Some Further Results on Income Tax Progression

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The purpose of this paper is to indicate the problems connected with the measurement of the progression of a tax system by different forms of Gini indices. These measures show theoretical and statistical shortcomings compared with the liability progression and the residual income progression of Musgrave and Thin. German tax data have been used to give empirical evidence.

I. Introduction

The measurement of the progresison of the income tax and the tax system respectively has recently grown in importance. This is primarily caused by the excessive growth of incomes due to inflation.[1] The main purpose of this paper is to discuss a proposal of a "new measure of tax progressivity"; it does not intend to create another "new" measure, but to show that all measures discussed can be reduced to the basic work of *Musgrave* and *Thin* (1948). Additionally the microeconomic relations between these measures are represented.

In part II the measure of progression proposed by *Kakwani* (1977), its theoretical consistency and its usefullness will be analyzed. On the result of this analysis part III is based; it concentrates on the functional relationship between the "liability progression" and the "residual income progression" of *Musgrave* and *Thin* (1948), and on the interdependence of these elasticities, the distribution of the tax burden and the distribution of income after tax (net income). In part IV the income tax system of the Federal Republic of Germany is used to give empirical evidence to the argumentation of part III. The results are summarized in part V.

II. A New Measure of Progression?

Kakwani's (1977) criticism of the measure of progression proposed by *Slitor* (1948) and called "average rate progression" by *Musgrave* and *Thin* (1948) focuses on the fact that this measure defines the pro-

[1] There have been some publications on the topic recently, e. g., *Blöcker* and *Petersen* (1975), *Jakobsson* (1976), *Kakwani* (1977).

gression in only one point of the income scale.[2] *Kakwani* (1977) prefers a measure which expresses the severity of progression for the entire income area in a single number.[3] The question is whether a single number is capable to describe adequately the progressivity of an income tax system. To find out we have to define the factors which influence this measure.

The measure of progressivity (P) — as proposed by *Kakwani* (1977) — represents the area between the Lorenz curve of the distribution of the tax burden and the Lorenz curve of the gross income distribution. This can be formalized as the difference between the Gini index (C) of the distribution of the tax burden and the Gini index (G) of the distribution of the income before tax:

$$P = C - G \quad (1)$$

The measure of progression P is determined by 1) the distribution of the income before tax, and 2) the yield elasticities referring to the individuel incomes before tax (called "liability progression" by *Musgrave* and *Thin,* 1948):

$$E_{t,y} = \frac{dt}{dy} : \frac{t}{y} \quad (2)$$

This "liability progression" is defined as the relation between marginal tax rate $t^m = \frac{dt}{dy}$ and average tax rate $\bar{t} = \frac{t}{y}$ (t denotes individual tax yield, y individual gross income). This "microeconomic yield elasticity" can appear in the income scale in values between ∞ (for incomes which tend to zero) and one (for incomes which tend to infinite), if we assume an income tax system with delayed progression[4] over the whole range.[5]

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[2] The same is true for the "marginal rate progression" as well as the "liability progression" and the "residual income progression" proposed by *Musgrave* and *Thin* (1948).

[3] This comes close to the "effective progression" of *Musgrave* and *Thin* (1948); see also the measures proposed by *Dalton* (1955) and *Wenk* (1947).

[4] We get a delayed progression when the "average rate progression" drops with growing income and when its first derivative (= second derivative of the average tax rate function) is negative. This type of progression is dominant in most countries of the Western world. It keeps the marginal tax rate from exceeding a certain, politically fixed maximum; see *Blöcker* and *Petersen* (1975).

[5] We always get a delayed progression in the case of an indirect progression. The tariff is: $t = a\,(y - b)$ (a denotes the marginal tax rate, b the exemption). Consequently the yield elasticity results from:

$$E_{t,y} = \frac{1}{1 - \frac{b}{y}}, \text{ with } \lim_{y \to 0} E_{t,y} = \infty \text{ and } \lim_{y \to \infty} E_{t,y} = 1 .$$

If income is equally distributed ($G = 0$) or completely concentrated ($G = 1$) the measure P corresponds to be zero, because than the distribution of tax burden is equally distributed ($C = 0$) or completely concentrated ($C = 1$) too. Whether P is positive or negative depends on the type of the tax system (progressive or regressive). The numerical value depends on the degree of unequal distribution of incomes and the values of microeconomic yield elasticity over the income scale. Therefore the question is: how effective is P as measure of progression?

