SILVA FENNICA VOL. 15, 1981, N:o 1: 92–99

EFFECTIVENESS OF FOREST TAXATION REFORM AS A MEANS OF ECONOMIC POLICY

PÄIVIÖ RIIHINEN

University of Helsinki, Finland

TAXATION AND AGGREGATE DEMAND

Following the subdivision used by TINBERGEN (1966) we can distinguish in economic policy between quantitative and qualitative means and reforms. This paper deals with the effect of a reform, i.e. of a potential shift from one forest taxation system to another.

The effectiveness of a tax reform can be considered in relation to its objectives. The number of objectives can be very large. They can be mutually competitive (even contradictory) or dependent. Here, however, we shall deal only with the most important objectives.

Taxation in general has at least the following objectives:

1. To acquire revenue for public expenditure.
2. To guide investment, production and employment by means of economic policy measures coupled with taxation.
3. To level differences in individual and regional income.
4. To contribute to balanced international payments.

By effectiveness of taxation reform we mean the degree to which the reform contributes to the achievement of each of the above-mentioned objectives. The evaluation of the effect of a change in the taxation system calls for a knowledge of the mechanism through wich taxation as a means of economic policy becomes effective.

There are certain formal criteria for evaluating the effect of taxation on aggregate demand in an economy. An increase in taxation has a dual effect. On the one hand, it brings about an increase in aggregate demand resulting from increased government expenditure:

$$(1)\ \Delta Y_G = \frac{\Delta E,}{1-b}$$

where ΔY_G = increase in aggregate demand due to increased government expenditure,

ΔE = equal change in expenditure and revenue,

b = marginal propensity to consume.

On the other hand, there is a decrease in aggregate demand due to the increase in taxation:

$$(2)\ \Delta Y_T = \frac{-\,b\,\Delta E,}{1-b}$$

where ΔY_T = decrease in aggregate demand due to increase in taxation.

Other symbols as in equation (1).

Summing the increase and decrease in aggregate demand we conclude that the resulting change in aggregate demand is

$$(3)\ \Delta Y = \Delta Y_G + \Delta Y_T = \Delta E\ \left(\frac{1}{1-b} - \frac{b}{1-b}\right) = \Delta E$$

Dividing both sides of (3) by ΔE we then obtain

$$\mu_{BB} = \frac{\Delta Y}{\Delta E} = 1,$$

where μ_{BB} is the balanced budget multiplier and is equal to unity. (Cf. CLAHE, F. R., 1977).

In reality, the changes in government expenditure and in taxation are not always equal. Therefore, the tax multiplier is less than unity, if an increase in taxation is not matched by at least an equal increase in government expenditure. Again, the tax multiplier is larger than unity if the increase in government expenditure is not matched by at least an equal increase in taxation. In the latter case there would be an increase in aggregate demand.

CASE: FOREST TAXATION IN FINLAND

The problem of forest taxation in general

We are interested here in the effect of a change in the system of taxation, i.e. a shift from area-based yield taxation to taxation of actual stumpage revenue. A reform like this is said to bring about a higher rate of taxation, while some might argue that it would also increase the tax revenue. A higher rate of taxation would decrease the purchasing power of almost 400 000 woodland owners, most of them in remote rural areas.

For the purpose of determining the priority of different objectives of taxation policy it is important to recall that forest taxation produces only a fraction of the total tax revenue. Also, the main effect of the reform would not manifest itself in a more perfect exposure of forestry income to taxation. The accretion, by forest taxation, of revenue for public expenditure depends on the effect on investment and consumption of a change in the taxation system.

On theoretical grounds one could expect a decrease in production due to weaking incentives. Hence, the hypothesis most readily available is that tax revenue would be reduced because of decreasing output in forestry and the forest industries and that the rate of taxation would rise. As a result, the aggregate demand would decrease.

The decreasing effect on production of the tax reform would be expressed as a declining supply.

Suppose we have, with the taxation of area-based yield, the following partial supply model:

$$(4)\ Q = a + bP,$$

where Q = quantity of roundwood supplied
P = stumpage price.

With the introduction of the taxation of actual stumpage revenue, taxation becomes a supply shifter:

$$(5)\ Q = a + bP - cT,$$

where T = taxation.

