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Fiscal Demography: Age-related Redistribution of Consumption Taxation

Introduction

Given the rising importance of consumption taxes in the tax system it seems worthwhile to deliberate on the influence of demographic changes on economic consequences of both income and consumption taxation. I propose the term "fiscal demography" to denote an area of study with the influence of demographic processes on fiscal decisions, in particular the tax system design and the structure of public expenditures. It seems worthwhile to investigate the demographic elasticity of tax revenues and public outcomes. Fiscal decisions should take into consideration not only the fiscal equilibrium across the decades of rising dependency ratio, but also the consequences for the years beyond the demographic transition. The tax burden redistribution is essentially related to the economic behavior of individuals driven by the market, but aging society enhances the role of demographic factors. Consumption taxes not only produce consequences which manifest themselves in a change in the price and sales volume of taxed goods, but also induce distribution of tax burden in relation to the different composition of goods consumed by elder and younger consumers.

Taxation of consumption expenses, used more and more frequently by public authorities in order to satisfy the demand for public funds, has a number of consequences at fiscal, economic, and demographic levels, thus determining, to an increasingly greater degree the actual distribution of tax burden among households with differentiated composition of consumer budget. The redistributive dimension of consumption taxation requires first of all an analysis of the microeconomic (market-related) aspects of the taxes imposed by public authorities on consumption expenses of ageing households with a decreasing income. It seems justified to begin the analysis of the redistributive nature of consumption taxes with issues related to microeconomics. This will help to define the fundamental

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economic consequences of consumption taxation, making it possible to look critically at former views formulated in the literature of the subject.

In the second half of the 20th century, theoretical concepts of appropriate consumption taxation underwent a process of evolution which consisted in a shift from the interest in problems related to the formulation of the criteria that served to minimize additional tax costs (the deadweight loss) to the focus on issues concerning the possibility of managing the structure of household consumption in connection to the external costs which resulted from an excessive, socially undesired consumption of some goods and insufficient consumption of other – socially desired – goods.

The first approach, predominant in studies undertaken in the first half of the 20th century, concentrated on recommendations how to maximize social utility by means of an appropriate construction of the tax system as a whole (the choice between taxation of either income or consumption) and a consumption taxation system (the choice between one or more consumption tax rates). The second approach, which gained in importance in the second half of the 20th century, consisted in the search for appropriate relations between taxation of different goods, analyzed in the context of external effects induced by their consumption. Consequently, restrictive taxation of certain goods (excise, additional charges) was justified in case of goods whose consumption, generating high or unpredictable external costs, could not be limited by means of prohibitive solutions. At the same time, it was recommended to use preferential (expansive) taxation of goods whose consumption had substantial positive external effects. A desirable consumption of such goods provides a justification for their negative taxation which manifests itself in public subsidies. This change in the approach to the analysis and the justification of consumption taxation inevitably results in the limitation on households' freedom to make decisions; this manifests itself, first of all, in substituting direct taxation of personal income with consumption taxation (the latter referred to as *the tax anaesthesia* – indirect taxes tend to meet with taxpayers' smaller resistance); secondly, in public authorities managing households' consumption through diversification of tax rates.

The aging of society is the most important contemporary demographic force. Population aging is a result of demographic transition which manifest itself in declines in fertility and improvements in mortality (Schoeni and Ofstedal, 2010). As a global phenomenon, aging differs according to the timing and dynamics across countries. For historical details see Vallin (2006a) and Vallin (2006b). The process components are discussed in Kapteyn (2010). Longevity and population aging, both connected with demographic transition, could be successfully investigated in relation to economic growth (Guinname 2011 as well as Cervellati and Sunde 2011). Bovenberg (2008) indicates that the median age in the European Union will peak 48 years in 2050 (compared to 31 in 1950). It is expected that the median age of a voter will be higher (the political aspect of aging society). The redistribution of the tax system runs parallel to the median age of consumer (the fiscal aspect of the aging society). The distance between median-age of voter and median-age of consumer may influence several political-related pressure of elderly cohorts on differentiating the rate of consumption tax in relation to participation of taxed good in the structure of

consumption. Dominated by consumption taxes, public revenues will depend mostly on the demographic factor due to the impact of age on the propensity to consume. Mulligan and Sala-i-Martin (1999) investigate the relation of government spending and the age of beneficiaries.

