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APPLICATION POSSIBILITIES OF PROGRESSIVE CONSUMPTION TAX

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2 RESEARCH BACKGROUND, AIMS

There is no consensus in economic and more specifically public finance thinking regarding the priority of consumption and income tax. I aim to demonstrate in my thesis that inasmuch progressive consumption taxation is established, it is more suitable than progressive income tax from the aspects of most criteria, especially that of equity and efficiency. The possibility has been given since Fisher (1942) and Káldor (1955) but in my thesis I will also consider the questions of feasibility and administrative burdens involved

Although it is an old question my thesis looks at, it is nevertheless a burning one currently. It is a sign of the unhealthy state of the economy that in the period prior to the current crises the population got into a net creditor position for which equation two (parallel) factors are responsible: the low level of savings and credit covered consumption. Expenditure tax would be beneficial for both phenomena which inspire us to compare it to the income tax reigning currently. In Fisher's time excessive saving was characteristic so the discouraging of consumption wasn't desirable, which is one reason why his idea wasn't received with great enthusiasm. The current era of crises management is subject to the same evaluation so this is not necessarily the time when a consumption based tax should be introduced even if it might be beneficial in the long run.

The view, that linear or flat taxes as they are more popularly known are not so beneficial as they were expected to be, is more and more justified nowadays. It was the simultaneous presence of other factors that may be credited for the economic growth that was felt at the place of the introduction of flat rate taxation. (see for example Erdős, 2012) The presumably short lived linear taxes will most likely be overtaken by the application of progressive taxation This is another reason why it is especially important to introduce and describe the systems of progressive taxation and the expansion and application of the terms

used to describe linear taxes by tax studies. We can hardly find scientific publications which assume progressive rates of taxation.

In my study I am comparing and contrasting progressive consumption tax with progressive income tax along important features which have formed the bases of the expectations of the given system of taxation for centuries. The weight of the criteria vary from era to era and from writer to writer but non of them may be neglected. Efficiency, equity and neutrality are among the aspects to be examined.

- (1) According to my first hypothesis, *in a one-period model the effect on efficiency of equivalent progressive consumption and income taxes can be expected to be the same.*
- (2) Contrary to this, I expect based on my second hypothesis *that considering more periods progressive consumption tax doesn't distort intertemporal consumption decisions as much as progressive income tax as the latter punishes fluctuating income flow.*
- (3) In a model encompassing more time periods we are able to discuss savings too so according to my third hypothesis income tax levied on capital income distorts intertemporal decisions to a greater extent than consumption tax.
- (4) In my fourth hypothesis what I expect is that *progressive consumption tax better satisfies the criterion of equity than progressive income tax.*
- (5) According to my fifth hypothesis *progressive consumption tax satisfies the criteria of neutrality while income tax hurts this criterion in some cases.*

3 MATERIAL AND METHODOLOGY

I am basically making use of the normative approach to public finance in my study while trying to find the answer to the question of which system of taxation would be better from society's point of view. In this process I can't avoid the positive questions of public choice: to what extent can either system safeguard against cheating and what are their respective administrative burdens. I will deal with these topics in the literature review section of my study.

I will analyse the particular tax system criteria in a partial model, since the tax theory literature often makes do with thinking in a single decision space even in the comparative analyses of linear taxes, thereby limiting the number of endogenous variables. Nevertheless I will always show the various income paths of various individuals in order to study in each period the decision making position of people with high, low and fluctuating incomes.

Tax theory research measures the *efficiency* of taxes by the dead weight loss caused by them. Dead weight loss can be calculated by consumer and producer surpluses as well as from the compensational or equivalent variables. However, these are based on uncertain estimation processes and subjective factors. In itself, in order to demonstrate the presence of dead weight loss, it is sufficient to examine the price rate of budget constraint relating to the tax. Price is an objective, evident data so this is what I concentrate on in my analyses I will only concentrate on the question of whether in the given country the price ratio of the goods changes as a result of the taxes and whether or not dead weight loss is created.

During my equity comparison the answer I was looking for is how the choice of tax base influences inequality. That is, does progressive consumption tax or progressive income tax decrease the inequalities to a greater extent present in society? In my dissertation I will calculate in a two time period model

whether it is progressive income tax or progressive consumption tax decreases the Gini coefficient (used to indicate inequality in social income distribution)

I used the tax payer's life time income to describe the shaping of *neutrality* and I presented an example when progressive income tax changed the rank order of individuals. Besides the consumption tax I demonstrate that an individual's taxed life time income can only be higher than an other individual's if the same relation was true for the before tax income.

I need to determine the consumption career for both the efficiency and the equity comparisons besides the income career. Instead of the mainstream utility maximalising individual I assumed consumption smoothing individuals, which is a generally accepted, less restricting method for assessment.

Consumption smoothing is the observable phenomena that throughout their life the consumption pattern of individuals follows a more or less steady path. It is much less volatile than their income, which can have fluctuating value throughout their life. The consumption functions used in macroeconomic models grab this behaviour in many different ways. In my dissertation I will demonstrate the concepts of Keynes, Modigliani, Friedman and also the buffer-stocks and habit-persistence theories. The newer and newer models deal with the shortcomings of the previous models but in the end they explain the same observations: what consumer decision precedes the phenomena of consumption smoothing.

In the multitemporal model of efficiency, equity and neutrality I consider *tax paying obligation* for both consumption and income tax only *in the period* in the budget constraints in which *they can be defined as income or consumption*. This is evident in the case of income tax as the employer continuously deducts the tax from the wages of the employees who hence gets the net, after tax earnings. In case of consumption tax the magnitude of the tax can only be determined later as it not only depends on the income earned in the period but also on the end of your bank account balance among others. So, in

order to ensure continuous revenues for the state, I think it is necessary to pay tax advance in the base period, the base of which may be the previous period. If we accept the assumption of consumption smoothing, we won't (significantly) deviate from the tax burden which is determined later.

I must emphasize here the strictness of the models and formulations which obviously limit the gained results. One such important limitation is that the consumers do not leave an inheritance, and do not inherit anything themselves and have no wealth at the start of their lives. These are very strong assumptions, even if many economic models are based on them.

4 RESULTS

4.1 Results of efficiency comparisons

4.1.1 The comparison of progressive consumption tax and labour income tax during the intratemporal choices made on the consumption of various goods.

