Using the Relation between GINI Coefficient and Social Benefits as a Measure of the Optimality of Tax Policy

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Abstract

Maximizing the social welfare function is the main purpose of designing optimal tax system which includes both of commodity taxes and income taxes. But despite of so many economists' contributions in the field of optimal taxation theory it is still very difficult to determine the directions that tax policy maker should follow to design the optimal tax policy. This paper tries to illustrate the importance of using the relation between GINI coefficient values and spending on social benefits as a share of GDP to measure the optimality of the tax policy.

Keywords: social welfare, optimal taxation, optimal commodity taxation, optimal income taxation, optimal tax policy, distorting effects, gini coefficient, social benefits

Introduction

The main idea of the optimal taxation theory is determining the design of commodity taxes and income taxes in the way that minimizes the distortion effects of these taxes on the economic decisions of individuals. But since the emerging of the theory of optimal commodity taxation by Ramsey (1927) and optimal income taxation by Mirrlees (1971) until now there is still a lot of conflicts between the author's ideas in the field of optimal taxation, and because of that it is still very hard to conclude optimal taxation's principles that are acceptable from all economists and the more difficult thing is determining the degree of optimality of some government's tax policy.

Lump- sum tax has no distorting effects but at the same time it is levied regardless of the individual's ability so they are unfair taxes and they can't be levied in real world and because of unfairness of this kind of taxes levying this tax in UK was one of the main reasons that caused Mrs. Thatcher's downfall in the elections that took place in UK in 1990.

On the other hand the commodity taxes can be fairer by levying them with low rates on the essential commodities like foods and by higher rates on luxury commodities, at the same time income taxes can be fairer as so by levying them by low rates on the low incomes and by higher rates on high incomes, but those kinds of taxes distort the economic decisions, generate an excess burden and as a result reduce the social welfare.

At the first section of this paper the main ideas of optimal commodity taxation will be illustrated after that the same thing will be done for the ideas of optimal income taxation at the second section.

At the third section the idea of using relation between GINI coefficient and the social benefits as a share of GDP as a measure of the optimality of tax policy will be illustrated and at the fourth section this measure will be applied on UK by studying the relation between social benefits as a share of GDP and GINI coefficient values in UK between 1977 and 2007.

Optimal Commodity Taxation

The concept of optimal taxation is associated with the concept of social welfare so the aim of optimal taxation theory is to lay the taxes in the way that maximize the function of social welfare (Heady, 1993). Lump- sum tax which is a specific amount of money that must be paid regardless to the individual's economic behavior doesn't distort the individual's economic decisions (Rosen, 2005) and that is why it is known as a neutral tax (Sandmo, 1976), but it can't be used in real world because it is levied regardless of the individual's ability to pay so it is unfair tax. Otherwise the other commodity taxes distort the economic decisions, generate the excess burden and by doing this decrease the social welfare especially when they are levied by different rates (Auerbach & Hines, 2001).

To solve the efficiency problem Ramsey has suggested the inverse elasticity rule which means that as long as goods are unrelated in consumption tax rates should be inversely proportional to elasticity. The explanation of Ramsey rule is that the distortion effects of commodity taxes will be greater for the commodity that has more demand elasticity so efficient taxation requires that relatively high rates of taxation be levied on relatively inelastic goods. But according to this rule the essential goods (like foods) will be taxed by high rates because those goods have inelastic demand so the unfairness problem appears again (Rosen, 2002).

To create a combination that achieves both equity and efficiency aims some authors in the field of optimal commodity taxation like Atkinson and Stiglitz (1976) suggested that the optimal commodity tax rates can be uniform if they are applied with Mirrlees' model of optimal income taxation which is nonlinear income tax associated with universal lump- sum transfer (Atkinson & Stiglits, 1976). On the other hand Deaton (1979) provided another condition to apply uniform commodity tax rates which is linear Engel curves. After that authors like Laroque (2005) and Kaplow (2006) argued that optimal commodity tax rates should be uniform regardless of the optimality degree of income tax (Revesz, 2014).