Graphically this can be illustrated by Fig. 1. Without the tax reform the long-run supply curve S_0 meets the long-run demand curve at point d, with the resultant roundwood output q_0. With the introduction of the taxation of actual stumpage revenue, the supply curve would move left and up to S_1 and would meet the demand curve at e, resulting in output q_1. Depending on the average elasticity of demand, there would also be an increase in stumpage price (from p_0 to p_1), other things being equal. To elaborate the diversity of short-run situations would take too much space here.

As in many countries, the high-level decision makers in Finland have, during the last few

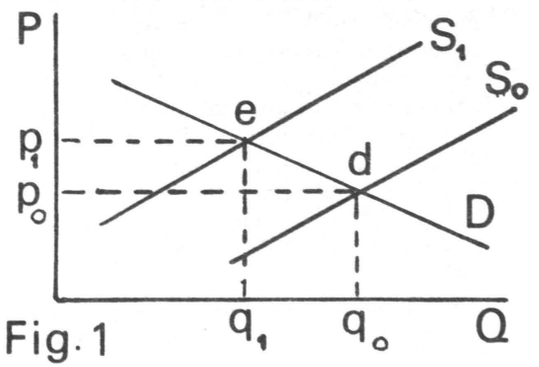

Fig. 1

years, emphasized the need for acquiring revenue for public expenditure. The function of taxation as a means of guiding investments, production and empolyment seems to have obscured by the need to make the rate of taxation more progressive. It may then constitute a policy means which is conflicting with the aims of a majority of people: incentives for production are weakened or its prerequisities destroyed. At the same time, we may endanger the foundations of the welfare services which ought to be maintained and developed using tax revenue. Weakening the incentives for production is possible in forestry in as much as the need for increased public revenue is satisfied by changing the system of taxation without due consideration of its consequences.

The present system of forest taxation

Woodland owners pay an income tax to both the government and the communes as well as a property tax to the government. The system of taxation is an area-based yield taxation. To assess taxable income the average "net revenue" per hectare for a relatively large area is multiplied by the area (by site class) of the woodlot to be taxed. The value of potential work done in connection with a delivery sale of timber is added, and management and administration expenses plus certain other reductions are deducted. Hence the taxable income is not affected by actual removals or by stumpage revenues obtained. Instead, it is affected by the average site class (called taxation class) of the appropriate woodlot, average stumpage prices in the region during the last three years (taxation year included) and the average volume increment in the region. The taxable property is determined by multiplying the "net revenue" by ten.

For the purpose of motivating regeneration and thus sales of old stumpage, legal provisions make it possible, since 1980, to exempt established seedling stands from taxation.

To determine the technical basis for taxation the growth sites are divided into five site classes. In addition, unproductive areas form a separete class. On the basis of this classification, the average annual yield per hectare for each site class ("taxation class") in a region is determined, taking into consideration the structural variation by site class of the growing stock. Legislation is passed from time to time on the structure of the timber assortments which are included in one cubic meter of stemwood in each of the structural regions. The mensurational and stumpage price data are provided by the Forest Research Institute.

The problem of this paper

The present system of taxation has been criticised on several grounds:

- Taxation is biased and unjust. It does not take into consideration differences in the growing stock by woodlot, thereby ignoring differences in stumpage revenue. A woodland owner may sell when stumpage prices are high and thus obtain untaxed income as the difference between actual and estimated average income. Another woodland owner may instead be compelled to pay taxes while having no possibility to sell timber for a prolonged period.
- On average, untaxed income is generated, i.e. the predetermined basis for taxation underestimates the actual revenue. At times, the opposite may be true.
- The progression of taxation has become steeper during the last few years.
- There has been a tendency to understand taxation as if it was an expense to the woodlot only. In fact, it is an expense to the woodland owner whose other income largely determines the amount of forest taxes.
- The taxation of forestry revenue is actually heavier than that of wage earnings or of agricultural revenue.
- Property taxation tends to be forgotten when criticising forest taxation. Property taxation makes forest taxation very heavy.

- On the other hand, certain advantages of the area-based forest taxation have been mentioned. Among them area a smooth flow of tax revenues and the possible effect of motivating forest improvements. Since the deductions made in taxation are independent of actual expenses, this influence may remain small.
- Area-based yield taxation is preferable in that it tends to maintain the owners' willingness to sell timber.