Let us examine how progressive consumption tax and labour income tax influence the decision set of individuals, assuming one period. Let's start from the position that the consumer's (exogene for now) income must cover his or her expenditures, which may be consumption driven or public duties to the state.¹

It is easy to see that given the correlations below, *within the same period the decision space of particular types of tax will be the same and there won't be any distorting effect.*

$$t_j = \frac{\tau_j}{1 - \tau_j}, \quad j \in (a, f) \quad (4.1)$$

$$\bar{C} = \bar{Y}(1 - \tau_a), \quad (4.2)$$

Where t : tax rate of expenditure tax and

τ : tax rate of income tax.

Practically, in a single time period model neither the general progressive consumption tax (covering all products) nor progressive income tax modifies the relative prices of given goods so neither of the taxes distort the consumer decision about which good to choose. As soon as we make the individuals income endogen, through choosing an income the individual will be able to influence his or her tax duties and his or her decision will be distorted.

¹As we are talking about a single period, we don't have to consider savings

4.1.2 The comparison of progressive consumption tax and labour income tax in light of the intratemporal choices of work and leisure time.

Let's consider the case when the income of the individual is based on his or her decision, which is the result of the choice between time allocated to work and leisure. I start from the fact that the time people have is limited (for example 24 hours a day or 168 hours a week.) If the individual spends time on work, he or she will receive a given amount of externally determined remuneration which can be spent on consumption but after a certain level of consumption, spending time on leisure might be worth more to the individual than on work. Let us further suppose that the decision maker lives only certain amounts of time, and can consume a single product, which product should be numeraire good by nature, so its price should be a unit. By choosing the amount of time spent on work, the individual can optimise the wellbeing achievable by work and leisure. We can write the budget constraint (without taxes as yet) of the decisions accordingly:

$$C = Y = w \cdot (\bar{L} - L) \quad (4.3)$$

Where:

C: amount of consumption,

Y: earned (work) income,

w :real hourly wage (expressed in numeraire good),

\bar{L} : all the time at the individuals disposal,

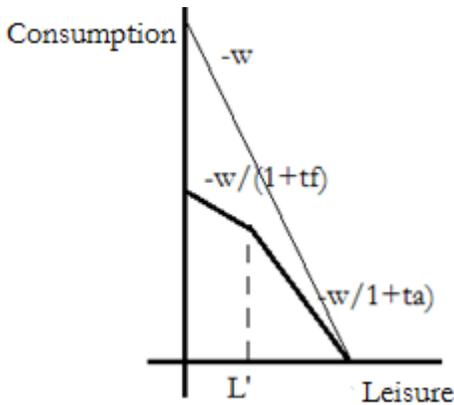
L: amount of leisure.

With progressive consumption taxes, the written budget constraint in (4.4) and (4.5) changes thus.

$$C = \frac{Y}{1 + t_a} = \frac{w \cdot \bar{L} - w \cdot L}{1 + t_a}, \text{ if } Y \leq \bar{E} \quad (4.4)$$

$$C = \frac{Y + \bar{E}(t_f - t_a)}{1 + t_f} = \frac{w \cdot \bar{L} + \bar{E}(t_f - t_a) - w \cdot L}{1 + t_f}, \text{ if } Y > \bar{E}. \quad (4.5)$$

In the consumption - leisure space, the consumption constraint breaks at the $L' = \bar{L} - (1 + t_a) \cdot \bar{E} / w$ leisure amount as can be seen in figure 4.1. In case of consumption less or more than L' , sacrificing one unit of leisure will result in $w/(1 + t_f)$ and $w/(1 + t_a)$ make up consumption. Besides, the budget line does not only break but also changes from the original. Its steepness changes on both sections as the original exchange relationship was the w real wage so the choice is distorted. *There is also a substitution effect besides the income effect.*



4.1. Graph: Budget constraint of leisure - consumption (original work)

Let's look at the decision situation above with progressive labour income tax. The budget constraint changes according to equation (4.6) and (4.7) .

$$C = Y(1 - \tau_a) = w \cdot (\bar{L} - L)(1 - \tau_a), \text{ if } Y \leq \bar{Y} \quad (4.6)$$

$$C = w(\bar{L} - L)(1 - \tau_f) + \bar{Y}(\tau_f - \tau_a), \text{ if } Y > \bar{Y}. \quad (4.7)$$

The constraint also brakes in this case, notably at the $L'' = \bar{L} - \bar{Y} / w$ point. In case of choosing more or less free time than L'' - the unit leisure sacrifice $w(1 - \tau_f)$ or $w(1 - \tau_a)$ leads to additional consumption. So the original exchange position ($-w$) has changed in this situation, too. The tax distorts the decision. Since both taxes distort the choice, the question is which one does more so. It is easy to see that in the case of equivalent rates and bands *the effects*

of the taxes are exactly the same as the breaking points are mathematically the same ($L' = L''$) and the steepness ($w/(1+t_f) = w(1-\tau_f)$ and $w/(1+t_a) = w(1-\tau_a)$). That is, for both the consumer tax and the labour income tax there is substitution effect in the choice between work and free time thereby distorting the economic decisions.

Based on subsections 4.1.1 and 4.1.2, in a single time period model there is no efficiency difference between progressive consumption tax and progressive income tax, their distorting effect in the same decision situation is the same magnitude.

4.1.3 Comparing and contrasting progressive consumption and labour income tax during consumption choices made in different periods.

Let us examine the intertemporal decision faced by the consumer having exogen income. Let us start again by analysing the behaviour of progressive consumption tax. Looking at two time periods, the budget constraint will turn out according to Figure 4.2. where the total consumption in given periods is measured on the different axes. The dotted line denotes the band borders of consumption tax (\bar{C}) at which the budget constraint is broken due to the progressive tax rate just as it happened in case of the work. In the various periods the rate bands divide the goods space into four parts and the budget constraint is differently modified in the different parts.

In section 2 and 3 the original and the after tax budget constraints are parallel as their steepness is the same, their value is: $-(1+r)$. The result of this parallelism is that *there is no substitution effect in either sections 2 or 3 only income effects. The consumer gets into these situations if he or she wants to smooth consumption.* Assuming consumption smoothing, the consumption career is typically rather straight throughout one's life so from here on our point

of departure will be that the tax payer deviates from the band border in both periods in the same direction, meaning that he or she will choose good depending on income in section 2 or 3. In what follows section 2 and 3 will be regarded as *the relevant decision plane*.