1. Obviously only a single number as measurement, which expresses the progressivity of an income tax system, expresses little about the different types of tariffs and exemption regulations, the irregularities and injustices, which may stay behind.[6] If we assume that an income tax system has to fulfill certain material tax criteria and formal tariff-criteria,[7] it should be clear that a single number will not respond to the requirements of an investigation as to whether these conditions have been met.

2. The value of this measure is not only dependent — as has been mentioned above — on the exemption regulation and the tariff structure, it is also determined by the distribution of the gross income Y in the income classes. Thus quite different measures of progression can result from the assumption of two different income distributions in the very same income tax system: if, e.g., P is very high this is not necessarily a consequence of a particularly steep rise of the tariff progression; it can also be caused by the concentration of incomes in the lower income brackets, where yield elasticity is higher. If P is very low, however, this may under certain circumstances result from a concentration of income in the upper income brackets, where yield elasticity is lower.

Thus we can trace the differences in the data of P to two distinct causes: either they result from different income tax systems and/or different income distributions. Those components cannot be separated. Apart from these P creates even more problems, which are primarily of a statistical-technical kind.

3. An insolated analysis of Gini indices without the investigation of the Lorenz curves on which they are based seems to be doubtful particularly in the dynamic analysis. Since the Lorenz curves of the income distributions of two consecutive periods can intersect, an assessment of the changes in distribution (toward equal and unequal

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[6] See *Pollak* (without date).
[7] See *Pigou* (1956) and *Petersen* (1976/77; 1977).

distribution respectively) is impossible,[8] the estimated Gini indices are not correct. Consequently the measure of progression P gives no evidence.

4. In the case of classified empirical income distributions the estimation of Lorenz curves and Gini indices with standard numerical approaches might lead to incorrect conclusions, if incomes grow at a fixed rate:[9] the Lorenz curve should be the same, but estimates give a changing one.[10] Three factors determine direction and extent of this "class phenomenon": a) the classification of the income distribution, or more precisely, a_1) the number of size groups and a_2) the change (increase) in the length of interval over the income scale; b) the structure of the income distribution itself: b_1) uni- or multimodal, b_2) skewed to the left or skewed to the right and c) the magnitude of income growth.

Apart from these theoretical and statistical shortcomings of the measure of progression P it seems important to state, that *Kakwani* (1977) neglects particularly the microeconomical, functional interdependence between the distribution of the tax burden and the distribution of net income. This may have caused his faulty interpretation of the "effective progression" as well. We shall try to clear up this problem in the following section.

III. The Interdependence of Yield Elasticity and Residual Income Elasticity

While the yield elasticity essentially determines the distribution of the tax burden, the distribution of the net income is influenced by the elasticity of the individual residual income y^n referring to the individual gross income y:

$$E_{y^n, y} = \frac{dy^n}{dy} : \frac{y^n}{y} . \tag{3}$$

This measure is defined as the relation between marginal and average residual income rate.[11] It was also called "residual income progression" by *Musgrave* and *Thin* (1948). An elasticity larger than one is equivalent to a regressive tax, of one corresponds to a proportional tax,

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[8] See *Krelle* (1962).

[9] In practice at least part of the income increase of any period has the character of growth at a fixed rate, e. g., that part which is destined to compensate the general inflation rate.

[10] Accordingly the Gini index changes; see *Petersen* (1979 a).

[11] $\frac{dy^n}{dy} = \left(1 - \frac{dt}{dy}\right)$ and $\frac{y^n}{y} = \left(1 - \frac{t}{y}\right)$.

and of less than one to a progressive tax. If we assume again an income tax tariff with delayed progression over the whole range, the residual income elasticity in the case of low incomes (below the basic exemption) is equal to one. Growing incomes then cause values below one. Finally it rises again — after having reached a minimum — for higher incomes and converges toward one in the infinite.[12]

Musgrave and *Thin* (1948) proposed as a measure of progression the quotient of the Gini index of the distribution after tax and the Gini index of the distribution before tax. This is similar to the measure of progression P preferred by *Kakwani* (1977). This measure called "effective progression" by *Musgrave* and *Thin* (1948)[13] depends on the distribution of gross income and the development of the residual income elasticity. *Kakwani* (1977), however, goes wrong in taking P to be a measure of progressivity and the "effective progression" as a measure of the distributive effects of the tax system. The correct notation for P would be "measure of the distribution of tax burden" and for the effective progression "measure of the redistribution of income". Both describe — under the restrictions made above — the progressivity of a tax system, for the determinants of these measures — the yield elasticity and the residual income elasticity — are functionally coherent.

