (i.e., $(\lambda+\mu)>0$).

Adding asymmetric information to the open economy framework generates the additional term on the right hand side, which is a marginal information cost. The presence of private information about mobility, therefore, calls for even larger tax distortions, thus driving some capital abroad. We may now state:

PROPOSITION 2: *Asymmetric information about mobility leads to lower investment levels for all types but the least mobile.*

Put differently, it is the investment decision of the *least* mobile firm that remains undistorted. The economic explanation for distortion (reduction) of the investments of the types $\theta<\bar{\theta}$, with larger distortions the more mobile is the company, is that rent extraction is enhanced since the incentive for mimicking is reduced. Immobile companies have an incentive to imitate mobile companies to obtain more favourable tax treatment. To imitate more mobile companies, however, they will have to reduce investments below their optimal level, making the imitating strategy less profitable. The distortion in investments is more costly for immobile companies as they have lower location

costs at the margin. Consequently, by distorting the investment decision, the incentive constraint is relaxed. To better grasp the idea, consider the rent expression:

$$(12) \qquad \frac{d\pi}{dK} = \int_{\underline{\theta}}^{\theta} \left\{ -\frac{\partial^2 C(\theta, K(\hat{\theta}))}{\partial\theta\partial K} \right\} d\theta > 0,$$

where the sign is determined by the single-crossing assumption (A2). As is clear from equation (9) the information rent is derived from the difference in location cost for different mobility types. From the single-crossing assumption (A2), it follows that the location cost difference is increasing in the investment level. By reducing K, therefore, the government is able to reduce the information rent. Choosing K lower than the first best level, however, implies suboptimal investments. The government, therefore, faces a trade-off between capturing the social information rent $\Pi(\theta)$ and maximising the total value of investments $\{(1+\lambda)N - L(\theta, K)\}$.[12] The optimal trade-off is to reduce investments to the point where the expected value-weighted marginal deadweight loss from these distortions, $(1+\lambda)f(\theta)\{\partial N / \partial K + \partial N / \partial P\} - f(\theta)\partial L / \partial K - (\lambda+\mu)f(\theta)\partial C / \partial K$, equals the expected marginal reduction in deadweight loss in the economy, $(\lambda+\mu)(1-F(\theta))\{-\partial^2 C / \partial\theta\partial K\}$.[13] Rearranging this equality, yields equation (11). The result is in line with the theory of second best taxation; when neutral taxes are not available, it is optimal to spread taxation over several sectors of the economy, to the point where the marginal deadweight losses are equalised across sectors. It should be clear from the above that due to asymmetric information, the government is not able to implement a neutral profits tax, and even if it could it would not be optimal

[12] See equation (4).

[13] The distortion of K reduces the rent of all types that are less mobile, having probability $(1 - F(\theta))$, and from equation (12) we have that the private value of the rent is reduced at the rate $(-\partial^2 C / \partial\theta\partial K)$. The value-weight for increased rent extraction is $(\lambda+\mu)$; the value of transferring one unit of income from the companies to the government. This is the marginal reduction in deadweight loss in other sectors of the economy, made possible by the increase in tax revenue from partly mobile companies.

in an open economy with a premium on public income. The reason is that firms can affect the tax base by migrating, thus creating a distortion. Hence:

COROLLARY: *In relative terms, the immobile sector will expand at the expense of the mobile sector as compared to the situation with symmetric information.*

The basic lesson from the corollary is quite powerful. Whenever asymmetric information about mobility is present, the government's effort in revealing true mobility and capturing rents creates a relative advantage for low mobility firms. As argued in section 1, low mobility firms are dependent on and contribute to industrial clusters. Thus optimal governmental response to private information about mobility will strengthen national industrial clusters through tax discrimination against investment in mobile activities.

The optimal regulatory outcome has a clear interpretation in terms of public economics. The problem facing the government is that those firms claiming to be internationally mobile - but in fact are not mobile - are those firms that can sustain the highest burden of taxation. Put differently, the government wants as many firms as possible to invest in immobile activities and then tax them at a higher rate. This is done by implementing an optimal regulatory solution that - at the margin - makes it unfavourable (by distorting investment incentives) to invest in mobile industries. By doing so the government will reduce the average mobility, thus, enhancing the tax potential of the corporate tax base. The change in industry structure enables the government to increase the average tax rate for all types but $\bar{\theta}$, at the cost of a reduction in the overall tax base due to suboptimal investments.