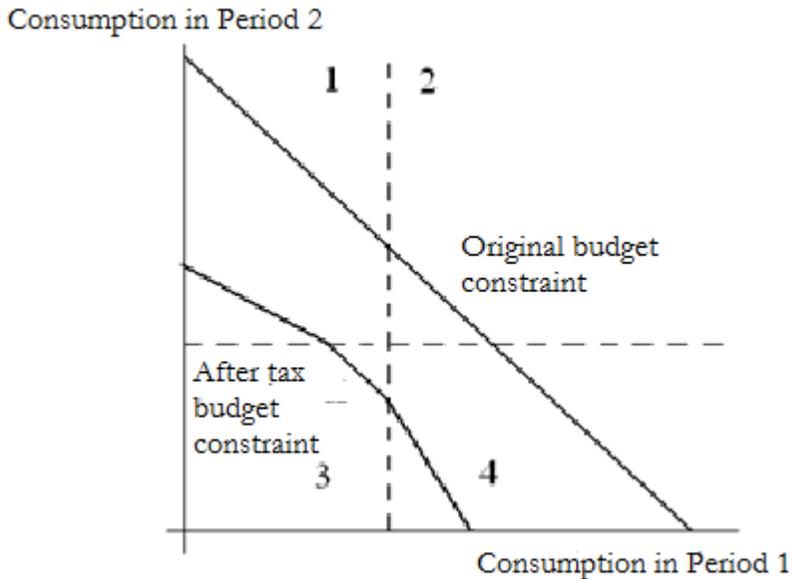


Figure 4.2. Budget constraint in case of progressive consumption tax.

4.1 Table Income flow sub cases (Own design)

| Income flow: | $Y_1 \leq \bar{Y}$ | $Y_1 > \bar{Y}$ |
|--------------------|--------------------|-----------------|
| $Y_2 \leq \bar{Y}$ | „Low” | „Decreasing” |
| $Y_2 > \bar{Y}$ | „Increasing” | „High” |

We must differentiate four types of income flow in order to analyse the effect of income tax. These are summarised in table 4. The so called ‘high’ and ‘low’ income flow denote those cases where someone has labour income above and below the income tax band border (\bar{Y}) in both periods. The income flow is ‘increasing’ or ‘decreasing’ for the person who had labour income above or below the tax band border in the first period and labour income below or above in the second. Based on the calculations, we found that the last two income flows behaves the same way with respect to taxation so the number of cases to

be examined may be reduced to three. ('low', 'unsteady' and 'high' income paths)

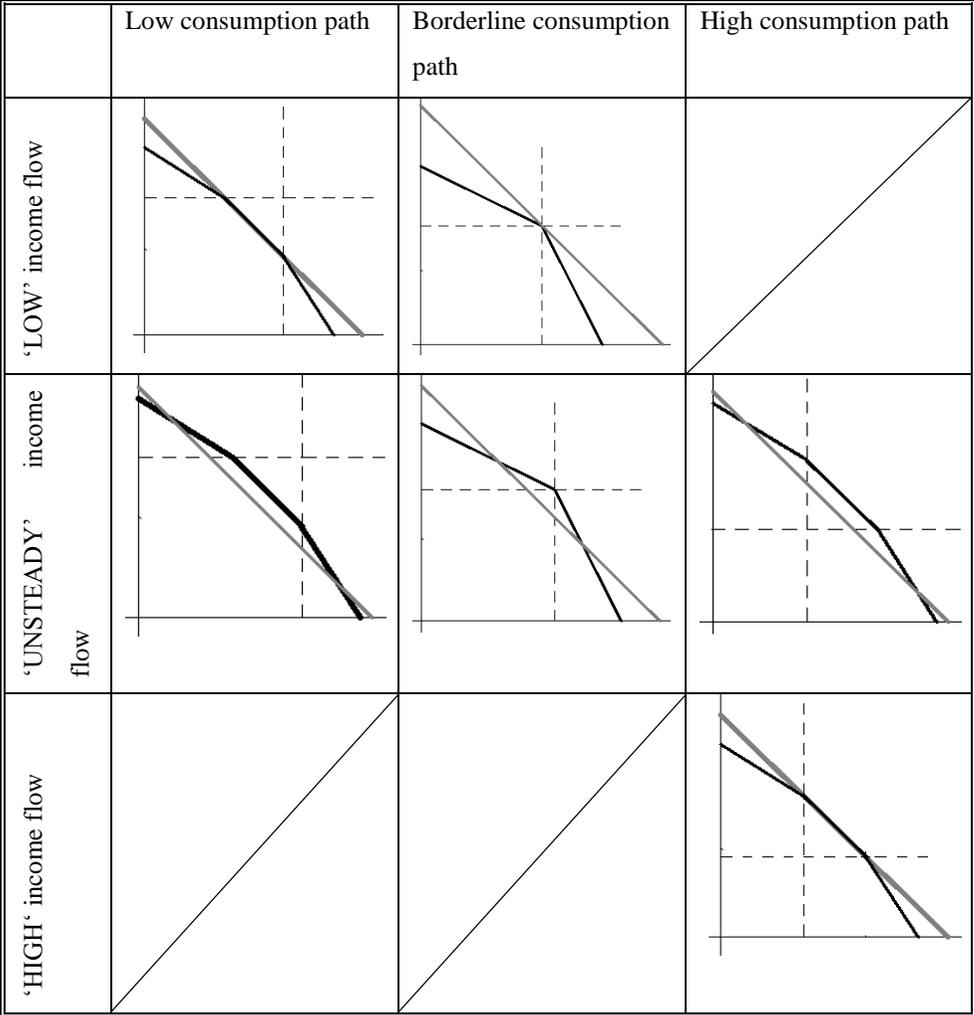


Figure 4.3. Budget constraints after the introduction of progressive labour income tax and consumption tax in case of different consumption and income paths (own design based on own calculations)

The consumption path can turn out in three different ways depending on the life path income (assuming consumption smoothing) happening in both periods on, below or above the rate border. Similiar to the income flow, we can call them high, low or borderline consumption path. In total then, we can imagine

three- three different income and consumption paths which in theory can be ‘paired’, so in total we must examine in 3x3 how progressive consumption and income based taxation can shape up in intertemporal decisions. Figure 4.3. sums up the achieved results with grey denoting the budget constraints of income tax, black is the budget constraint of consumption tax and dotted line is border of consumer tax rate.

Let us consider the cases in the relevant decision spaces.

(1) *Low consumption path* ($C_1, C_2 < \bar{E}$) – *low income flow* ($Y_1, Y_2 \leq \bar{Y}$)

After levying consumption and income tax, the budget constraints coincide. There is only income effect in both cases and there is no substitution effect.