The yield elasticity (2) can be divided in:

$$E_{t,y} = E_{\bar{t}\,.\,y} + 1;^{14} \tag{4}$$

$E_{\bar{t}.y}$ represents the elasticity of average tax rate $\bar{t}$ referring to the gross income y. Correspondingly the residual income elasticity can be divided into:

$$E_{y^n,y} = E_{\bar{y}^n.\,y} + 1 \ . \tag{5}$$

The elasticity of the average residual income rate $\bar{y}^n$ referring to the gross income can be expressed as:

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[12] In a proportional income tax system ($E_{t,y} = 1$ and $E_{y^n,y} = 1$) the Lorenz curves of the distribution of the gross income, of the tax burden, and of the net income will coincide ($P = 0$).

[13] The critical remarks about measure of progression P also apply to this measure.

[14] $$E_{t,y} = \frac{d\,(\bar{t}\cdot y)}{dy}\cdot\frac{y}{(\bar{t}\cdot y)} = \left[\frac{d\bar{t}}{dy}\cdot y + \bar{t}\right]\cdot\frac{y}{(\bar{t}\cdot y)} \ .$$

Consequently:

$$E_{t,y} = \frac{d\bar{t}}{dy} : \frac{\bar{t}}{y} + 1 \ .$$

(6) $$E_{\bar{y}^n, y} = \frac{d\,(1-\bar{t})}{dy} \cdot \frac{y}{(1-\bar{t})} \, .$$

Consequently:

(7) $$E_{\bar{y}^n, y} = \frac{d\bar{t}}{dy} : \frac{\bar{t}}{y} \cdot \frac{\bar{t}}{(1-\bar{t})}$$

or:

(8) $$E_{\bar{y}^n, y} = - E_{\bar{t}, y} \cdot \frac{\bar{t}}{(1-\bar{t})}$$

respectively:

(9) $$E_{y^n, y} = 1 - E_{\bar{t}, y} \cdot \frac{\bar{t}}{(1-\bar{t})} \, .$$

The residual income elasticity thus depends on the elasticity of the average tax rate as well as on the relation between the average tax rate and the average residual income rate.

This confirms *Kakwani's* statement: the residual income elasticity — and consequently the distribution of net income — depends in a particular way on the average tax rate $\bar{t}$.[15] On the other hand in view of:

(10) $$E_{t, y} = 1 - E_{\bar{y}^n, y} \cdot \frac{\bar{y}^n}{(1-\bar{y}^n)}$$

we can say that the yield elasticity — and consequently the distribution of the tax burden as well — depends in a particular way on the average residual income rate $\bar{y}^n$.[16] The average tax rate $\bar{t}$ as well as the average residual income rate $\bar{y}^n$ are potential parameters of action used by state authorities. We have to keep in mind, however, that establishing one parameter requires uno actu the establishing of the other. Which parameter is changed depends on the decision on distribution of legislator.

Thus microeconomic yield elasticity and microeconomic residual income elasticity are not contrary measures. Both describe the progres-

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[15] An exogenous, steady rise of the average tax rate $\bar{t}$ (for example a doubling) for all tax payers would, as could easily be shown, keep the yield elasticity constant, and would cause the residual income elasticity to decline, since the relation $\bar{t}/(1-\bar{t})$ rises. Distribution of tax burden would be constant while distribution of net income would change.