In the preceding analysis the participation constraints (6) have been formulated so that all companies stay in the country. Most likely, it will be optimal to let some of the most mobile firms migrate, since this reduces the problem of private information. An additional policy instrument is introduced:

a cutoff rate θ_c, where the most mobile companies ($\theta < \theta_c$) leave the country, and where the remaining companies are offered the incentive contracts developed above. Assuming an interior solution, the optimal cutoff rate is found by maximising (10) with respect to θ_c (i.e., with respect to the lower integral limit):

$$(13)\quad (1+\lambda)f(\theta_c)N(K(\theta_c),P) - f(\theta_c)L(\theta_c,K(\theta_c)) - (\lambda+\mu)C(\theta_c,K(\theta_c))f(\theta_c) = -(\lambda+\mu)\left[\frac{\partial C(\theta_c,K(\theta_c))}{\partial \theta_c}\right](1-F(\theta_c)).$$

Under symmetric information, the optimal cutoff rate is found by setting the left hand side of equation (13) equal to zero: we would like to keep the companies that generate a positive net social welfare. Asymmetric information imposes the additional term on the right hand side of (13), resulting in some types not investing in the home country even though these investments would give positive welfare ex post. The explanation is that by truncating the information support to $[\theta_c, \overline{\theta}]$, the problem of private information is reduced, yielding a reduction in expected information rent. Equation (13) states that the government when choosing the truncation point θ_c, equalises the net loss (at the margin) from mobile firms migrating, to the net gain from enhanced rent extraction from those staying put. The additional policy instrument of letting the most mobile companies leave the country, reinforces the result of relative expansion of the immobile sector at the expense of the mobile sector.

3. Implementation

Analogous to Laffont and Tirole (1986), the optimal allocation can be implemented by a menu of fixed payments and a proportional tax, i.e., a menu of lump sum taxes and investment fees. The most striking difference between

this scheme and commonly observed tax systems, is that the companies in the model are not offered a single contract, but a choice between a set of contracts.[14] The purpose is screening of the firms' mobility. The economic explanation of why this scheme induces truthful reports (selfselection) can, for example, be related to the shipping industry. Shipping companies are presented with a choice between different tax packages, either a low registration fee and high investment fees, or vice versa. A mobile type, earning none or low information rents, will choose the first alternative, since it is unable to pay a high front-end tax. An immobile type will be tempted by a low registration fee, but will realise that due to a relatively higher investment level the reduction in registration fee will be less important than low investment fees. Hence, it will choose the second alternative, that is, selfselection leads mobile firms to choose a higher effective marginal investment tax than immobile firms.

The optimal choice of investment fees is best explained by noting that the firm's first order condition without taxes is equal to

$$(14)\quad \frac{\partial N}{\partial K} + \frac{\partial N}{\partial P} - \frac{\partial C}{\partial K} = 0.$$

Compared to equation (11), we see that the second best optimum can be implemented by type-specific investment fees given by

$$(15)\quad \frac{\partial L(\theta,K)/\partial K}{(1+\lambda)} + \left(\frac{\mu-1}{1+\lambda}\right)\frac{\partial C(\theta,K(\theta))}{\partial K} + \left(\frac{\lambda+\mu}{1+\lambda}\right)\left[-\frac{\partial^2 C(\theta,K(\theta))}{\partial\theta\partial K}\right]\left(\frac{1-F(\theta)}{f(\theta)}\right).$$

The first and second term of equation (15) would be the optimal investment fee or subsidy under symmetric information. The first term is correcting for a net

[14] It has been argued that in practice we only observe the final contract, i.e., the linear contract selected by the company, whereas the *menu* of linear contracts offered is part of the bargaining process leading to the final contract.

externality, and the second term corrects for the difference between private and social location costs. The third term, the marginal information costs, adjusts for asymmetric information.[15] In a sense the investment fees are similar to Pigouvian taxes. As made clear in section 2, the optimal regulatory response to asymmetric information about mobility is to distort (reduce) the investment level for all types but the least mobile. This second best allocation is implemented by a type-dependent augmenting of the investment fees that apply under symmetric information. From expression (15) we see that the optimal information-induced distortion is higher when the benefit of capturing rent $(\lambda+\mu)$ is high, when the marginal locating cost is sensitive with respect to differences in mobility (making it a good screening instrument), and when the fraction of firms at the particular investment level is small (distortions are preferred at the parts of the distribution where the magnitudes of distortions are kept at a minimum).