(2) *Low consumption path* ($C_1, C_2 < \bar{E}$) – *unsteady income flow* (2a. decreasing $Y_1 > \bar{Y} \geq Y_2$ or 2b increasing $Y_1 \leq \bar{Y} < Y_2$)

After levying consumption and income tax the budget constraints do not coincide. Although there is no substitution effect, the income effects differ. (2a)

In case of decreasing income flow the income tax $(Y_1 - \bar{Y})(\tau_f - \tau_a)$ sum, (2b) In case of increasing income flow $(Y_2 - \bar{Y})(\tau_f - \tau_a)/(1+r)$ sum extra is deduced from the life path income discounted for the first period.

(3) *Low consumption path* ($C_1, C_2 < \bar{E}$) – *high income flow* ($Y_1, Y_2 > \bar{Y}$)

This is only a theoretical possibility as the person with high income flow is bound to choose high consumption path due to utility maximisation as he or she is covering expenditure.

(4) *Borderline consumption path* ($C_1, C_2 = \bar{E}$) – *low income flow* ($Y_1, Y_2 \leq \bar{Y}$)

This is only possible in case of $Y_1 = Y_2 = \bar{Y}$ so we are only analysing a single point. So the only question that makes sense is looking at what happens in the case of given taxes if one wants to move from consumption point (\bar{E}, \bar{E}) . In

case of income tax there is still no substitution effect. There is in case of consumption tax but the decision maker must have rather unrealistic preferences to be even worth making a move. Hence in case of consumption smoothing there is practically no difference between consumption and income tax.

(5) *Borderline consumption path* ($C_1, C_2 = \bar{E}$) – *unsteady income flow*
 (5a. decreasing $Y_1 > \bar{Y} \geq Y_2$ or 5b. increasing $Y_1 \leq \bar{Y} < Y_2$)

If the decision maker has unsteady income flow the borderline consumption line can be achieved by consumption tax but at the same level of life time income this can't be chosen with income tax because with income tax the effect of income is greater (5a) with decreasing income flow $(Y_1 - \bar{Y})(\tau_f - \tau_a)$ sum, (5b) in case of increasing income $(Y_2 - \bar{Y})(\tau_f - \tau_a)/(1+r)$ sum (again discounted for the first period). So in the relevant decision space in case of marginal change although the consumption tax distorts, there is substitution effect but even like this it secures bigger choice than income tax since this subtracts more.

(6) *Borderline consumption path* ($C_1, C_2 = \bar{E}$) – *high income flow* ($Y_1, Y_2 > \bar{Y}$)

This is also just a theoretical possibility as the person with high income flow covers his or her expenses so high consumption path will be chosen for utility maximalisation. .

(7) *High consumption path* ($C_1, C_2 > \bar{E}$) – *low income flow* ($Y_1, Y_2 \leq \bar{Y}$)

This is not even a theoretical possibility because high consumption path cannot be ensured with low income flow.

(8) *High consumption path* ($C_1, C_2 > \bar{E}$) – *unsteady income flow* (8a. decreasing $Y_1 > \bar{Y} \geq Y_2$ 8b. increasing $Y_1 \leq \bar{Y} < Y_2$)

After levying income tax and consumption tax, the budget constraints do not coincide, although there is no substitution effect anywhere but the income

effects differ. (8a) In case of decreasing income flow the *income tax* $(\bar{Y} - Y_2)(\tau_f - \tau_a)/(1+r)$ sum, (8b) in case of increasing income flow $(\bar{Y} - Y_1)(\tau_f - \tau_a)$ sum extra is deduced from the life career income discounted for the first period.

(9) *High consumption path* $(C_1, C_2 > \bar{E}) - \text{high income } (Y_1, Y_2 > \bar{Y})$

The budget constraints coincide after levying income and consumption tax, There is only income effect in both cases and neither has substitution effect.

Altogether the taxpayer is worse off with progressive income tax in cases (2), (5) and (8), that is when the income flow is unsteady between the time periods. In any other situation involving decisions within a single time period or between periods, income tax and consumption tax have the same effect on it in all the relevant decision spheres. The only exception is the point when in both periods \bar{Y} income is made from which \bar{E} is consumed because here the consumer tax ensures worse exchange possibility if he or she wants to deviate from perfect consumption smoothing. We can practically say nevertheless that progressive income tax results in at least as much but in cases there is even more (with unsteady income) excess withdrawal than consumption tax.

Examining the question from a social point of view, we do not find such a serious diversion. *The excess withdrawal appearing with progressive income tax (stemming from unsteady income flow) is realised for the state.* It is only the deadweight loss that ruins the cumulative balance of tax levier and tax payer for which the substitution effect is responsible. However this effect is the same in almost every decision making situation for the two tax types. There is only variance in the (\bar{C}, \bar{C}) consumption path for the disadvantage of the consumer tax. What this means in practice is *that there is no difference between the two rateable values from the perspective of efficiency. They cause the same level of deadweight loss.* Due to the differing level of tax withdrawal there is ‘only’ the question of justice, to be discussed in another chapter.

4.1.4 The expansion of the comparison of progressive consumption tax and labour income tax to capital income tax in making consumption choices in different periods

It is not worth looking at capital income tax in single time period decision making (since people make no savings) so I did not differentiate income based on its source. In a multi period model, savings generate an interest in the next period and they maybe levied with a positive level tax. We saw in sub-chapter 4.1.3. that income tax does not distort intertemporal consumption and hence saving decisions if it only burdens income tax and not capital income tax. In reality it is rather rare that a government doesn't use the revenue source provided by capital income tax. In this chapter of my dissertation I will examine how the intertemporal budget constraint and hence consumer decisions are influenced by a linear interest tax levied beside a progressive labour income tax. Using the previous symbols, the new budget constraint is given by equations (4.8) and (4.9).

$$C_1 + C_2/[1 + r(1 - t_k)] = Y_1^r + Y_2^r/[1 + r(1 - t_k)], \text{ if } Y_1^r > C_1 \quad (4.8)$$

$$C_1 + C_2/(1 + r) = Y_1^r + Y_2^r/(1 + r), \text{ if } Y_1^r \leq C_1 \quad (4.9)$$

Where Y_i^r stands for the work income in period i , and t_k is the (linear) rate of a capital income tax.

If the consumer has savings, that is he or she consumes less than his or her total labour income in this period, than interest tax must be paid according to (4.8). *The interest tax distorts the intertemporal consumption decision as it may change the relative price of consumption in the various periods and has substitution effect with the consumer.* Because if he or she would like to increase the consumption of the second period by a unit, he or she must decrease that of the first period by $1/(1+r(1-t_k))$ unit while before the introduction of interest tax he or she only had to give up $1/(1+r)$. Consumption in the first period became relatively cheaper with the tax so it is worth substituting that of

the second period. This leads to a drop in savings and encourages to consumer to larger than optimal credit uptake.