[16] Correspondingly a cut by half of all individual average residual income rates $\bar{y}^n$ would keep the residual income elasticity constant, and would cause the yield elasticity to rise, since the relation $\bar{y}^n/(1-\bar{y}^n)$ decreases. Distribution of net income would remain constant while distribution of tax burden would change.

sion of an income tax system: one from the point of view of tax burden, the other from the point of view of the withdrawl effect of taxation; both are inseparable. If we base our calculations on the utility theory and if we assume further that taxes lower the level required for satisfying personal needs, we should prefer the residual income elasticity as a measure of progression. In general, both measures should be used because even big shifts in the distribution of tax burden could be compatible with constant distribution of the net income and vice versa.[17]

The statements given above should have convinced that the analysis of the development of the yield elasticity as well as of the residual income elasticity over the entire income area is decisive for a judgement of the progressivity of an income tax system. The next chapter serve to provide empirical evidence; as an example the income tax system of the Federal Republic of Germany is choosen.

IV. Measures of Progression for the German Income Tax System

The developments of the microeconomic yield elasticity over the entire income area of the German income tax laws of 1965, 1975 and 1978 are depicted in figure 1 (page 52).[18] This figure shows that in 1975 and 1978 the German income tax system has been of delayed progressivity in all areas.[19] The large leaps in the developments of the microeconomic yield elasticity (1975 and 1978) are to refer to jumps in the marginal tax rate of the tariff, while the smaller leaps are the result of the limitation of the exemptions especially for social insurance.[20] Figure 2 (page 52) shows the corresponding developments of the microeconomic residual income elasticity.

Both figures demonstrate — constant tax law assumed — that especially small earners, who are just covered by taxation, and the incomes of the middle bracket are subject to an extremely severe progression. If the income tax reform from 1975 as well as from 1978 are taken into account we can note, that they create an increase[21] of the yield elasticity especially for the incomes of the middle bracket, while the residual income elasticity is declining. These developments point out the

[17] See *Jakobsson* (1976), *Niehans* (1958) and the appendix below.

[18] As example the exemption regulation of the "Lohnsteuerklasse I" (income tax on wages of unmarried employees) has been choosen.

[19] The German income tax tariff of 1965, however, showed an area of accelerated progression (first derivative of average rate progression positive) as well; see *Blöcker* and *Petersen* (1975). Since the last reform of the income tax tariff in 1979 once more we have an accelerated progression in the first area of direct progression; see *Petersen* (1980).

[20] See *Petersen* (1978).

[21] With the exeption of some small areas.

Figure 1:
yield elasticity

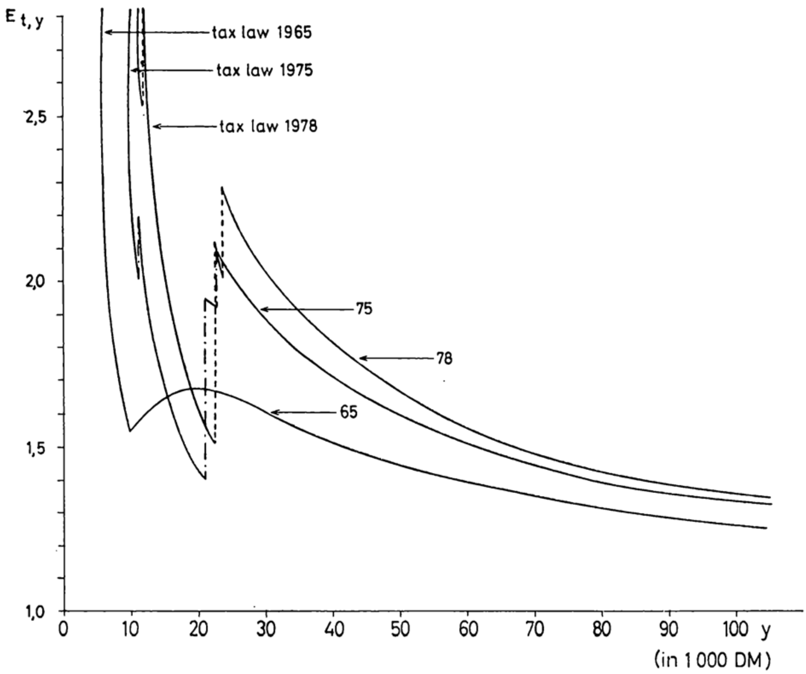
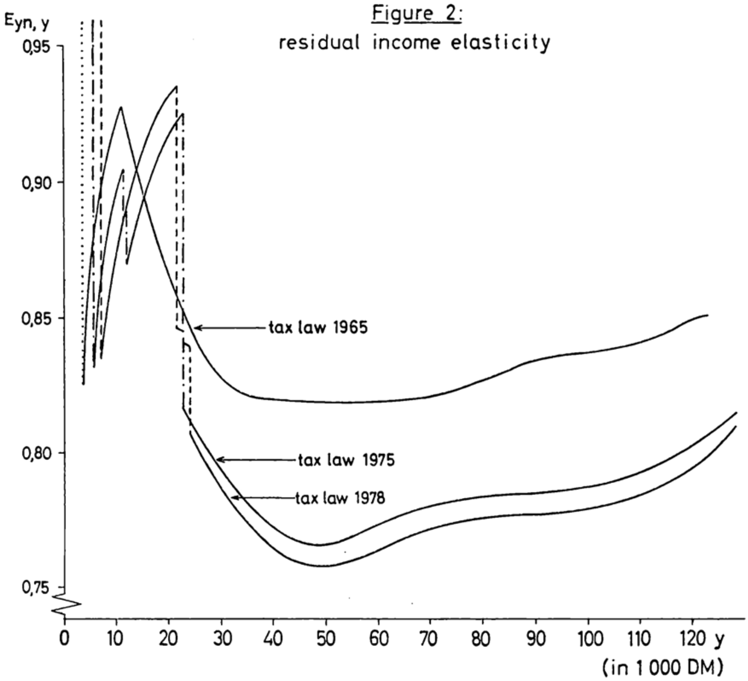