Fiscal demography could reformulate both of the approaches taking into consideration the political and fiscal consequences of the ageing process. Firstly, the aging median voter induces politicians to take into account the age structure of the society to calculate the social utility. It is highly probable that consumption taxes will be less preferred than taxes on income. It is worth remembering that retired households in fact play a much greater role in consumption than in the production of wealth. Secondly, within the ageing society the evaluation of consumption external effects will depend on the role of taxed goods related to fertility. The desirable externalities for the ageing society should prefer consumption of such goods which could stop the decline in the fertility rates characteristic for demographic transition.

There is wide range discussion of age-related optimal income taxation (Weinzierl 2011, Gervais 2012), but the problem of age-dependent consumption taxation makes the room for theoretical investigations. Hence, the aim of paper is to discuss the determinants of the neutrality of consumption taxation due to age-related redistribution of income. If income-based redistribution is achieved, public finance could be designed either for the further redistribution-in-kind (because of consumption taxation) or for the preservation of the redistribution-in-money (because of income taxation as well as transfer programs). The first part of the paper contains the main assumption of a fiscal demography model of consumption taxation. The next part discusses the core model of consumption tax incidence and tax incidence rate calculation. The third part of the paper introduces a fiscal demography rule of consumption taxation neutrality in conjunction with distribution of consumers' age.

1. Assumptions of the fiscal demography model of consumption taxation

It will be convenient to start from the main relation among consumer, society, and economy. Economy ought to be discussed first because the economic background could be treated as a limitation of individuals' decisions. Secondly, an assumption related to the consumer characteristic will be presented. The model accepts the paradigm of methodological individualism in line with Arrow's (1994) statement claiming all social interactions are after all interactions among individuals. Hence, the society should be defined as the sum of individuals whose consumption depends on their demographic attributes (age). Thirdly, state will be introduced by discussing the redistributive effects of consumption taxation.

Economy. Market offers two goods $j = \alpha, \omega$. Prices before consumption taxes are given which is not discussed in model. For simplicity of analyses prices before taxation p_j of both goods are calibrated to 1, then:

$$\forall j{:}p_j = 1. \tag{1}$$

If none of goods is Giffen or inferior one, then demand X could be characterized in relation to price p and income y respectively:

$$\forall j{:}\frac{\partial X_j}{\partial p} < 0; \tag{2a}$$

$$\forall j{:}\frac{\partial X_j}{\partial y} < 0. \tag{2b}$$

The supply of goods is demographically neutral, thus price elasticity of supply is stable in relation to the distribution of consumers' age. But individuals facing changes in the price of a good (even if the changes result from taxation) will react according to their age.

Consumer. There are two consumers (individuals) $k = 1, 2$. Two characteristics are attributed to the individuals:
a) age a^k,
b) income after redistribution-in-money y^k.

Consumer $k = 1$ is younger than consumer $k = 2$, then:

$$a^1 < a^2. \tag{3}$$

Assumption stated in (3) takes into account the main personal attribute characterizing the aging process.

Redistribution by personal income taxation, transfers, and social security payments is achieved and no savings are needed, hence owing to (1) income y^k is equal to consumption spending:

$$\forall k{:}y^k = \sum\nolimits_j X_j^k; \tag{4}$$

where: X_j^k is individual k's demand for good j.

The fiscal demography approach forced to state additionally that:

$$\forall k \exists\, a^{k*}{:}y^k = f(a^{k*}) = \max. \tag{5}$$

Assumption presented by (5) reflects each individual's so-called *prime-earnings year* (Huggett and Ventura, 2000: 364 *et passim*).

In connection with the life-time path of earnings and redistribution transfers, the function f could be described:

$$\forall a^k < a^{k*}{:}\frac{\partial y^k}{\partial a^k} > 0, \tag{6}$$

and

$$\forall a^k > a^{k*}{:}\frac{\partial y^k}{\partial a^k} < 0. \tag{7}$$

The shape of f is not discussed. The model accepts only the monotonically increasing income before a^{k*} and monotonically decreasing income after a^{k*}.