There is no need to examine the effect of linear income tax as capital income is already taxed by progressive consumption tax in such a way that it does not encourage credit uptake (at least not larger than optimal) and does not ‘discourage’ savings (in case of relatively smooth consumption, that is, when in both periods the consumer chooses between the same two band borders)

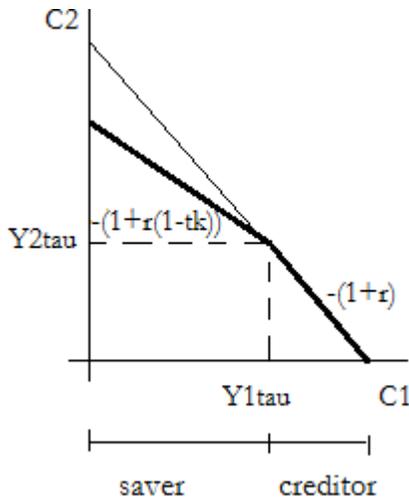


Figure 4.4. Intertemporal budget constraints with capital income tax. (own work)

4.2 Results of Equity Comparison

4.2.1 The construction of the Model – Stylized facts

Table 4.2: Pre-tax life-path incomes

| | | Second period | |
|--------------|--------------|----------------------------|----------------------------|
| | | (w_a, p_a) | (w_m, p_m) |
| First period | (w_a, p_a) | $Y_{aa} = w_a + w_a/(1+r)$ | $Y_{am} = w_a + w_m/(1+r)$ |
| | (w_m, p_m) | $Y_{ma} = w_m + w_a/(1+r)$ | $Y_{mm} = w_m + w_m/(1+r)$ |

Supposing that the economic individuals live for two periods, in which p_a ($0 < p_a < 1$) part of the society earns w_a , while the others ($0 < p_m = 1 - p_a$ part of society) earn w_m work-related income, where $w_a < w_m$. Let us

suppose that no-one has any initial wealth, and let us leave out of consideration any possible inheritance, that is to say, everyone exhausts their reserves by the end of the second period. The income flow of the two periods are independent of each other, creating four types of income flow, as Table 4.2 illustrates. $p_i \cdot p_j$ (henceforth denoted p_{ij}) part of the people have life-earnings for the first period discounted as: $Y_{ij} = w_i + w_j/(1 + r)$, where $i, j \in \{a, m\}$, r denotes the interest rate for a credit loan and the yield on savings is the same.

4.2.2 Defining the Gini coefficient

The average absolute deviatons rate is calculated by equation (4.10).

$$G = \sum_{l=L}^H \sum_{k=L}^H \sum_{j=L}^H \sum_{i=L}^H p_{ij} \cdot p_{kl} \cdot |Y_{ij} - Y_{kl}| \quad (4.10)$$

After levying the income tax, the above formula is modified by calculating career earnings with earnings after tax, so the Gini co-efficient after taxation is to be marked L^\dagger . For this calculation, I am assuming the income tax brackets to fall between low and high salaries, formally to be denoted: $w_a < \bar{w} < w_m$.

For the calculation of the Gini co-efficient in relation to consumption tax (henceforth marked L^\ddagger), I am assuming a perfect consumption smoothing, and have thus determined consumption from career-earnings (see formulas 4.11 and 4.12), and the extent of consumption tax.

$$C_{ij} = Y_{ij}(1+r)/[(2+r)(1+t_a)], \quad \text{if } Y_{ij}(1+r)/[(2+r)(1+t_a)] \leq \bar{C} \quad (4.11)$$

$$C_{ij} = [Y_{ij} + \bar{C}(2+r)(t_f - t_a)/(1+r)](1+r)/[(2+r)(1+t_f)],$$

$$\text{if } Y_{ij}(1+r)/[(2+r)(1+t_a)] > \bar{C} \quad (4.12)$$

where C_{ij} is the periodical consumption of the individual subject whose life path income is Y_{ij} , and the tax band boundaries and tax rates develop according to the established equivalency-criterion.

L^\dagger is the life-path income decreased by consumption tax, as illustrated by formula 4.10.

4.2.3 Calibration of the model

In numerically denoting the model, I am working on the assumption that the income tax band is the simple average of the low and high incomes.

$$\bar{w} = (w_a + w_m)/2. \quad (4.13)$$

The low income is understood to be one unit and the results have been examined with two levels of high income; in the case of (I) as twice the low income and in (II) as ten times the low income.

$$(I) \quad w_m = 2 \cdot w_a \quad (4.14)$$

$$(II) \quad w_m = 10 \cdot w_a \quad (4.15)$$

The low and high income tax has been adjusted to current income taxation rates, and determined as 20 and 40%, of which consumption tax rates are set as 25 and 67%.

4.2.4 Results

The resulting differences in the Gini co-efficient have been formulated as follows:

$$\Delta L = L^r - L^t \quad (4.16)$$

Next to the consumption and income taxes, the difference of the Gini co-efficient (ΔL) shows which tax resulted in a greater reduction of social inequality. When the consumption tax is more productive in this respect, the ΔL value is positive, whereas when the income tax is more successful in reducing inequality, the value of ΔL is negative.

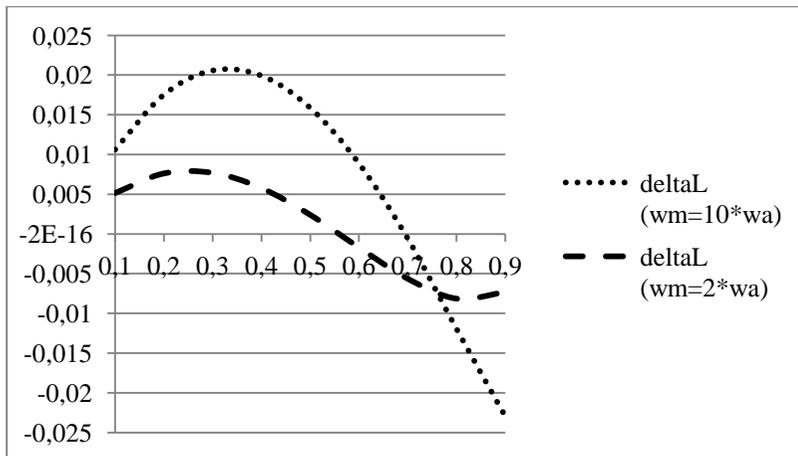


Figure 4.5: Differentiation of the Gini coefficient with respect to low income (my own design)

The results are greatly dependent upon the composition of social levels; figure 4.5 shows the value of ΔL with respect to the ratio of low incomes (p_a). The following results can be clearly determined from the figure:

1. The greater the difference between high and low incomes, the longer the interval and the greater the extent to which progressive consumer taxes, along with the Gini coefficient, reduce social inequality more than progressive income taxes.
2. Both consumer taxes and income taxes (depending on social composition) can be both more *and* less successful than the other in decreasing inequality. Consumer tax is more successful at longer intervals; however, in cases when the ratio of low incomes is 0.55 (twice a difference in salaries) or 0.7 (ten times a difference in salaries), while income tax is more successful when the ratio of “the poor” in the populace is higher.