In general despite of the conditions the economists provide to accept uniform commodity tax rates as optimal commodity taxes (like perfect competition condition and not existing of compliance and administrative costs) the direction toward uniform commodity tax rates looks logical especially after realizing that the commodity taxes will distort the individuals' economic decisions in greater degree (generate a greater excess burden) when they are applied by different rates. On the other hand Diamond and Mirrlees (1971) showed that just final goods should be taxed (Diamond & Mirrlees, 1971), and this result still has a general acceptance between the authors in the field of optimal commodity taxation.

Optimal Income Taxation

Income taxes affect the labor supply decisions, generate an excess burden, reduce individual's utility and as a result they reduce the social welfare as whole, in other words income taxes distort the economic decisions like commodity taxes do.

Generally income taxes with progressive rates are fair because under this kind of income tax the individuals with high incomes will pay higher amount of money[1] as taxes than those with lower incomes but this is right just when the individuals with high incomes keep their labor supply at the same level but if they reduce their labor supply level as a respond to the higher tax rates that levied at the high levels of their income maybe they will not pay that higher amount of money because by reducing their labor supply they reduce their incomes as so, in this case it can been seen that this kind of income taxes generates problem in efficiency and as a result affects the social welfare negatively.

As illustrated in this paper lump- sum tax doesn't distort the individual's economic behavior so it has no efficiency problems but it is unfair. To solve this problem Mirrlees discussed the issue of designing an optimal non- linear income tax function applied with a uniform lump-sum transfer and he noted that more income redistribution creates a reduction in labor supply. At the same time he showed that the linear income tax schedule (in which the marginal tax rate doesn't change according to the level of income) could be close to optimal (Mirrlees, 1976). After that some authors like Atkinson (1973) and Toumala (1984) suggested that optimal income tax structure should have decreasing marginal tax rates.

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[1] When there are no differences between wage rates this rule doesn't work because the differences between incomes in this case are caused by of differences between individual's work hours so individuals with low incomes have chosen to work less.

On the other hand Stern (1987) found out that income tax equation should take this form:

Revenues = -a + t × Income
Where (a) and (t) are positive numbers.

It is referred to this kind of income taxes as linear income tax schedule or flat income tax because the geometric interpretation of its equation appears as a straight line.

So according to Stern the flat income tax with uniform lump- sum transfer can achieve both equality and efficiency aims, but for higher values of t the income tax will be more progressive, on the other hand more progressive income tax creates bigger excess burden and this excess burden will be larger when the labor supply elasticity is greater, because of that Stern thought that the optimal income tax can be chosen by find the best combination of a and t (Rosen, 2002).

After that Diamond (1998) suggested that the degree of progressiveness or regressiveness of the income tax structure depends on the income distribution (Beresteanu & Dahan, 2002). The illustration of this idea is that the higher marginal tax rate will distort the labor supply decisions of individuals at a specific income level (the income level that will be affected by the higher marginal tax rate). But for the individuals at the higher income levels the higher marginal tax rate will be like lump- sum tax (because their high income levels will not be affected by the higher marginal tax rate) so the higher marginal tax rate doesn't seem to distort their labor supply decisions (Saez, 2001).

After showing those different ideas, it is still difficult to determine what optimal income tax structure is but it can be said that the idea that has a large acceptance between the authors in the field of optimal income taxation is that optimal income tax structure could be a flat income tax with uniform lump- sum transfer.

Optimal Tax Policy

According to the ideas that have been presented until now the main issue in optimal taxation theory is to keep the social welfare at the maximum level, lump- sum taxes have no distorting effects but they are unfair and they can't redistributive the income and reduce the inequality degree, commodity taxes and income taxes are fairer than lump- sum taxes and they can redistribute the income and reduce the inequality degree in the community (by levying high tax rates on the luxury commodities in the case of commodity taxes and by levying high tax rates on the high incomes in the case of income taxes) but they have distorting effects so they are less efficient than lump-sum taxes.