Equations (4)–(7) contain assumptions, which refer merely to income changes during life-time, but do not take into consideration consumption behavior. Assumption provided by (2) should be complemented by introducing *an age-related function of demand*, crucial for fiscal demography approach. An age-related function of demand simply reflects the relation between the expected changes in demand for a particular good j and the change in the age of consumer k. Hence:

$$X_j^k = h(a^k). \tag{8}$$

As stated above economy contains two goods, for further analysis differentiated by age-related demand. Age-related demand for a particular good is monotonically uniform. But for $j = \alpha$:

$$\forall a^k \frac{\partial X_\alpha}{\partial a^k} < 0, \tag{9}$$

and for $j = \omega$:

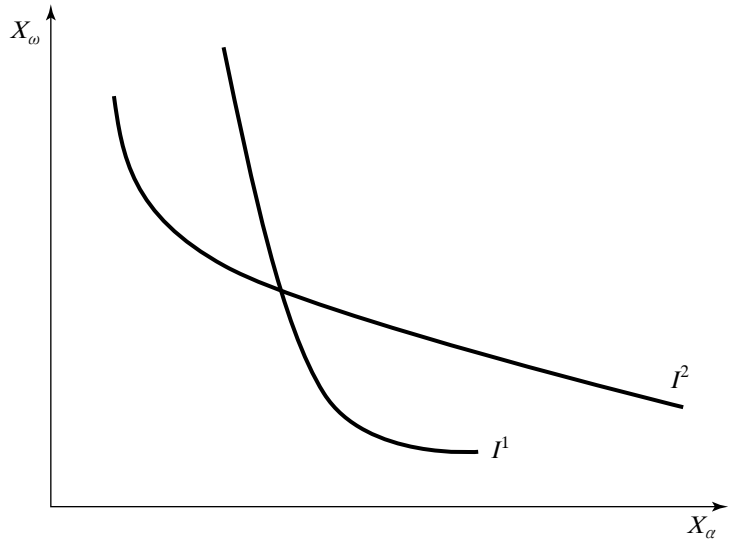
$$\forall a^k \frac{\partial X_\omega}{\partial a^k} > 0. \tag{10}$$

The above assumptions mean that good α is preferred by younger consumers and good ω plays a growing part in the consumption structure of the elderly. Taking into consideration (3), (9) and (10), the indifference curves for both individuals could be compared for a given income:

$$\left| \frac{\partial X_\omega^1}{\partial X_\alpha^1} \right| > \left| \frac{\partial X_\omega^2}{\partial X_\alpha^2} \right|. \tag{11}$$

Figure 1

The indifference curves for age-different consumers



Source: own study.

Fig. 1 presents the difference between indifference curves I for both individuals (younger one I^1 and older one I^2) for given income y. Further elucidation of the fiscal demography approach to taxation could be based on *the age-elasticity of demand* ${}_Ae_j^k$, defined for individual k and good j:

$$ {}_Ae_j^k = \frac{\frac{\partial Xj}{X_j}}{\frac{\partial a^k}{a^k}}. \tag{12}$$

Society. For simplicity, two individuals 1 and 2 could be a society. Their demographics meet (3) in relation to age. Taken (5) into consideration, the following relations occur:

$$y^1 \leqslant y^{1*} = y^{2*} \geqslant y^2. \tag{13}$$

A broader analysis could be based on introducing two sets of individuals $K = A, \Omega$ in place of a simple two-person society. Distinctions manifest themselves in age and income only. The difference in the number of group N^K could be taken into account to find the crucial index of demographic transition stage, i.e. the dependency ratio:

$$DR = \frac{N^\Omega}{N^A} \tag{14}$$

DR shows the simple distribution of individuals according to the shape of the age pyramid, and allows to indicate the political power of older over the younger voters reflecting the former pressure on distribution tax burdens. In fact *DR* grows according to the phase of the aging process because the mortality rate declines quicker than the fertility rate. At the end of the demographic transition, a slight fall in *DR* is expected.

The longevity ratio *LR* and income redistribution ratio *YR* could be obtained for both types of society (two-person one and two-group one):

$$LR = \frac{a^2}{a^1} \tag{15a}$$

(for a two-individual society) or

$$LR = \frac{a^\Omega}{a^A} \tag{15b}$$

(for a two-group society);
where a^K is the average age of individuals within group K.

And:

$$YR = \frac{y^2}{y^1} \tag{16a}$$

(for a two-individual society) or

$$YR = \frac{y^\Omega}{y^A} \tag{16b}$$

(for a two-group society);
where y^K is the average income of individuals within group K.