I have made the calculations above according to an alternative criterion of equivalence; namely, keeping the terms relating to the tax rate (as 4.1), yet determining the consumer tax-band not as in 4.2 but, instead, so as to ensure

state revenues on level with income tax. Figure 4.6 illustrates the differences of the Gini coefficient along this line of calculation:

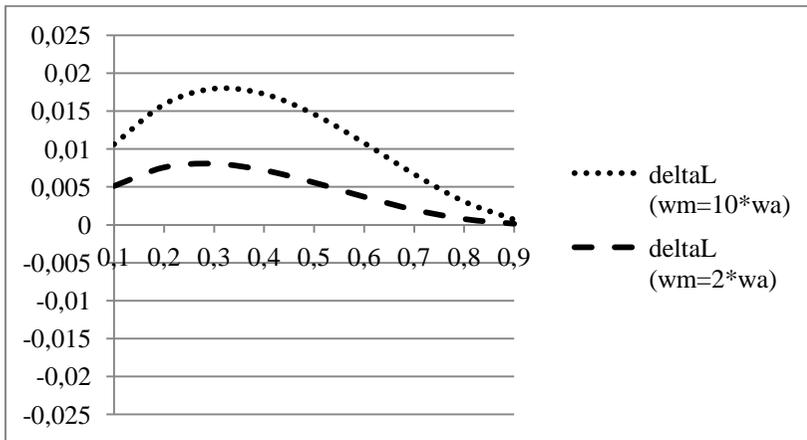


Figure 4.6: Difference between Gini coefficients relative to low incomes with view to alternative criteria of equivalency (my own design)

With the following results:

1. Similar results as before: the larger the difference between high and low incomes, the greater the extent to which progressive consumer taxes reduces social inequality - as measured by the Gini coefficient - more than progressive income.
2. Given the criterion of identical state revenue, progressive consumer taxation is more efficient than progressive income taxation at reducing social inequality, no matter what the composition of society is like.

4.3 Results of neutrality comparison

According to the tax system's condition of neutrality, the (financial) status of the market players in comparison to each other cannot change (Balogh, 2003). It is this expectation that progressive income tax clearly does not meet, as it punishes fluctuating income-flow. Namely, if person A and B both have the

same life-path income, but person A has acquired it unevenly, he will have a greater tax burden than person B, with an even and steady income flow. In contrast, due to the effect of consumption smoothing, a consumption path is selected which is identical to the life-path income, resulting in an identical consumption tax burden, and their (financial) status in relation to each other remains unaltered.

Equations 4.17 and 4.18 show, using the same denotations as earlier, the life-path income after the levying of consumption taxes.

$$\begin{aligned}
 Y_{ij}^t &= Y_{ij} - t_a \cdot C_{ij} = \\
 &= Y_{ij} - t_a \cdot Y_{ij}(1+r)/[(2+r)(1+t_a)] = \\
 &= Y_{ij} \cdot (2+r+t_a)/[(1+t_a) \cdot (2+r)], \\
 &\quad \text{if } Y_{ij}(1+r)/[(2+r)(1+t_a)] \leq \bar{C} \quad (4.17)
 \end{aligned}$$

$$\begin{aligned}
 Y_{ij}^t &= Y_{ij} - \{t_a \cdot \bar{C} + t_f \cdot (C_{ij} - \bar{C})\} = \\
 &= Y_{ij} - \{t_a \cdot \bar{C} + t_f \cdot ([Y_{ij} + \bar{C}(2+r)(t_f - t_a)/(1+r)](1+r)/[(2+r)(1+t_f)] - \\
 &\bar{C})\} = Y_{ij}(2+t_f+r)/[(2+r)(1+t_f)] + \bar{C}(t_f - t_a)/(1+t_f) \\
 &\quad \text{if } Y_{ij}(1+r)/[(2+r)(1+t_a)] > \bar{C}. \quad (4.18)
 \end{aligned}$$

Consumer taxes can be considered neutral when life-path incomes' relation to one another remain the same as before taxation; that is to say, the following is true:

$$Y_1 > Y_2 \Leftrightarrow Y_1^t > Y_2^t \quad (4.19)$$

Three different cases must be examined to gain confirmation of this:

- (1) *Case I*: Both life-path incomes only allow for consumption below the consumer tax band-border, in the following relation:

$$Y_{ij}^1(1+r)/[(2+r)(1+t_a)] \leq Y_{ij}^2(1+r)/[(2+r)(1+t_a)] \leq \bar{C}$$

This is evident, as 4.19 follows, from seeing that the factor, defined in 4.20 and derived in 4.17, is positive, resulting from the nature of the low rate and interest-rate.

$$0 < (2 + r + t_a) / [(2 + r)(1 + t_a)] \quad (4.20)$$

(2) *Case 2*: Both life-path incomes allows for consumption over the consumer tax band border, in the following relation:

$$\bar{C} \leq Y_{ij}^1 (1 + r) / [(2 + r)(1 + t_a)] \leq Y_{ij}^2 (1 + r) / [(2 + r)(1 + t_a)]$$

In this case, we need discern the following inequality (4.21) that is reduced to (4.22) after the deduction of the constant $\bar{C}(t_f - t_a)/(1 + t_f)$, and results, as in the previous case, from the nature of the high rates and interest-rate.

$$Y_{ij}^1 (2 + t_f + r) / [(2 + r)(1 + t_f)] + \bar{C}(t_f - t_a) / (1 + t_f) < \\ < Y_{ij}^1 (2 + t_f + r) / [(2 + r)(1 + t_f)] + \bar{C}(t_f - t_a) / (1 + t_f) \quad (4.21)$$

$$0 < (2 + r + t_f) / [(2 + r)(1 + t_f)] \quad (4.22)$$

(3) *Case 3*: One of the life-path incomes is below the consumer tax band border, while the other allows for consumption over it, in the following relation:

$$Y_{ij}^1 (1 + r) / [(2 + r)(1 + t_a)] \leq \bar{C} \leq Y_{ij}^2 (1 + r) / [(2 + r)(1 + t_a)]$$