Returning to our shipping example, our proposed selfselection mechanism (in registration fees and investment fees) calls for tax differentiation between companies with different degrees of mobility. Since shipping companies often operate vessels of different mobility types, it does not seem as if the regulatory optimum can be implemented within the framework of a corporate taxation system, such as a profits tax or a cash flow tax. Instead, we might need to have every vessel category as its own tax subject.[16] By developing an alternative implementation mechanism, however, we will show that optimal screening also can be implemented in a corporate income tax system. This is achieved by offering the group of mobile companies a corporate

[15] Note that $L(\theta,K)$ does not enter into the revelation mechanism and the marginal information costs, since it is external to the company.

[16] A system of tonnage specific taxation has been implemented in Greece. Equation (15) gives qualitative insights into how taxes may be differentiated across vessel categories, along the mobility dimension.

taxation system that contains a screening device in the form of a menu of depreciation allowances and negative tax exemptions.

PROPOSITION 3: *The optimal allocation is implementable within the framework of a corporate taxation system. Mobile firms will selfselect more unfavourable depreciation allowances as compared to immobile firms.*

Define net revenue as

$$(16)\quad N(K(\theta),P) \equiv F(K(\theta),P) - (1+r)K(\theta) + [1-\delta(\theta)]K(\theta),$$

where F is the production function, r is the financial cost of capital, and δ is the rate of economic depreciation.[17] This specific formulation presupposes that investments are financed by borrowing abroad so that net corporate profit and social profit coincide. Letting $a(\theta)$ be the tax deductible depreciation allowance, t the corporate tax rate, and $E(\theta)$ a type-dependent tax exemption, the company's after-tax profits are given by

$$(17)\quad F(K(\theta),P) - (1+r)K(\theta) + [1-\delta(\theta)]K(\theta) - C(\theta,K(\theta))$$
$$-t\left[F(K(\theta),P) - rK(\theta) - a(\theta)K(\theta) + E(\theta)\right],$$

and the first order condition for the investment decision is equal to

$$(18)\quad \frac{\partial F}{\partial K} + \frac{\partial F}{\partial P} - r - \delta(\theta) = \frac{t}{1-t}[\delta(\theta) - a(\theta)] + \frac{\partial C / \partial K}{(1-t)}.$$

Under asymmetric information about true mobility we have shown that the second best optimum implies distortion of the investment decision of mobile

[17] Depreciation schedules may seem artificial in a static model. Assuming the government is able to credibly commit to a taxation scheme for the entire horizon, however, the model can be generalised to two periods.

companies. In a corporate taxation setting the distortion is obtained by imperfect and type-dependent depreciation allowances, as a distortive profits tax essentially is a factor tax. Hence, as a means for distorting investments, investment fees and insufficient depreciations are equivalent. The optimal depreciation schedule is found by equating the right hand side of equation (18) with the sum of net externalities and marginal information costs. Solving for $a(\theta)$, we get

$$(19)\quad a(\theta)=\delta(\theta)-\frac{1-t}{t}\left[\frac{\partial L(\theta,K)/\partial K}{(1+\lambda)}+\left(\frac{\lambda+\mu}{1+\lambda}\right)\frac{\partial C(\theta,K(\theta))}{\partial K}\right.$$

$$\left.+\left(\frac{\lambda+\mu}{1+\lambda}\right)\left[-\frac{\partial^2 C(\theta,K(\theta))}{\partial\theta\partial K}\right]\left(\frac{1-F(\theta)}{f(\theta)}\right)\right]-\frac{\partial C(\theta,K(\theta))/\partial K}{t},$$

where the second and third term on the right hand side of (19) are the tax depreciation equivalent of the total distortion. To enhance rent extraction, the corporate income tax is designed so that mobile firms selfselect unfavourable depreciation allowances. This is quite contrary to common practice; internationally mobile companies are often offered generous depreciation schedules in order to make it attractive for them to remain in the country. The analysis has shown, however, that as a means of enhancing its bargaining position under asymmetric information about mobility, it will be optimal for the government to let part of the most mobile capital flee the country.