LR reflects the civilization success depending on various social, medical, as well as political (welfare state) changes that have taken place since the middle of the previous century. *YR* could be interpreted as the indicator of equalization of income by means of fiscal policy. Hence, for given *LR* and *DR*, lower *YR*, more intensive redistribution is implemented. For a two-group type of a society, the calculation of *LR* and *YR* for $DR = 1$ allows to construct a model of consumption taxation in relation to the rationale of group decision-making (a median-voter approach) proposed in the seminal paper of Black (1948).

State. The government decides to tax consumption of goods. There are no limits to diversification of taxation scheme, hence for each good j the consumption tax rate t_j^C could be infinite. Nonetheless, the goal of taxation is not to devastate the distribution of tax burdens provided by income redistribution, reflected in *YR*. Hence, it is expected that consumption tax burdens should be distributed proportionally among consumers of taxed goods.

2. Core model of consumption tax incidence

As regards redistributive consequences of consumption taxation, the effects on the microeconomic (market) level must be separated from the macroeconomic (economy) level. In the case of an analysis on market level, one must determine the character of relations between changing consumption tax rate and the distribution of tax burdens between consumers and sellers. It will determine the decline in individual wealth in relation to a reduction in consumption due to the growth of the prices. In the case of the macroeconomic analysis, it is essential to determine the influence of state decisions on the distribution of tax burdens between particular groups of consumers differing in age driven income.

The model of the redistributive consequences of consumption taxation should make use of the following characteristics of the taxed good j market:

a) equilibrium price before tax p_j,
b) equilibrium price after tax p_j^T,
c) consumption tax rate t_j^C,
d) price elasticity of demand e_j^D, and
e) price elasticity of supply e_j^S.

The aim of the model is to calculate *the consumption tax incidence rate*, which indicates the relation of the fiscal burden imposed on sellers and the fiscal burden imposed on consumers.

Assuming that before making a fiscal decision there is an equilibrium on the market for a particular good j, an introduction of an increase in the amount of consumption tax rate t_j^C will set a new balance with different price and sale levels, with which equilibrium between demand and supply will be achieved. In the presence of certain elasticity of supply and of demand, imposing consumption tax rate t_j^C on a good will lead to an increase in the market price from p_j to p_j^T.

The burden of a raised tax is distributed between consumer and seller (Tresch 2008: 346 *et passim*). Buying a taxed good, the consumer pays a price increased by the part of the imposed tax, while the producer, when selling a taxed good, accepts a lower margin per unit. The relation of the difference in prices for consumers to the difference in gross margin for sellers determines the tax incidence rate. The incidence rate is dependent both on price elasticity of demand e_j^D and price elasticity of supply e_j^S. Hence, the incidence rate for good j π_j can be expressed by the following relation:

$$\pi_j = \frac{\left| e_j^S \right|}{\left| e_j^D \right|}. \tag{17}$$

Equation (17) indicates that fiscal decisions concerning consumption taxation will cause fiscal burdens to be distributed between consumers and sellers depending on the shape of the demand and the supply function. Accordingly, the lower the price elasticity of demand is, the greater part of an imposed tax will be reflected in a higher price of the taxed good. As a consequence, the redistributive effect of taxation will be dependent on the economic character of the taxed good.

In the case of necessary goods for which the price elasticity of demand is lower, the major part of an imposed tax will be included in the price. Thus, the tax will burden the consumer. On the other hand, in the case of superior and luxury goods whose price elasticity of demand is comparatively high, the major part of the tax will be absorbed by the seller, since an imposed or raised tax which cannot be transferred into price will cause reduction in gross margin.

Tax incidence rate can also be expressed by presenting the relations between the tax burden including the price transferred to the consumer and the tax burden absorbed by the seller; in other words, the relations between the difference in the price after tax and before tax, and the difference between the price before tax and the net price on which tax will be charged. Thus, the incidence rate can be expressed, in relation to the price of good j, prices before tax p_j and p_j^T after tax, respectively:

$$\pi_j = \frac{p_j^T - p_j}{p_j - \dfrac{p_j^T}{1 + t_j^C}}. \tag{18}$$

The expression $\dfrac{p_j^T}{1 + t_j^C}$ in (18) determines the net price, on which the tax rate t_j^C is levied. It is worthy to note that both (17) and (18) seem to be demographically neutral, and the consumption tax incidence rate is related to economic characteristics of the market of taxed good j only. Nonetheless, taking into consideration the changing structure of household demand for goods, the demographic neutrality should be discussed. If economy, as stated above, offers two different goods, and taking into consideration (9) and (10) good α whose participation in