To solve this conflict between efficiency and equality the economists like James Alm (1996) suggested that optimal tax system should contain both of commodity and income taxes levied in the way that minimize the distorting effects and maximize the social welfare (Alm, 1996). The problem is that despite of the generally acceptable idea that the optimal tax system should contain optimal commodity taxes and optimal income taxes there are still no specific directions that the tax policy maker can follow to design the tax policy that match the principles of the optimal taxation theory so it will be useful to use simple tool to determine if the tax policy is near to optimality or not.

Mirrlees in 1971 figure out that in the societies that have higher degree of inequality the optimal tax policy should be more redistributive (Mirrlees, 1971). To apply this idea Mankiw, Weinzirel and Yagan have used the inequality degree between earnings as a measure of inequality and the social expenditures as a share of GDP to measure the degree of redistribution that the tax policy in the economy has (Mankiw, Weinzirel & Yagan, 2009). In other words in some economy if the applied tax policy is near to optimality then when the earnings inequality rises the social expenditures as a share of GDP will rise as so.

Using the Relation between Gini Coefficient and Social Benefits to Measure the Optimality of Tax Policy in UK

As explained earlier it is obvious that in some economy the higher the inequality degree is the more redistributive tax policy should be, in this paper for UK case between 1977 and 2007 and to determine the degree of inequality GINI coefficient (which is an acceptable indicator for inequality and which takes values between 0 and 1 where 0 refers to a perfect equality and 1 refers to a perfect inequality) will be used. At the same time the social benefits (as a share of GDP) will be used to determine the redistribution degree of the tax policy in UK.

To get this done the chosen GINI coefficient values will be those values that have been calculated according to the base of original income[2] which is defined as the income that is received directly (like self-employment, savings and investments), except the social benefits (Townsend, 2009).

To determine the strength of relation between the GINI coefficient values and the social benefits as a share of GDP in UK for 1977- 2007 period Person's correlation coefficient ($r_{x,y}$)[3] between them has been calculated in this paper and the resulting value was about 0.78 which means that the correlation between the variables is strong (because the value of correlation coefficient ($r_{x,y}$) is near to 1).

Consequently it can be concluded that in UK for 1977- 2007 period when the GINI coefficient values rise the spending on social benefits as a share of GDP rises as so, which means that when the inequality degree rises the tax policy becomes more redistributive and as a result it can be said that the applied tax policy is near to optimality.

In fact determining if some tax policy is optimal or not needs many indicators to discover if income taxes and commodity taxes has been levied in the way that minimizes the inequality degree and minimizes the distorting effects of these taxes at the same time, in other words the way that maximize the social welfare function, but despite of that using the relation between GINI coefficient and social benefits as a share of GDP can provide very useful index about the general direction of the tax policy if it works toward optimality or not by examining the Mirrlees's rule: In the societies that have higher degree of inequality the optimal tax policy should be more redistributive, even if the depending on this indicator is not enough to conclude if some tax policy as whole is optimal or not.

Conclusion

Since 1927 the date in which the Ramsey's contributions about optimal taxation had been widespread until now the contention between the authors' ideas in the both fields of optimal commodity taxation and optimal income taxation has been still existed, but despite of that it can be said that there are two general directions that have some kind of acceptance between those authors, the first one is that the optimal commodity tax rates should be uniform and the second one is that the flat income tax rate could be optimal if it is associated with lump- sum transfers.

On the other hand it can be noted that in real world and despite of some authors' acceptance that the optimal tax system should contain the both indirect and direct taxes (like James Alm) the theory of optimal taxation couldn't provide a feasible tools that can be used to measure the degree of optimality that some tax policy has.

In this paper it has been presented that according to Mirrlees's rule: In the societies that have higher degree of inequality the optimal tax policy should be more redistributive, it could be useful to use the relation between GINI coefficient (as measure of inequality) and social benefits as a share of GDP (as measure of the redistribution degree of tax policy) to conclude if the general direction of the tax policy is working toward optimality or not.

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[2] The purpose of using original income is determining the inequality degree between individuals' before paying taxes and getting benefits.