4. Numerical Example

To illustrate the consequences for tax policy of opening the economy in the presence of private information about mobility, we construct a simple numerical example. To simplify the example and to focus on asymmetric

information, we will abstract from externalities and cluster effects: $N(K(\theta),G,P)\equiv N(K(\theta))=100\ln K(\theta)-K(\theta)$. The mobility parameter θ is assumed to be uniformly distributed over the interval $\theta\in[0.2,2]$. Social cost of public funds, λ, is set to 0.5, and we assume a foreign corporate equity share, μ, equal to 0.4. By choosing an opportunity cost of location that is very sensitive to the mobility type, $C(\theta,K(\theta))=K(\theta)/\theta$, we obtain a clear illustration of the effects of private information. With the given support the most mobile firm has a net alternative rate of return abroad on its domestic investment that is ten times that of the least mobile firm.

Using specific functional forms, we are able to find an explicit solution for optimal investment level K as a function of the company's type θ. We also find expected tax payments and the expected level of net domestic revenue. The calculations are made for the three basic models: 1) A closed economy, 2) An open economy with symmetric information about mobility, and 3) An open economy with private information about mobility. We are able to verify that: moving from 1) to 3) gradually reduces the potential for taxation and increases optimal distortions of the investment level. Hence, in the present model both capital mobility in itself and private information about mobility increase the social cost of taxation.

Net domestic revenue in a closed economy is equal to 360. This is also the potential amount of tax payments, since the government will be able to capture all net revenues by using lump sum taxes. In an open economy with symmetric information about mobility, expected net domestic revenue, $\int_{\underline{\theta}}^{\bar{\theta}} N(K(\theta))dF(\theta)$, equals 347 and expected taxes, $\int_{\underline{\theta}}^{\bar{\theta}} R(\theta)dF(\theta)$, amount to 281. The difference between the two figures in the open economy case, is given by the firms' expected opportunity cost for locating in the country. This added opportunity cost leads to lower domestic investments - explaining the drop in net domestic income. Introducing private information about mobility gives an expected net domestic income of 315 and an expected tax revenue of 86. As a

response to private information, it is optimal to distort the investment decision - explaining the drop in net domestic revenue. The drop in expected tax payments is explained by information rents and is rather dramatic in this particular example. The cost of taxation in the open economy wit symmetric taxation would be 13/281= 0,046 as compared to 45/86 = 0,52 in the asymmetric case.

(FIGURES 1-7 ABOUT HERE)

The optimal investment level K as a function of the company's type θ, are for the three models depicted in figure 1, where K_c = investments in a closed economy, K_s= investments in an open economy with symmetric information about mobility, and K_a = investments in an open economy with private information about mobility. We see that under asymmetric information investments are distorted for all types but $\overline{\theta}$. Likewise, figure 2 depicts net domestic revenue, N, as a function of mobility type, for the three basic models. Figure 3 illustrates total domestic profits Π_s and Π_a under symmetric information, and private information rents π_a under asymmetric information. Under symmetric information the government is able to capture all private rents in excess of alternative reforms obtainable abroad. From the π_a-curve we see that all types but the most mobile enjoy an information rent under asymmetric information, and that the information rent is increasing in immobility. The explanation is that the immobile companies can follow a profitable strategy of mimicking mobile companies but not vice versa. Figure 4 illustrates that tax payments, R, are drastically reduced under asymmetric information. The severity of the information problem is due to our choice of a strongly type-sensitive function for opportunity cost of location. From equation (6) we have that $R = N - C - \pi$. A change in θ will have different effects on the various components of the R-function, thus explaining its concave