consumption falls with age, and good ω whose consumption grows with age, the demographic factors (especially the structure of the age pyramid) have to be taken into account. The fiscal demography approach necessitates the introduction of *an age-related price elasticity of demand*, which allows to measure the dependency between the crucial demographic factor, *the age of consumer*, and the economic factor, *the demand for taxed good*. It allows to define *a rule of redistribution neutral consumption taxation*.

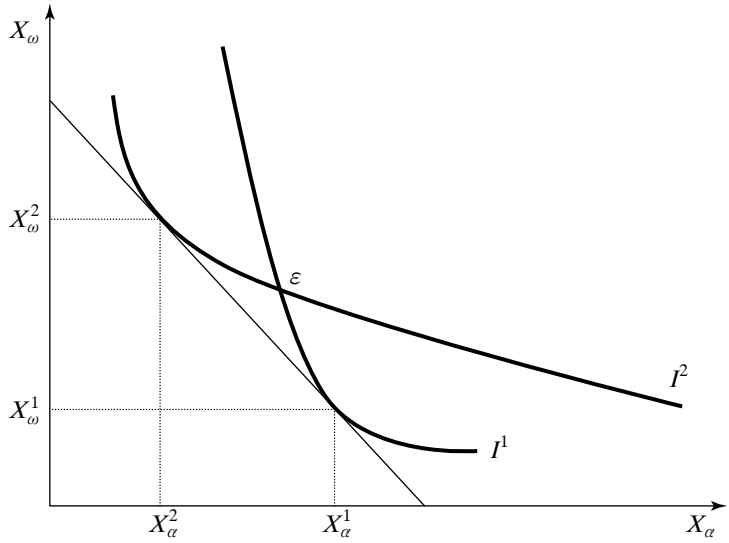
3. The model of redistributive neutrality of consumption taxation with incidence rate depending on the distribution of age

Assumption of the model. Diversification of consumption tax rates may take various forms, which are in particular dependent on the construction of the tax system that allows for preferential taxation of certain goods, by means of either lowering the tax rates or exempting of a particular class of goods from taxation. It is also dependent on taxation of some goods by means of restrictive fiscal means, such as selective excise and increased taxes. Regardless of the form which the diversification of tax rates will take in a tax system, it will cause a substitution effect of consumption taxation (Musgrave 1959: 257–259). The fiscally induced substitution effect of consumption taxation may not result from the diversification of tax rates intended by public authorities only. The single-rate consumption tax which, in principle, aims only at income effect of consumption taxation may also produce a substitution effect. The coexistence of both consumption taxation effects with the same tax rate will be a result of a diversified incidence rate π, characteristic of markets for goods which have different levels of price elasticity of demand and supply.

Consumer equilibrium. In accordance with (3)–(12), the structure of consumption depends on individuals' preferences reflected in the shape of the indifference curves (Fig. 1) as well as the budgetary constraint depending on income after redistribution. The first one is a demographically driven variable (age-related elasticity of demand), whereas the second one shows not only the demographic peculiarity of individuals (changes in income in relation to age), but also the fiscal policy driven transfer of income among individuals. Hence, it is possible that two individuals have the same income (ultimate redistribution to equalization of income), but prefer a different composition of goods (because of age-related elasticity of demand) – Fig. 2.

The same composition of goods for individuals in different age is impossible. Taking into consideration the rate of substitution between good α and good ω for both consumers, their indifference curves ought to intersect (point ε in Fig. 3). Hence, if the budgetary constraints are parallel with each other, the most preferable composition for both of them in one point is out of the question. It is possible that during their lifetime individuals face the same income twice (before

Figure 2
The preferences of individuals with the same income but different age



Source: own study.

and after the prime-earnings year), but it is impossible to come back to the same consumption composition. It means that redistribution neutrality of consumption taxation depends on the difference in disposable income of individuals (models where demographic attributes of consumer are omitted, e.g. the structure of consumption depends on nothing but income) as well as the difference in age of individuals (model of redistributive neutrality of consumption taxation with incidence rate depending on the distribution of age, e.g. the structure of consumption depends on both income and age of consumers). Hence, even when redistribution activity of the government could reduce *YR* to 1, consumption taxation will be the challenge for fiscal policy.