[3] Person's($R_{x,y}$) is a known coefficient which is used to measure the strength of relation between tow variables and is given by this equation: $r = \dfrac{n\sum x_i y_i - \sum x_i \sum y_i}{\sqrt{n\sum x_i^2 - (\sum x_i)^2}.\sqrt{n\sum y_i^2 - (\sum y_i)^2}}$

Table 1: GINI Coefficient and Spending on Social Benefits as a Share of (%) GDP by Years during the Period of (1977- 2007) in UK

Year	GINI Coefficient (%)- Original Income*	Spending on social benefits as a share of GDP (%)**
1976/77	42.8	8.69
1977/78	42.8	8.98
1978/79	43.5	9.32
1979/80	44.4	9.17
1980/81	45.9	9.71
1981/82	47.1	10.79
1982/83	48.2	11.27
1983/84	48.6	11.56
1984/85	49.1	11.63
1985/86	50.4	11.56
1986/87	51.1	11.61
1987/88	50.9	10.84
1988/89	49.7	9.88
1989/90	51.5	9.59
1990/91	51.2	10.02
1991/92	51.7	11.17
1992/93	53.5	12.28
1993/94	53.7	12.69
1994/95	52.9	12.35
1995/96	51.9	12.2
1996/97	52.7	11.91
1997/98	52.7	11.33
1998/99	52.7	10.99
1999/00	52.5	10.87
2000/01	51.3	10.97
2001/02	52.6	11.35
2002/03	51.2	11.27
2003/04	51.7	11.5
2004/05	50.6	11.42
2005/06	51.9	11.41
2006/07	51.6	11.31
2007/08	51.7	11.37

* Lan Townsend, UK income inequality and international comparisons, House of Commons Library, 30 July 2009, p. 19.

** James Browne and Andrew Hood, A survey of the UK Benefit System, institute for social studies, November 2012, p. 72.

References

Alm, j. (1996). What is an optimal tax system. National Tax Journal, 49(1): 117- 133.

Auerbach, A.J., & Hines, J.R. (2001). Taxation and Economic Efficiency. February,
        http://www.nber.org/papers/w8181.pdf, (03.09.2014).

Beresteanu, A., & Dahan, M. (2002). An optimal shape of income tax: Evidence from zero income tax countries-
        Paraguay & Uruguay.

Browne, J., & Hood, A. (2012). A survey of the UK benefit system. Institute for Social Studies, November,
        http://www.nber.org/papers/w8181.pdf, (03.09.2014).

Diamond, P.A., & Mirrlees, J.A. (1971). Optimal taxation and public production I: Production efficiency.
        American Economic Review 61(1).

Heady, C. (1993). Optimal taxation as a guide to tax policy: A survey. Fiscal Studies. 14 (1): 15- 41.

Mankiw, N.G., Weinzirel, M., & Yagan, D. (2009). Optimal taxation in theory and practice. National Bureau of
        Economic Research. Working paper 15071, Cambridge,
        http://dash.harvard.edu/bitstream/handle/1/4263739/Mankiw_OptimalTaxationTheory.pdf?sequence=2,
        (03.09.2014).

Mirrlees, J.A. (1971). An exploration in the theory of optimal income taxation. Review of Economic Studies, 38:
        175-208.

Mirrlees, J.A. (1976). Optimal tax theory. Journal of Public Economics. 6: 327- 358.

Revesz, J.T. (2014). A computational model of optimal commodity taxation. Public Finance Research Papers,
        Sapienza University of Rome.
        http://www.digef.uniroma1.it/sites/default/files/pubblicazioni/economia/research-papers/e-pfrp-n-4.pdf,
        (03.09.2014).

Rosen, S.H. (2002). Public finance. Sixth edition, McGraw- Hill Higher Education. New York.

Rosen, S.H. (2005). Public finance. Seventh edition, McGraw- Hill Higher Education. New York.

Saez, E. (2001). Using elasticity to derive optimal income tax rates. Review of Economic Studies, (68): 205- 229.

Sandmo, A. (1976). Optimal taxation: An introduction to the literature. Journal of Public Economics, 6: 37-54.

Townsend, L. (2009). UK income inequality and international comparisons. House of Commons Library, July.