We must prove the disparity of (4.23) in order to fulfil the condition of neutrality.

$$Y_{ij}^1 \cdot (2 + r + t_a) / [(1 + t_a) \cdot (2 + r)] < Y_{ij}^2 (2 + t_f + r) / [(2 + r)(1 + t_f)] + \\ \bar{C}(t_f - t_a) / (1 + t_f) \quad (4.23)$$

On the right-hand side of the inequality, \bar{C} can be replaced with the smaller part $Y_{ij}^1 (1 + r) / [(2 + r)(1 + t_a)]$, and after redistribution we get the inequality of (4.23), that is, that the relation $Y_1 < Y_2$ is required for the condition of neutrality – which was our primary supposition and starting point.

Thus, we have seen that progressive consumption tax does not violate neutrality, in the sense that it does not change the rank order of an individual life-path income.

In the case of income tax, we can easily find a counter-example which violates the criterion of neutrality. Let individual A denote the pre-tax income of 400 units in the first year, and 200 units in year two. Meanwhile, let B denote an individual with an income of 300 units during both periods. Calculating with a 5% real interest-rate, the life-path income, discounted for the first period (rounded off to 590.5) is higher than that received by B (585.7). However, B is in a significantly better position after-tax, as 468.6 units remain in this case, whereas A is left with only 452.4

The above counter-example proves that progressive work-related income can violate requirements of neutrality in some (not all) cases, as when it changes the rank order of individuals' life-path income.

5 CONCLUSIONS

Taking into consideration the stringent limitations of the model (partial approach, no inherited or prior assets, consumption smoothing by decision-makers), we can draw the following conclusions:

On the basis of efficiency studies - *in a periodical model - there is no difference in efficiency between progressive consumption and income tax, and both distort decision-making in the same situations and to the same extent; specifically, in the choice between work and leisure activities.* In the model encompassing several time periods, there is hardly any discernable difference in efficiency between the two tax rateable values and, contrary to expectations, they both result in the same deadweight loss. Due to the varying tax burdens on the tax payer, “only” problems with equality arise since, despite equivalency criteria, progressive consumption tax deducts less from individuals with identical incomes than does progressive income taxation and, consequently, state revenues will be less, as well. However, several periodical models meet with our previous expectation by showing that – when income taxation is extended to capital income - progressive consumption taxation causes less distortion than income taxation. It would therefore appear that consumption taxation is better, from the point of view of efficiency, insofar as it is contrasted to income tax; however, in the case of labour income tax, there is no difference in distortion.

As far as equity is concerned, it has already been shown that it can perform better also when faced with an income tax only levied against labour income taxes. Under the original equivalent systems of taxation, both consumption and income taxes (depending on the structure of society) can be both more *and* less successful than the other in levelling social inequality. The greater the difference between high and low incomes, the larger the interval, and the greater the extent to which progressive consumer taxes reduce social inequality - as measured by

the Gini coefficient - more than progressive labour-income tax. However, given the criterion of identical state revenues, *progressive consumption taxation is more effective in reducing social inequality than progressive labour-income taxation, irrespective of different levels and layers of society*. Therefore, the hypothesis relating to equity was, in part, proven to be correct.

Consumption tax clearly met the requirements of neutrality, while progressive income tax can easily be at odds with it.

The chapter reviewing some relevant literature shows that simplicity favours the current income taxation although, granted some alterations, progressive consumption tax can be similarly simplified (insofar as the current income tax can be said to be simple). Ultimately, consumption tax better serves the function of the state to act as a stabilising influence. On the one hand, it can prevent a crisis similar to the current one; on the other hand, it can better serve recovery from such a crisis, should one develop, assuming that consumption tax had already been introduced beforehand.

6 NEW RESEARCH RESULTS

My research indicates that the following new and scientific conclusions can be inferred in a partial model, insofar as prior inherited assets, initial wealth are excluded, and consumption smoothing is assumed:

(1) Based on the literature, the most expedient demarcation between direct and indirect taxation is the separation of the personal and the material.

In this sense, progressive consumption tax can be considered direct tax.

Interpreting the concept of direct tax is not among the primary aims of this thesis; nonetheless, it can be viewed as an important research result. Hungarian and international literature on the subject of taxation does not define direct and indirect tax in quite the same way. I encountered this problem of definition in relation with the classification of expenditure tax – an issue on which I tried to define my position and to present points of interest worth considering. The process of devolution is complex and, in my opinion, does not lend itself to accrument, while enumeration may only lead to the exclusion of new taxes. The marked difference in the taxation of persons or material assets is that the former makes it possible to take individual characteristics into consideration; furthermore, it at least allows for not only linear, but progressive taxation. Progressive taxation taxes persons, progressively, and can therefore unequivocally be classified as direct tax.

(2) Principles of equivalency introduced to progressive tax-rates. According to the original principle, two progressive system of taxation can be deemed to be equivalent, if they possible an identical consumption stemming from an identical income; that is, if the after-tax budget restraints are identical in a given period. As an alternative criterion, two taxes must yield an identical state revenue in such a way that tax-rates ensure the same change in relative prices, according to the original principle.

Literature on the subject typically only compares flat-tax rates, however, the principles of equivalency cannot be applied to progressive rates without modifications. The introduction of new principles of equivalency was necessary in order to verify the hypothesis of the thesis. Having accepted the equivalency criterion of Rosen – Gayer (2010) (same change in relative prices), I have formulated two different criteria of equivalency for cases of progressive tax-rates.

(3) In a periodical model, the effects of progressive consumption and income tax on efficiency are the same.

Insofar as the decision-maker is in effect for only a single period, budget restrictions are modified in the same way in the respective decision-making areas, during both the process of choosing between individual assets and choosing between work and leisure. The correlation was noted in relation to the original criterion of equivalency, although it clearly also applies to the alternative principle of equivalency, as well, since the same displacement of same budget restrictions results in same state revenues.

(4) Taking several periods into consideration, the distortion effects of consumption tax and progressive income tax are the same – with the exception of one particular case.