Age-related elasticity of demand. It is crucial to separate single consumption tax rate from a redistribution-equal consumption tax scheme. In the aging society the substitution effect of consumption taxation may appear, not as a result of fiscal decisions (tax rate diversification), but due to various consumer responses, especially those driven by the age-related price elasticity of demand. Consequently, it may turn out that the system of diversified consumption tax rates, allowing for the characteristics of demand and supply functions, will restore redistributive neutral consumption taxation. Assuming that, in order to maintain redistributive indifference of consumption taxation, the budgetary constraint line should move parallel. In Fig. 3, the necessary coincidence of fiscal and economic responses is presented in connection to diversified tax incidence rate.

Assuming that good ω is characterized by a relatively high incidence rate, the introduction of a single tax rate will result in prices of goods α and ω changing

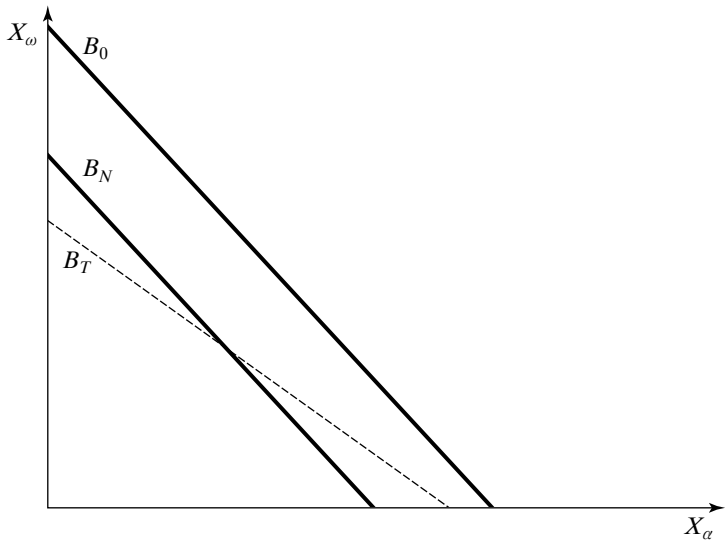
disproportionally to each other. Taking into account (1), the following equation will be satisfied:

$$\frac{p_{\omega}^{T}}{p_{\alpha}^{T}} > 1. \tag{19}$$

Consequently, the budgetary constraint line will move toward the beginning of the coordinate system, however not proportionally along the horizontal axis X_{α} which describes the limitation on the purchase of taxed good α, and the vertical axis X_{ω} which displays the possibility (limited by a price increase) of purchasing good ω. Further limitation on the possibility of good ω consumption is connected to a higher incidence rate which manifests itself in a comparatively higher increase in prices after tax. Accounting for the change in the proportions between prices of α and ω goods of constant tax rate, the budgetary constraint line will change its position form B_0 to B_T. A comparison of both budgetary constraint lines indicates that two consumption taxation effects (the income effect – movement downwards; and the substitution effect – a change in the tilt angle) overlap each other.

Figure 3

Redistributive neutrality of consumption taxation with diversified incidence rates



Source: own study.

Hence, in order to maintain the redistributive neutrality of consumption taxation, public authorities should diversify the tax rates to the degree that lower incidence rate of good α taxation which distorts the proportions after taxation will be corrected by means of a higher tax rate of good α, which will allow to move the budgetary constraint line from the dotted one B_T to the solid one B_N. Accounting for the incidence rate formula defined in (18), appropriate relations

which characterize certain goods and guarantee a proportional increase in prices after taxation should satisfy the following set of equations:

$$\forall j: \frac{p_j^T}{p_j} = \frac{1+\pi_j}{1+\frac{\pi_j}{1+t_j^C}}. \tag{20}$$