These and many other arguments have aroused a great deal of interest among politicians. The question has been raised as to whether or not the present area-based taxation system should be replaced by the taxation of actual sales revenue.

FOREST TAXATION AND PUBLIC REVENUE

From the standpoint of the first objective of taxation, i.e. obtaining public revenue, area-based yield taxation can be criticised in as much as the estimated average tax revenue and its alternative, tax revenue based on actual stumpage revenue, deviate from each other. The effect of a possible change from area-based yield taxation to the taxation of actual stumpage revenue can be studied by comparing the gross revenues as assessed on the basis of each of these two taxation systems. (Gross revenue refers to the revenue from which certain statutory deductions have not yet been made.)

In 1970–1974, the gross revenue from forestry as assessed for area-based yield taxation was, on the average, FIM 831 million per year. The actual gross stumpage revenue at the same time was FIM 1 791 million per year, which is more than twice the area-based figure.

In 1975–1978, the area-based gross revenue was FIM 2 421 million per year, while the actual gross stumpage revenue was FIM 2 676 million per year (cf. LOVÉN, 1980, pp. 152–158).

One could draw from these comparisons the conclusion that the taxation authorities have lost a good deal of tax revenue just because of the system of taxation. Such a conclusion, however, would be premature because one should then assume that, with the taxation of actual stumpage revenue, the woodland owners would sell the same amount of timber as with the taxation of area-based yield.

EFFECT ON INVESTMENT, PRODUCTION AND EMPLOYMENT

From the standpoint of investments, production and employment, it is foreseeable that a transfer to the taxation of actual stumpage revenue would result in a considerable reduction of timber sales. There is no valid empirical basis to estimate how much the sales would decrease. It seems therefore that one has to depend on sensitivity analysis to gain an insight into how large a reduction in timber sales would be enough to cause losses to the national economy of a magnitude that would offset the benefits of taxing the actual stumpage revenue.

It is not easy to point out the effects on the national economy of, say, a ten per cent reduction in fellings assuming that these were not compensated for by roundwood imports. Such a calculation necessarily involves certain simplifications which hopefully constitute no systematic error.

It is conceivable from the above-mentioned comparisons that gross revenue, as computed for area-based yield taxation, in 1970–1974, was FIM 960 million short of the actual gross stumpage revenue. Let us assume that in 1970–1974, the proportion of taxes paid by forestry and the forest industries, in the tax component of the gross national product, was of the same magnitude as the relative share of these activities of the GNP, i.e. about 12 per cent of FIM 2 848 million

per year. A ten per cent reduction in production, therefore, would have caused a FIM 285 million decrease in tax revenue per year. In order to compensate for this by taxing the difference between the gross stumpage revenue and the gross revenue computed for area-based yield taxation, in 1970–1974 (FIM 1 791 million– FIM 831 million = FIM 960 million), it would have been necessary to tax this difference at the rate of more than 28 per cent. It may be recalled that in 1970–1974 direct taxes constituted about 23 per cent of GNP, while all taxes constituted almost 40 per cent.

As far as the effect on Gross National Product in 1970–1974 is concerned, a ten per cent reduction in the output of forestry and the forest industries (with no corresponding roundwood imports and no changes in roundwood stocks) would have cut the GNP by an average of 1,2 per cent per year, assuming that the labour thus released had remained unemployed. In reality, only a minor proportion would have been left unemployed. The forest industries would have filled the roundwood shortage by imports. The cost to the national economy would have consisted mainly of the stumpage income and the wages lost due to reduced fellings. In addition, unemployment compensations to part of the forest workers and their retraining would have added to the social cost.

In 1975–1978, the gross stumpage revenue remained only FIM 255 million larger than the gross revenue computed for area-based yield taxation. This is less than the ten per cent decrease in the output of forestry and the forest industries assumed to result from changing the taxation systems (about FIM 621 million per year). Thus, it would have been impossible to increase the tax revenue by taxing the actual stumpage revenue. The reduction of GNP would have been about 0,9 per cent per year, with the static assumption that the labour released had remained unemployed. It is of course difficult to foresee how long the woodland owners would refrain from selling as much as earlier. A forest is practically an unperishable stock, which makes possible to maintain different growing stocks. Experience in Sweden and certain parts of Finland shows that it is biologically possible to double or tripple the present average growing stock. To reach this situation would require a long time period if the woodland owners reduced their sales by an average of ten per cent per time unit. On the other hand, experience has shown that at least as much time will elapse before means are found to increase sales under such circumstances.