Figure 2:
residual income elasticity



fact that the progression of income tax almost in all areas has been strongly increased.[22]

The calculations of the microeconomic yield elasticity and the microeconomic residual income elasticity have proved that they make evident the different types of tariffs and exemption regulations; especially the leaps in the developments of the elasticities produce some injustices and refuse both principles, the ability-to-pay as the redistribution principle.[23]

Now let us have a look at the measure of progression P and the "effective progression". The following results are derived from a simulation model of the German income tax system.[24] Six consecutive simulation periods are taken into account ($t = 0, 1, \ldots, 5$); the income distributions before taxes of the basic period ($t = 0$) were extrapolated by 10 per cent each.[25]

Table 1 (page 54) shows the Gini indices of the distribution of the gross income G,[26] the tax burden C and the net income G^* in the simulation periods for the income tax system of 1965 and the distribution of tax payers of the "Lohnsteuerklasse I" of 1965. The "effective progression" EP results from:

$$EP = G^*/G \ . \tag{11}$$

If P is used as a measure of progression it declines with increasing individual incomes, which indicates a lower progression of the income tax system. On the other hand, if we use EP, it declines too but indicates an increase of progression.[27] But if we use our correct notation P indicates a levelling of the distribution of tax burden, whereas EP simultaneously indicates a more equal distribution of net income. This development of both distributions only shows that levelling the distribution of tax burden is not necessarily connected with a differentiation of the distribution of net income (and vice versa).[28]

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[22] This causes some probles especially if inflation is taken into account; see *Petersen* (1979 b).

[23] See *Petersen* (1976/77); such leaps are typical for most of the income tax systems of the Western world, e. g., *Levy* (1960).

[24] See *Petersen* (1977).

[25] For a discussion of the method, see *Petersen* (1979 a).

[26] The statistical shortcomings mentioned above do not occur here because of the particular method of extrapolation; see *Petersen* (1979 a). The Gini index of the gross income distribution remains constant, since all tax payers get the same income growth of 10 per cent. Thus nothing is changed in distribution.

[27] If P is declining (and tends to zero) the progression is declining too and vice versa; if EP is increasing (and tends to one), the progression is declining and vice versa.

[28] The development of the distributions depends on the values (especially the leaps) of the microeconomic elasticities; see *Petersen* (1979 b).

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Table 1

Gini indices, measure of progression P, and "effective progression" EP (1965 income tax system)

t	G[a)]	C	G*	P	EP
0	0.3591	0.5853	0.3376	0.2262	0.9401
1	0.3591	0.5681	0.3373	0.2090	0.9393
2	0.3591	0.5561	0.3367	0.1970	0.9376
3	0.3591	0.5473	0.3359	0.1882	0.9354
4	0.3591	0.5376	0.3352	0.1785	0.9334
5	0.3591	0.5309	0.3343	0.1718	0.9309

a) Distribution of the "Lohnsteuerklasse I" 1965.