curvature in figure 4. An increase in θ will lead to an increase in N and a reduction in C, causing an increase in R. This tax increase, however, is countervailed by a sharp increase in π. Taxes are low for immobile companies since they enjoy considerable information rents. In fact the better part of tax revenue is extracted from relatively mobile firms. Note that for the most immobile companies, taxes are even negative. These companies still generate net social welfare, since the high domestic information rents are part of the social welfare function given in equation (3). Average tax rates, $t(\theta) \equiv R(\theta) / N(\theta)$, are depicted in diagram 5. Again, the potential severity of the information problem is clearly illustrated. Figure 6 illustrates net domestic revenue and social rent under symmetric information. The difference between the two curves is given by taxes, and is clearly higher for immobile companies, thus explaining the shape of the R_s-curve in figure 4. Similarly, net domestic revenue and social rent under asymmetric information are shown in figure 7. The tax revenue is given by the shaded area. By decomposing the tax payments we explain the curvature of the tax function R_a in figure 4.

5. Extensions

In the model the government's tax potential is increased by reducing the average mobility of the corporate tax base. This is implemented by tax incentive schemes where mobile companies selfselect high investment fees or unfavourable depreciation schedules. As pointed out, this is the opposite of common practice. A more traditional way to reduce the mobility of the corporate tax base, is to subsidise inputs that are extensively used in the immobile sector. We will in this section examine whether this policy can be justified by models of asymmetric information.

We will examine the following policy options: 1) Screening in public infrastructure, 2) Screening by public provision of private goods, and 3) Subsidising private inputs that induce immobility. Apriori we may presume that the possible strategies under 1) to 3) would have to come in addition to the tax distortion of investments in the model above. This follows from general insights of the theory of second best taxation: distortions should be spread over many markets, that is, distortions in the private inputs and the provision of public infrastructure would supplement distortions in private investments.

It is the total package of taxes, subsidies, and publicly offered goods and services that make agents decide where to locate. A revelation mechanism based on type-dependent supply of infrastructure - the first policy option - is not likely to be feasible since infrastructure usually is a non-excludable public good. We need to examine, however, if the government can obtain screening by public provision of private inputs - the second policy option.

In the context of optimal income taxation under asymmetric information about skills, Blomquist and Christiansen (1994) determine conditions under which public provision of a private good can alleviate the informational problem by relaxing the selfselection constraint. One restriction is that the publicly provided quantity cannot be resold or supplemented. If it could be resold it is equivalent to a cash transfer, and nothing is gained by public provision. Furthermore, to obtain screening, in our context the valuation of the good must be strongly correlated with a company's international mobility. Finally, the publicly provided input must be sector specific, and there must not be any close market substitutes. We have not been able to identify inputs to mobile industries that are likely to satisfy all these requirements.

The third policy option, subsidising private inputs that induce immobility, can be modelled by including a country specific input x in the functions for net domestic income, $N(K(\theta),x(\theta),P)$, and the private locating

cost, $C(\theta,K(\theta),x(\theta))$.[18] The expression for the information rent is unaltered. Furthermore, the first order condition for investments is unchanged. In addition we get a first order condition for the input x:

$$(20)\qquad \frac{\partial N(K(\theta),x(\theta),P)}{\partial x}-\left(\frac{\lambda+\mu}{1+\lambda}\right)\frac{\partial C(\theta,K(\theta),x(\theta))}{\partial x} = \left(\frac{\lambda+\mu}{1+\lambda}\right)\left[-\frac{\partial^2 C(\theta,K(\theta),x(\theta))}{\partial\theta\partial x}\right]\left(\frac{1-F(\theta)}{f(\theta)}\right).$$

Analogous to equation (11), the right hand side of equation (20) is a distortion of the input decision of the firm to enhance rent capture. It is common practice to subsidise inputs in immobile companies. This policy is implied by the model if the following is satisfied:

$$\frac{\partial^2 C(\theta,K(\theta),x(\theta))}{\partial\theta\partial x}>0.$$

Alternatively, from equation (1) we see that the assumption may be stated in terms of the migration costs: $\partial^2 M / \partial x\partial\theta < 0$. Thus, we would like to subsidise inputs that increase migration costs and where the rate of cost reduction is highest for immobile companies. Returning to our shipping example, examples of relevant country specific inputs are specialised research and education. It is, however, the immobile part of the shipping fleet that is most dependent on highly skilled personnel and technological clusters, suggesting that the single crossing property has the opposite sign. Since immobile industries rely on country specific inputs, this seems to be a general result. Optimal policy, therefore, would be to impose commodity taxes rather than subsidies on country specific inputs.