Sales would not only be reduced by the shift to taxation of actual sales revenue. With rising income from other sources and ingreasingly progressive taxation, people would also be increasingly careful in exposing their timber sales to steeply progressive scales of taxation. As long as they had incomes from other sources they would postpone timber sales to as distant a future as possible. The steeply progressive taxation of income already results in a heavy taxation of forestry revenue, despite the fact that by choosing the periods of sales the woodland owners may get "untaxed income".

In several countries with a taxation of actual stumpage revenue there is a cronic unwillingness among the private woodland owners to sell timber. It can be assumed to result from a general rise of income level and from certain other social factors, but also from a steeply progressive taxation of income. Highincome countries have a tendency to destroy the motives for forestry. The income obtained by people from their principal occupation is hight enought to permit reasonable living standards, with no need to resort to a comparatively large timber sales revenue which, with the taxation of actual sales revenue, is placed at the top of the taxation scale.

Sometimes the question is raised as to whether the timber sales revenue is at the bottom, the middle or at the top of the income tax scale, or whether this is a matter of imagination. Where stumpage revenue is obtained at the will of the woodland owner who obtains a regular income from a source other than forestry, stumpage revenue constitutes marginal income and is placed at the top of the income tax scale, which is most heavily taxed. Where area-based taxation is applied, however, this is not the case, because taxes are paid independent of sales.

The position of taxation in forest policy depends on the objectives. At the beginning of the 1960's forestry in Finland seems to have

assumed the goal of producing as much timber as will be required by the forest industries desirable from the standpoint of the growth of Gross National Product, full employment, agreed distribution of income, stable money value, and balanced international payments. This required considerable investments in both forestry and the forest industries. These investments, which were carried out with certain preconditions, will become profitable or unprofitable largely according to what kind of economic policy is chosen. If a policy is chosen which is likely to decrease fellings we consciously reduce the benefit from these investment. The taxation of actual sales revenue would have this type of effect (cf. Riihinen, 1977).

Excessive raising of the values of the physical characteristics used as a basis for determining the "net income" in area-based yield taxation may also not be without effects in forestry. Holders of poor growing stock, usually the not so well-to-do woodland owners, may then find it necessary to cut enough timber to obtain a sufficient income for paying taxes. But they would then avoid regeneration fellings because of the comparatively high regeneration cost. This would easily result in a gradual diminution of the growing stock per hectare. Finally, one may not be willing to pay taxes for woodlands which no longer produce a regular income. They are then offered for sale. Companies and the state have been willing buyers. Sales of woodlands in the future may be increased by the property tax which in many cases has raised to a large sum the amount of taxes to be paid. Only the expectation of constant inflation has made people to adhere to real estate.

EQUATING DIFFERENCES IN REGIONAL AND PERSONAL INCOME

There has been a tendency to adopt a so-called solidary income policy. It is most concretely manifested in the way of carrying out wage increases and in the progression of income tax scales. In other words, efforts are made to equalize disposable incomes by means of wage increases of different size and by a steep progression of the income tax scales. Apart from more equal disposable incomes, this may have resulted in a reduced spirit of enterprise. It is most likely that a shift from area-based yield taxation to taxation of actual stumpage revenue would be conducive to these objectives. However, the purpose of equating regional differences in income is more efficiently served by area-based yield taxation than by taxation of actual stumpage revenue. This is due, for example, to the fact that in the largest low-income region, in Northern Finland, there are large areas of state-owned forests, for which the statutory deductions in the present income taxation (area-based yield taxation) are considerably smaller than actually documented. In the taxation of actual stumpage revenue the costs would obviously be taken at their actual size, which would leave a smaller taxable income than at present. Development regions have also benefited from area-based yield taxation to the extent that actual sales volumes have in general exceeded the volumes used as a basis for assessing the "net income".