Table 2

Gini indices, measure of progression P, and "effective progression" EP (1965 income tax system)

t	G[a)]	C	G*	P	EP
0	0.3834	0.5413	0.3531	0.1579	0.9210
1	0.3834	0.5375	0.3516	0.1541	0.9171
2	0.3834	0.5321	0.3503	0.1487	0.9137
3	0.3834	0.5272	0.3489	0.1438	0.9100
4	0.3834	0.5227	0.3475	0.1393	0.9064
5	0.3834	0.5184	0.3461	0.1350	0.9027

a) Distribution of the "Lohnsteuerklasse I" 1974.

Table 2 shows the corresponding values for the income tax system of 1965 but the distribution of the "Lohnsteuerklasse I" of 1974. Compared to 1965, the 1974 distribution became less equal ($G_{65} = 0.3591$; $G_{74} = 0.3834$); P and EP declined ($t = 0$ in table 2 compared with table 1). This change was caused only by the differentiation of the distribution because tax law was constant.

The following two tables show the corresponding values for the income tax system of 1975 (table 3) and the system of 1978 (table 4); in both cases the distribution of 1974 has been used. Now the changes in P and EP are refered to the changes in the tax law because distribution was constant. Only in this case it is correct to say that progression has been increased (compare table 3 and 4, $t = 0$).

In any case, the calculations make clear that the measure P as well as the measure EP give no evidence of the progressivity of a tax system, if both — the tax system itself and the income distribution — have been changed; then the values of *P* and *EP* are mainly dependent on the centre of gravity of the income distributions. For international comparisons, where usually the tax systems and the income distributions are quite different, these measures are absolutly unsuitable.

Table 3

Gini indices, measure of progression P, and „effective progression" EP (1975 income tax system)

t	G[a)]	C	G*	P	EP
0	0.3834	0.5756	0.3547	0.1918	0.9251
1	0.3834	0.5710	0.3526	0,1872	0.9197
2	0.3834	0.5676	0.3502	0.1838	0.9134
3	0.3834	0.5637	0.3477	0.1799	0.9069
4	0.3834	0.5606	0.3449	0.1768	0.8996
5	0.3834	0.5569	0.3423	0.1731	0.8928

a) Distribution of the "Lohnsteuerklasse I" 1974.

Table 4

Gini indices, measure of progression P, and „effective progression" EP (1978 inxome tax system)

t	G[a)]	C	G*	P	EP
0	0.3834	0.6069	0.3553	0.2235	0.9267
1	0.3834	0.6010	0.3529	0.2176	0.9204
2	0.3834	0.5974	0.3501	0.2140	0.9131
3	0.3834	0.5894	0.3478	0.2060	0.9071
4	0.3834	0.5820	0.3452	0.1986	0.9004
5	0.3834	0.5763	0.3424	0.1929	0.8931

a) Distribution of the "Lohnsteuerklasse I" 1974.

V. Concluding Remarks

The arguments given above show that the measure of progressivity of the income tax system proposed by *Kakwani* (1977) suffers from considerable theoretical and statistical shortcomings. It may have a certain significance as far as statistical comparisons are concerned. The use of Lorenz curves and Gini indices for the investigation of the effects on the distribution of tax burden and redistribution of net income may be quite efficient, if their weaknesses are taken into account. Our analysis has shown, though, that distribution of the tax burden and income distribution after taxes are essentially influenced by the development of the microeconomic yield elasticity and residual income elasticity, which again are functionally coherent. If the differences between the Lorenz curves of the distribution of the tax burden and the income distribution before tax is used,[29] indeed we get a single number of measurement. This number, however, does not tell us anything about the severity of the progression, as far as the individual tax payer is concerned.

A usefull measure of progression, however, has to satisfy the demand, i.e., to supply information on all areas of income — including those less occupied — as the severity of the progression. This can be satisfied particularly by the measures proposed by *Musgrave* and *Thin* (1948), the liability progression and the residual income progression. These should, however, be regarded as complementary measures of progression. Moreover they are usefull for international comparisons as well, since they are not affected by the different distributions of income in the individual countries.