The first order conditions for K and x, equations (11) and (20), respectively, imply a tax function in three dimensions, $T(K,x)$. Following the

[18] This model approach is analogous to Lewis (1995).

approach in Osmundsen (1994), provided the concavity conditions are met, the optimal allocation can be implemented by a menu of tangent planes, generated by investment fees and commodity taxes for the country specific input.[19]

6. Conclusion

An optimal governmental response to asymmetric information about mobility types is to induce relative expansion of the immobile sector. This is implemented by designing a corporate tax system where the firms selfselect high investment fees or unfavourable depreciation allowances. This is quite contrary to common practice; internationally mobile companies are often offered generous depreciation schedules and low investment fees in order to make it attractive for them to remain in the country. The analysis, however, shows that with private information about mobility there will be a trade-off between keeping mobile activities in the country and the taxation possibilities for more immobile activities. In terms of tax revenue, it will be optimal to let part of the most mobile capital migrate as this enables the government to extract more revenue from more immobile firms.

New growth theory focuses on industrial clusters as a basis for economic expansion. This theory - presupposing symmetric information - has implicit implications for tax policy: taxes should be corrected for possible net external benefits of investments. In particular, investments contributing to infra-structure and national industrial clusters should receive a favourable tax treatment. In this paper we show that by introducing private information about companies' international mobility this argument is reinforced, since a relative expansion of the immobile sector will strengthen firms´ dependence on national industrial clusters. A criticism pertaining to both the new growth

[19] This is a generalisation of the implementation scheme in Laffont and Tirole (1986).

theory and our model is that by building up industry-specific infrastructure and by promoting national industrial clusters, the economy will be less diversified and thus more vulnerable to exogenous shocks. By assuming a risk neutral government, this problem is not addressed.[20] Risk aversion is likely to modify the results.

Also the analysis overlooks possible positive welfare effects from companies that migrate. Some of the tax revenues may be maintained after migration, e.g., if the owners remain in the country. It is also plausible that migrated firms can provide positive externalities to the domestic economy. Such effects may take the form of contracts with former business partners domestically or by the use of skills acquired abroad in national board positions.

[20] Adverse selection models are not designed to deal with risk aversion.

References

Bjerksund, P. and Schjelderup, G, 1995, Capital Controls and Capital Flight, Finanzarchiv 52 (forthcoming).

Blomquist, S. and Christiansen, V, 1994, Public Provision of Private Goods as a Redistributive Device in an Optimum Income Tax Model, Mimeo, Department of Economics, Oslo University.

Caballero, J. R. and R.K. Lyons, 1990, Internal Versus External Economies in European Industry, European Economic Review 34, 805-830.

Dasgupta, P., P. Hammond, and E. Maskin, 1979, The Implementation of Social Choice Rules, Review of Economic Studies 46, 185-216.

Guesnerie, R. and J.J. Laffont, 1984, A Complete Solution to a Class of Principal-Agent Problems with an Application to the Control of a Self-Managed Firm, Journal of Public Economics 25, 329-369.

Laffont, J.J. and J. Tirole, 1986, Using Cost Observation to Regulate Firms, Journal of Political Economy 94, 614-641.

Lewis, T. and D. Sappington, 1989, Countervailing Incentives in Agency Problems, Journal of Economic Theory, 49 (2), 294-313.

Lewis, T. R., 1995, Instruments of Choice for Environmental Protection, Mimeo, Department of Economics, University of Florida.

Osmundsen, P., 1994, Dynamic Taxation of Nonrenewable Natural Resources. Asymmetric Information About Reserves, Discussion paper 18/94, Department of Economics, Norwegian School of Economics and Business Administration.