Although the movement of budget restrictions are not the same, with the exception of the case where the decision-maker is a consumer on the band-boundary of consumption tax. There is no difference in efficiency in the case in which parallelism is involved, the substitution effect is not apparent in either instance. Nevertheless, effects of income do differ from one another: progressive income tax operating along the original principle of equivalency deducts more than consumption tax from those who fall into different tax-rates at different periods; however, this raises questions concerning equity. Changing their prior decisions is worthwhile only for those on the boundary and with special preferences, but if we accept consumption smoothing, then it is certainly

not worthwhile. In this case there is therefore no sense in talking about the distorting effects on decision-making of differences between consumption and income tax.

(5) Income tax levied on capital income distorts inter-temporal decisions to a greater magnitude than consumption tax.

The inter-temporal budget restriction breaks in the case of interest-tax: while the budget constraints of borrowers does not change, a substitution effect, resulting in can occur in the phase related to those with savings.

(6) In certain cases, progressive consumption tax is more in line with expectations of equity than progressive income tax.

Where the original criterion of equity is concerned, progressive consumption tax is only able to reduce social inequality to a greater degree than income tax given certain sections of society. In contrast is the criterion of alternative equivalency where, regardless of any poverty ratio, the Gini coefficient indicated a greater measure of equity for progressive consumption tax.

(7) Progressive consumption tax satisfies the criterion of neutrality while progressive income tax often violates it.

I examined neutrality by comparing the reduced values of lifetime taxation on career earnings. I demonstrated that progressive consumption tax always remains neutral, given an arbitrary income-flow, if we accept consumption smoothing. On the other hand, I cited only a single example for income tax which, however, cannot be considered exceptionally rare.

(8) I consider the most important scientific result of my thesis to be the presentation of the effects of progressive taxes. University text-books and most articles go no further than analysing linear tax. Constraints and criteria relating to specific progressive taxes are not prescribed. Furthermore, comparisons of income and consumption tax found in relevant literature tend to deal with general income tax; however, my thesis draws attention to the way in which there are distinct advantages to taxes levied only on labour income tax.

Consumption tax and the tax exemption of savings is not the same as the tax exemption of capital income – and this is the case to such a degree that the former is demonstratively better than the latter; primarily on the grounds of equity, neutrality and stability.

7 RECOMMENDATIONS (Theoretical and Practical Usage)

The following conclusion can be drawn from working assumptions in the thesis' partial model section: progressive tax can better satisfy expectations of tax systems – given the condition that appropriate simplifications are made when placed into practice - and also that certain terms are disregarded, as is the case with the current income tax. When applied in practice, this means that the current income-tax system needs to be transformed in such a way that it approximates or approaches expenditure tax. This endeavour has two stages: firstly, rateable-value needs to be extended to as many income categories as possible; secondly, savings for the given period need to be under exemption. The more we are inclined towards progressive consumption tax, the more apparent become those effects presented in this thesis which are principally in line with requirements of equity, neutrality and stability.

For those who would not accept a wider application of expenditure tax, the Advisory Commission on Intergovernmental Relations (1974) only recommends the introduction of progressive consumption tax for a narrow section, despite every positive and simplifying effect it may present. For instance, if consumer expenditure would exceed taxable income by some previously stimulated minimal amount, then consumption would be rateable-value based, and tax would be levied according to the income tax rate. A socially wide-ranging discourse-presenting the advantages of the system- is certainly necessary prior to the introduction of the system, due to high administration expenditures involved; moreover, it is highly recommended that the system be initially introduced and tried on a small base as an instructive trial period (for instance 100,000 thousand earned above \$100,000 in 1971).

8 PUBLICATIONS ON THE TOPIC OF THE THESIS

Peer-reviewed papers in Hungarian

- Varga, Erzsébet Teréz (2014): *Lehet-e közvetlen a fogyasztási adó?* Magyar Tudomány, 175. évfolyam, 11. szám, Budapest. pp. 1325-1331.
- Varga, Erzsébet (2014): *Ekvivalens adók hatása a társadalmi egyenlőtlenségekre.* Köz-Gazdaság, 9. évfolyam, 3. szám, Budapest. pp. 155-169.
- Varga, Erzsébet (2013): *Adózási fogalmak újragondolása és rendszerezése.* In: Bánfi Tamás – Kürthy Gábor (ed.): Pénz, világpénz, adó, befektetések. Budapest. pp. 65-184.
- Varga, Erzsébet (2012): *A jövedelem és fogyasztás alapú sávosan progresszív adóztatás összevetése.* In: Fülöp Péter (ed): Tavasz Szél 2012. Konferenciakötet, Doktoranduszok Országos Szövetsége, Győr, pp. 601-608.

Peer-Reviewed Papers in a Foreign Language :

- Varga, Erzsébet Teréz (2013): *Comparison of the equity effect of progressive income and consumption taxation.* Közgazdász fórum, 2013. issue 6. , Kolozsvár. pp. 184-196

Lecture Notes:

- Kürthy, Gábor – Varga, Erzsébet (2012): *Pénzügytan gyakorlatok.* Tanszék Kft., Budapest.

Presentations:

- Varga, Erzsébet (2011): *A végén csattan a bankadó.* Budapesti Corvinus Egyetem, Közgazdaságtudományi Kari Konferencia.
- Varga, Erzsébet (2011): *A progresszív fogyasztási és jövedelmi adó hatékonysági összevetése.* Budapesti Corvinus Egyetem, Közgazdaságtani Doktori Iskola VII. éves Konferencia.

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- Varga, Erzsébet (2007): *Az adóalap örök dilemmája.* I. Kaposvári Gazdaságtudományi Konferencia.
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- Varga Erzsébet (2007): *Tőkejövedelmek adóterheinek optimális szintje..* OTDK, Miskolc.

Foreign Language Presentations:

- Varga, Erzsébet (2010): Expenditure tax - Assumptions of the efficiency. European Doctoral Seminar, Sarajevo.
- Varga, Erzsébet (2009): Comparison of progressive consumption and income taxation – especially in the light of efficiency. European Doctoral Seminar, Budapesti Műszaki Egyetem.

Translation of Foreign Language Article:

- Musgrave, R. A. (1996): *A Public Finance és a Finanzwissenschaft hagyományainak összevetése.* Part I in: *Köz-Gazdaság* 2007. issue 3. pp. 59-80, part II in: *Köz-Gazdaság* 2008. year issue 4. pp. 137-152.

Hungarian Summary of Foreign Language Article:

- Fogel, R. (2006): *Szökés az éhségtől és a korai haláltól 1700-2100 Angus Deaton nyomán.* In: *Köz-Gazdaság*, 2006. issue 2. pp. 128-132.