Appendix

In the case of an income tax tariff of general form:

(1) $$t = a \cdot y^b \quad \text{with } a > 0 \quad \text{and} \quad b > 0 \ ,$$

the marginal tax rate t^m:

(2) $$t^m = b \cdot a \cdot y^{b-1}$$

and the average tax rate $\bar{t}$:

(3) $$\bar{t} = a \cdot y^{b-1}$$

the yield elasticity then is:

(4) $$E_{t,y} = \frac{b \cdot a \cdot y^{b-1}}{a \cdot y^{b-1}} = b \ .$$

It is thus constant for all incomes[30], while the residual income elasticity drops continuously from one to zero[31].

[29] The quotient of the Gini index of the net income distribution and the Gini index of the gross income distribution ("effective progression") respectively.

[30] This tariff produces for every income increase the same effects which *Kakwani* (1977) observed in the case of a doubling of all individual average tax rates: its yield elasticity is constant.

On the other hand, the income tax tariff of general form:

$$t = y - a \cdot y^b \quad \text{with} \quad a > 0 \quad \text{and} \quad b > 0 \tag{5}$$

shows a constant residual income elasticity that amounts to b[32], while the yield elasticity declines from ∞ to one. It is obviously that tariffs including constant yield elasticity (residual income elasticity) do not affect the distribution of the tax burden (income after taxes) in the case of growing incomes (except for the distribution effects at the date of their introduction). There is no way to construct a progressive tariff which includes a constant yield elasticity and the same time a constant residual income elasticity[33].

Summary

Recently there have been some publications on the progression of the tax system, especially of the income tax. *Kakwani* (1977) proposed a "new measure of tax progressivity" that — following *Kakwani* — expresses the severity of progression for the entire income area in a single number. This measure is based on the Gini index and comes close to the "effective progression" of *Musgrave* and *Thin* (1948). Both measures show theoretical and statistical shortcomings, especially they do not tell us anything about the serverity of the progression, as far as the individual tax payer is concerned. This can be satisfied particularly by the measures proposed by *Musgrave* and *Thin* (1948), the liability progression and the residual income progression. A simulation model for the German income tax system has been used to give some empirical evidence.

Zusammenfassung

In jüngerer Zeit wurden verschiedene Beiträge zur Progression des Steuersystems — insbesondere der Einkommensteuer — publiziert. *Kakwani* (1977) schlug ein „neues" Progressionsmaß vor, das seiner Meinung nach die Stärke der Progression für den gesamten Einkommensbereich in einer Zahl zum Ausdruck bringt. Diese Maßzahl basiert auf den Gini Index und ist der

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31 $y^n = y - (a \cdot y^b)$

$$\frac{dy^n}{dy} = 1 - a \cdot y^{b-1}$$

$$\frac{y^n}{y} = 1 - b \cdot a \cdot y^{b-1}$$

$$E_{y^n, y} = \frac{1 - b \cdot a \cdot y^{b-1}}{1 - a \cdot y^{b-1}}\,;\ \lim_{y \to 0} E_{y^n, y} = 1 \text{ and } \lim_{y \to \infty} E_{y^n, y} = 0\ .$$

32 $y^n = a \cdot y^b$

$$\frac{dy^n}{dy} = b \cdot a \cdot y^{b-1}\ ;$$

$$\frac{y^n}{y} = a \cdot y^{b-1}\ ; \quad \text{consequently:} \quad E_{y^n, y} = b\ .$$

33 See *Niehans* (1958).

„cffective progression" von *Musgrave* und *Thin* (1948) ähnlich. Beide Maße haben theoretische und statistische Schwächen; insbesondere bringen sie nicht die Stärke der Progression, der der einzelne Steuerpflichtige gegenübersteht, zum Ausdruck. Diese Anforderung erfüllen in besonderer Weise die von *Musgrave* und *Thin* (1948) vorgeschlagenen Steuerschuld- und Verfügungselastizitäten. Unter Zuhilfenahme eines Simulationsmodells für das deutsche Einkommensteuersystem wurden die Zusammenhänge empirisch untermauert.

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