Porter, M.E. (1990), Competitive Advantage of Nations, McMillan, London.

CES Working Paper Series

29 Michael Funke and Dirk Willenbockel, Die Auswirkungen des "Standortsicherungsgesetzes" auf die Kapitalakkumulation - Wirtschaftstheoretische Anmerkungen zu einer wirtschaftspolitischen Diskussion, January 1993

30 Michelle White, Corporate Bankruptcy as a Filtering Device, February 1993

31 Thomas Mayer, In Defence of Serious Economics: A Review of Terence Hutchison; Changing Aims in Economics, April 1993

32 Thomas Mayer, How Much do Micro-Foundations Matter?, April 1993

33 Christian Thimann and Marcel Thum, Investing in the East: Waiting and Learning, April 1993

34 Jonas Agell and Kjell Erik Lommerud, Egalitarianism and Growth, April 1993

35 Peter Kuhn, The Economics of Relative Rewards: Pattern Bargaining, May 1993

36 Thomas Mayer, Indexed Bonds and Heterogeneous Agents, May 1993

37 Trond E. Olsen and Gaute Torsvik, Intertemporal Common Agency and Organizational Design: How much Decentralization?, May 1993

38 Henry Tulkens and Philippe vanden Eeckaut, Non-Parametric Efficiency, Progress and Regress Measures for Panel Data: Methodological Aspects, May 1993

39 Hans-Werner Sinn, How Much Europe? - Subsidiarity, Centralization and Fiscal Competition, July 1993

40 Harald Uhlig, Transition and Financial Collapse, July 1993

41 Jim Malley and Thomas Moutos, Unemployment and Consumption: The Case of Motor-Vehicles, July 1993

42 John McMillan, Autonomy and Incentives in Chinese State Enterprises, August 1993

43 Murray C. Kemp and Henry Y. Wan, Jr., Lumpsum Compensation in a Context of Incomplete Markets, August 1993

44 Robert A. Hart and Thomas Moutos, Quasi-Permanent Employment and the Comparative Theory of Coalitional and Neoclassical Firms, September 1993

45 Mark Gradstein and Moshe Justman, Education, Inequality, and Growth: A Public Choice Perspective, September 1993

46 John McMillan, Why Does Japan Resist Foreign Market-Opening Pressure?, September 1993

47 Peter J. Hammond, History as a Widespread Externality in Some Arrow-Debreu Market Games, October 1993

48 Michelle J. White, The Costs of Corporate Bankruptcy: A U.S.-European Comparison, October 1993

49 Gerlinde Sinn and Hans-Werner Sinn, Participation, Capitalization and Privatization, Report on Bolivia's Current Political Privatization Debate, October 1993

50 Peter J. Hammond, Financial Distortions to the Incentives of Managers, Owners and Workers, November 1993

51 Hans-Werner Sinn, Eine neue Tarifpolitik (A New Union Policy), November 1993

52 Michael Funke, Stephen Hall and Martin Sola, Rational Bubbles During Poland's Hyperinflation: Implications and Empirical Evidence, December 1993

53 Jürgen Eichberger and Ian R. Harper, The General Equilibrium Foundations of Modern Finance Theory: An Exposition, December 1993

54 Jürgen Eichberger, Bayesian Learning in Repeated Normal Form Games, December 1993

55 Robert S. Chirinko, Non-Convexities, Labor Hoarding, Technology Shocks, and Procyclical Productivity: A Structural Econometric Approach, January 1994

56 A. Lans Bovenberg and Frederick van der Ploeg, Consequences of Environmental Tax Reform for Involuntary Unemployment and Welfare, February 1994

57 Jeremy Edwards and Michael Keen, Tax Competition and Leviathan, March 1994

58 Clive Bell and Gerhard Clemenz, The Desire for Land: Strategic Lending with Adverse Selection, April 1994

59 Ronald W. Jones and Michihiro Ohyama, Technology Choice, Overtaking and Comparative Advantage, May 1994

60 Eric L. Jones, Culture and its Relationship to Economic Change, May 1994

61 John M. Hartwick, Sustainability and Constant Consumption Paths in Open Economies with Exhaustible Resources, June 1994