EFFECT ON THE BALANCE OF PAYMENTS

Assuming that the shift to taxation of actual stumpage revenue would reduce timber sales by ten per cent and that the shortage of roundwood thus occasioned was not compensated for by roundwood imports, the currency income would decrease by ten per cent of the value of forest products exports. In 1970–1974, a ten per cent decrease in forest products exports would have caused an average FIM 706 million currency drain and, in 1975–1978, a FIM 1 168 million drain.

If, instead, the ten per cent decrease in fellings were compensated for by roundwood imports, then the net currency drain would

consist of the value of the roundwood imported to fill the domestic gap. Assuming that the roundwood imports were substituted for about 2 million m³ of domestic roundwood (10 per cent of an average of 20 million m³ of roundwood other than saw and veneer logs), it would perhaps require the counter value of some FIM 300 million of foreign currency.[1]

It would, however, be fallacious to believe that the balance-of-payment effects of a tax reform assumed here were merely negative. On the contrary, in an open economy, as referred to earlier, the hypothesized reform would probably decrease the aggregate demand and thus reduce the need for imports.

[1] This conclusion does not apply as such to roundwood imports from the USSR to Finland, which are paid for by exports. One would then have to assume that Finland must refrain from importing other goods from elsewhere to that value.

STATIC VS. DYNAMIC ANALYSIS

It is easy to realize that the analysis contained in this paper is essentially static: the principal purpose was to illustrate the concept of effectiveness as applied to a taxation problem. It is customary to expect that an analysis like this is as dynamic as possible, i.e. the adjustment process of an economy as a result of a policy measure is traced as far as possible. The dynamic analysis is then based on the likely consequences of a policy reform and is positive in that sense. The question asked is "What will happen?" instead of "What should be done?" as the question would be put in a normative analysis. While a free market economy functioning at full employment needs some degree of dynamics in analyzing the consequences of a policy reform, this is not necessarily always the case for an economy with employment problems. The primary effects of a reform as revealed by a static analysis may illustrate how much production and employment should be increased elsewhere, or how much imports should be substituted for domestic production. If the objective is to reduce unemployment a dynamic analysis may bypass this by assuming that the labour released by the reform will be employed elsewhere, disregarding the fact that the reform may impede the employment of those unemployed before the reform. On the other hand, we must bear in mind that certain dynamic effectiveness analyses may be carried out with the explicit objective of improving employment.

SUMMARY AND CONCLUSIONS

In dealing with the effectiveness of forest taxation reform as a means of economic policy, the paper starts by recalling certain objectives of taxation, as well as the effect on aggregate demand of taxation in general. The effect of forest taxation depends on such factors as (1) whether the woodland owner has a regular income from a source other than torestry; (2) the system of taxation (whether taxation of actual stumpage revenue or of area-based yield); (3) the progression of taxation; (4) the woodland owner's income level. The problem is illustrated by an example taken from Finland, where forestry revenue is taxed on the basis of area-based yield. A shift to taxation of actual stumpage revenue, as proposed, is assumed. The effectiveness of this change is studied in terms of how far the assumed change is consistent or inconsistent with the objectives of the national economy. It is assumed that a shift to taxation of actual stumpage revenue would cause a decline in roundwood supply. A sensitivity analysis is then applied to detect the effect on tax revenue and national income of the tax reform. It is likely that a ten per cent decrease in fellings would bring about a reduction of tax revenue which would not be compensated for by the more perfect exposure of forestry income to taxation brought about by the reform. The effect on investment, production, employment, differences in individual and regional income, and on the international balance of payments also disfavour the suggested change.

LITERATURE CITED:

GLAHE, F. R. 1977. Macroeconomics: Theory and policy. New York – Chicago – San Francisco – Atlanta.

LOVÉN, LASSE. 1980. Kohtuullisuusperiaate metsäverotuksessa. Verotuslehti No 3/1980.

RIIHINEN, PÄIVIÖ. 1977. Metsäverotuksen monet kasvot. Summary: Forest taxation: A multi-face problem. Metsä ja Puu No 2/1977, pp. 11–13.

TINBERGEN, J. 1966. Edonomic policy: Principles and design. Amsterdam.