In order to satisfy the condition of (20), it is necessary to diversify the tax rates, depending on the incidence rate that characterizes certain taxed goods. If the redistributive neutrality requires proportional change in prices of all taxed goods to be retained (assuming that for every good j, the $\frac{p_j^T}{p_j}$ relation is constant and, in simplified terms, defined as δ), then transformations (20) will help to define tax rates of certain goods which will be neutral to effect of income redistribution. For each of the taxed goods, set of the consumption tax rates should be:

$$\forall j: t_j^C = \frac{\delta \times \pi_j}{1+\pi_j-\delta}. \tag{21}$$

The set (21) is *a rule of consumption taxation neutrality*. For instance, if an accepted proportional increase in prices of all taxed goods is 10%, which corresponds to $\delta = 1{,}1$, then, in the case of a good characterized by an equal distribution of tax burden between consumers and sellers (i.e. $\pi = 1$), an appropriate tax rate, based on (21), should be $t^c = 22.2\%$. In the case of a necessary consumer good, for which high incidence rate (i.e. $\pi = 10$) is characteristic, the tax rate should be $t^c = 11.1\%$. Accordingly, if the incidence rate is comparatively low, which characterizes luxurious goods (high price elasticity of demand), and equals, for instance, $\pi = 0.2$, then appropriate tax rate should be $t^c = 120\%$.

Calculation of the incidence rate. The reaction of sellers to the changes in consumption taxation depends on the price elasticity of supply, which is immunized to the age distribution of consumer demanding a taxed good. If the tax incidence rates are different for goods α and ω, the single consumption tax rate distributes burdens in favor of the good characterized by the lower rate. In particular: if $\pi_\alpha > \pi_\omega$, single rate of taxation devastates wealth of older consumers to a lesser degree than the wealth of younger ones. Demography influences the rate of incidence only. Adapting (17) for the age-related elasticity of demand needs to take into consideration that the price elasticity of demand for good j will be determined by the contribution of this good in consumption preferences of individual k. Then, if e_j^k is the price elasticity of demand for good j assigned to individual k, and taking into account the slope of the indifference curves (Fig. 1), the following relations will be obtained:

$$\left|e_\alpha^1\right| > \left|e_\omega^1\right|, \tag{22}$$

and

$$\left|e_\alpha^2\right| > \left|e_\omega^2\right|. \tag{23}$$

The elasticity of demand for a particular good j depends on the individual-related price elasticity and the participation of individual k's demand in the market for a taxed good. Taking into consideration (1), calibrating the prices of goods to 1, if the demand of individual k for good j is X_j^k, the elasticity demand for good α will be:

$$e_\alpha^D = \frac{1}{X_\alpha}\sum_k X_\alpha^k e_\alpha^k. \tag{24}$$

Taking into consideration y, as the sum of an individual's income, and (4a) to the calculation of the elasticity of demand for good ω:

$$e_\omega^D = \frac{1}{y - X_\alpha}\sum_k \left(y^k - X_\alpha^k\right)e_\omega^k. \tag{25}$$

It might be inspired to reformulate the above to:

$$e_\omega^D = \frac{1}{y - X_\alpha}\sum_k \left(y^k e_\omega^k - X_\alpha^k e_\omega^k\right). \tag{26}$$

and to find two determinants of e_ω^D: the income-redistribution ratio YR influences y^k, and the age-related distribution of demand for good α influences X_α^k.

Proof of the neutrality rule. Taking into consideration the lack of savings (4) and the calibration of prices (1), the rule (21) provides the price after tax for all taxed goods, equal to δ. It means that for individual k the consumption tax burden is:

$$(\delta - 1)X_\alpha^k + (\delta - 1)X_\omega^k = (\delta - 1)\left(X_\alpha^k - X_\omega^k\right) = (\delta - 1)y^k \; q.e.d. \tag{27}$$

Equation (27) shows that all individuals loose the same part of their income paying higher prices for taxed goods when the neutrality rule (21) is implemented for consumption taxation.

Conclusion

Besides providing the reason for minimizing the deadweight cost of taxation which is expressed by proposition of inverse proportionality of tax rates to elasticity (Ramsey 1927), the consumption tax system with differentiated rates may also justify compensation for a different distribution of consumption tax burden between consumers and sellers, resulting from different incidence rate.

The model shows that the lack of diversification in the consumption tax rates influences the distribution of tax burdens, devastating the redistribution of income provided by income taxation and social security transfers. It is easy to expect that during the demographic transition process, especially when *the longevity ratio LR* grows, the correction in *the income redistribution ratio YR* should be completed with the introduction of the neutrality rule of consumption taxation (21). A higher degree of tax rates differentiation should meet a growing *LR*, taking into account that in the end of demographic transition *LR* slows down, the implementation of the neutrality rule (21) results in a lower degree of differentiation.