62 Jürg Niehans, Adam Smith and the Welfare Cost of Optimism, June 1994

63 Tönu Puu, The Chaotic Monopolist, August 1994

64 Tönu Puu, The Chaotic Duopolists, August 1994

65 Hans-Werner Sinn, A Theory of the Welfare State, August 1994

66 Martin Beckmann, Optimal Gambling Strategies, September 1994

67 Hans-Werner Sinn, Schlingerkurs - Lohnpolitik und Investitionsförderung in den neuen Bundesländern, September 1994

68 Karlhans Sauernheimer and Jerome L. Stein, The Real Exchange Rates of Germany, September 1994

69 Giancarlo Gandolfo, Pier Carlo Padoan, Giuseppe De Arcangelis and Clifford R. Wymer, The Italian Continuous Time Model: Results of the Nonlinear Estimation, October 1994

70 Tommy Staahl Gabrielsen and Lars Sørgard, Vertical Restraints and Interbrand Competition, October 1994

71 Julia Darby and Jim Malley, Fiscal Policy and Consumption: New Evidence from the United States, October 1994

72 Maria E. Maher, Transaction Cost Economics and Contractual Relations, November 1994

73 Margaret E. Slade and Henry Thille, Hotelling Confronts CAPM: A Test of the Theory of Exhaustible Resources, November 1994

74 Lawrence H. Goulder, Environmental Taxation and the "Double Dividend": A Reader's Guide, November 1994

75 Geir B. Asheim, The Weitzman Foundation of NNP with Non-constant Interest Rates, December 1994

76 Roger Guesnerie, The Genealogy of Modern Theoretical Public Economics: From First Best to Second Best, December 1994

77 Trond E. Olsen and Gaute Torsvik, Limited Intertemporal Commitment and Job Design, December 1994

78 Santanu Roy, Theory of Dynamic Portfolio Choice for Survival under Uncertainty, July 1995

79 Richard J. Arnott and Ralph M. Braid, A Filtering Model with Steady-State Housing, April 1995

80 Vesa Kanniainen, Price Uncertainty and Investment Behavior of Corporate Management under Risk Aversion and Preference for Prudence, April 1995

81 George Bittlingmayer, Industry Investment and Regulation, April 1995

82 Richard A. Musgrave, Public Finance and Finanzwissenschaft Traditions Compared, April 1995

83 Christine Sauer and Joachim Scheide, Money, Interest Rate Spreads, and Economic Activity, May 1995

84 Jay Pil Choi, Preemptive R&D, Rent Dissipation and the "Leverage Theory", May 1995

85 Stergios Skaperdas and Constantinos Syropoulos, Competing for Claims to Property, July 1995

86 Charles Blackorby, Walter Bossert and David Donaldson, Intertemporal Population Ethics: Critical-Level Utilitarian Principles, July 1995

87 George Bittlingmayer, Output, Political Uncertainty, and Stock Market Fluctuations: Germany, 1890-1940, September 1995

88 Michaela Erbenová and Steinar Vagstad, Information Rent and the Holdup Problem: Is Private Information Prior to Investment Valuable?, September 1995

89 Dan Kovenock and Gordon M.Phillips, Capital Structure and Product Market Behavior: An Examination of Plant Exit and Investment Decisions, October 1995

90 Michael R. Baye, Dan Kovenock and Casper de Vries, The All-pay Auction with Complete Information, October 1995

91 Erkki Koskela and Pasi Holm, Tax Progression, Structure of Labour Taxation and Employment, November 1995

92 Erkki Koskela and Rune Stenbacka, Does Competition Make Loan Markets More Fragile?, November 1995

93 Koji Okuguchi, Effects of Tariff on International Mixed Duopoly with Several Markets, November 1995

94 Rolf Färe, Shawna Grosskopf and Pontus Roos, The Malmquist Total Factor Productivity Index: Some Remarks, November 1995

95 Guttorm Schjelderup and Lars Sørgard, The Multinational Firm, Transfer Pricing and the Nature of Competition, November 1995

96 Guttorm Schjelderup, Kåre P. Hagen and Petter Osmundsen, Internationally Mobile Firms and Tax Policy , November 1995