Further results show that the absence of the neutrality rule (21) leads to progressivity or regressivity of the consumption tax scheme. Hence, for a given stage of the demographic transition (equal to assumption $LR = const.$), a single consumption tax rate for $YR < 1$ and π_ω differing significantly from π_α, will produce regressivity if $\pi_\alpha > \pi_\omega$, and progressivity if $\pi_\omega > \pi_\alpha$. The evaluation of the effects of fiscal decisions (the set of tax rates t_j^C) has to take into consideration both economic factors (the incidence rate π) and demographic process (LR), influencing the shape of the indifference curves and, consequently, the most preferable composition of X_ω and X_α. By contrast, when the personal income tax and social security transfers are toughly progressive, high-regressive consumption taxation could improve the less-progressive tax system or even leads to regressivity.

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DEMOGRAFIA FISKALNA: ZORIENTOWANA DEMOGRAFICZNIE REDYSTRYBUCJA OPODATKOWANIA KONSUMPCJI

Streszczenie

Uwzględniając fiskalne znaczenie opodatkowania konsumpcji oraz rosnące znaczenie wydatków konsumpcyjnych w starzejącym się społeczeństwie, artykuł podejmuje próbę określenia warunków redystrybucyjnej neutralności opodatkowania konsumpcji w przypadkach, kiedy dobra różnią się strukturą podziału obciążeń fiskalnych między producenta i konsumenta. Zróżnicowanie stopnia incydencji, czyli zdolności przerzucenia podatku na konsumenta, wymaga uwzględnienia nie tylko cenowej elastyczności popytu, lecz także przypadków, kiedy zachowania rynkowe różnią się w zależności od wieku konsumenta. Problem neutralności redystrybucyjnej podatków konsumpcyjnych jest ważny ze względu na różnice w strukturze konsumpcji zależne od wieku konsumentów. Celem artykułu jest budowa prostego modelu neutralności redystrybucyjnej opodatkowania dóbr charakteryzujących się znacznym zróżnicowaniem elastyczności popytu ze względu na wiek konsumentów.

Słowa kluczowe: opodatkowanie konsumpcji, redystrybucja, starzenie społeczeństwa

JEL: H220, H230, J180

FISCAL DEMOGRAPHY: AGE-RELATED REDISTRIBUTION OF CONSUMPTION TAXATION

Summary

Taking into account the role of consumption taxes as the source of public revenues and the growing propensity to consume characteristic of the aging society, the paper focuses on an investigation of the conditions of the redistributive neutrality of consumption taxation in a situation when particular goods are marked by a different distribution of tax burden between consumer and seller. The study attempts to define the rule of diversification of consumption tax rates which will compensate for a different market effect (price elasticity) leading to a decrease in the wealth of consumers differentiated by age (age elasticity). The issue of the redistributive neutrality of consumption taxes is crucial because of lifetime differences in consumption. The aim of the paper is to construct a simple model of the redistributive effects induced by consumption taxes.

Key words: consumption taxation, redistribution, ageing

JEL: H220, H230, J180

ФИСКАЛЬНАЯ ДЕМОГРАФИЯ: ДЕМОГРАФИЧЕСКИ НАПРАВЛЕННОЕ ПЕРЕРАСПРЕДЕЛЕНИЕ НАЛОГООБЛОЖЕНИЯ ПОТРЕБЛЕНИЯ

Резюме

Учитывая фискальное значение налогообложения потребления, а также растущее значение потребительских расходов в стареющем обществе, в статье предпринимается попытка определить условия перераспределительной нейтральности налогообложения потребления в случаях, когда блага различаются структурой деления фискальных нагрузок между производителем и потребителем. Дифференциация степени инцидентности, т.е. способности перебросить налог на потребителя, требует учета не только ценовой эластичности спроса, но также случаев, когда рыночное поведение различается в зависимости от возраста потребителя. Вопрос перераспределительной нейтральности налогообложения благ важен ввиду различий в структуре потребления по возрастам. Целью статьи является построение простой модели перераспредельной нейтральности налогообложения благ, характеризующихся значительной дифференциацией эластичности спроса в зависимости от возраста потребителей.

Ключевые слова: налогообложение потребления, перераспределение, старение общества

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