Società italiana di economia pubblica

XIV CONFERENZA

TAX PROGRESSIVITY AND ECONOMIC AND POLITICAL DETERMINANTS: AN EMPIRICAL ANALYSIS FOR THE OECD COUNTRIES

EMMA GALLI

società italiana di economia pubblica

dipartimento di economia pubblica e territoriale – università di Pavia

Tax progressivity and economic and political determinants: an empirical analysis for the OECD countries

Emma Galli

Università di Roma "La Sapienza" e Centro Studi di Economia delle Istituzioni

Preliminary draft (September 2002)

1. Introduction

The choice of tax structure and optimal degree of progressivity is usually analyzed in public finance within the framework of the optimal taxation[1] theory along the lines of Ramsey (1927) and Sadmo (1976), without paying much attention to the political process as the main determinant of the level and structure of taxation.

However it is difficult - if not impossible - to explain actual tax systems on the basis on this approach alone. Winer and Hettich (1999) point out that the omission of collective choice prevents the economist from understanding the central role of political equilibrium in the analysis of taxation. On this basis, more recently a strand of literature has focused on the importance of political and institutional factors in explaining the design of the tax structures, the use of different tax instruments and the extent of tax progressivity. So far, however, these studies have not yielded a fully developed framework that allows for empirical testing. In particular, explanations of the determinants of tax progressivity have received only scant attention in the literature, which is rather surprising given a) the importance nowadays of tax reforms that often propose a reduction in the income taxation progressivity; and b) a growing empirical literature on the impact that a progressive

income taxation has on economic growth (see, among others, Widmalm, 1998 and Padovano and Galli, 2001).

While tax progressivity is a central question in public finance, most of the research has focused either on the measurement issue, or on normative aspects of progressivity. Given the complexity of the problem, however, there has been very little empirical work to explain observed differences in progressivity, both between countries and within countries. This lack constitutes an important gap in our understanding of the tax system. The paper is an attempt to begin to work in the direction of the political economy of progressivity. It proposes various hypotheses that relate tax progressivity to some economic and politico-institutional explanatory variables and tests them by applying panel data analysis on a sample of OECD countries for the period 1965-1995.

The paper is organized as follows. Section 2 briefly reviews previous literature in this field, while section 3 formulate some testable hypotheses. In section 4 I discuss the empirical results.

2. *Review of the literature*

Statutory income tax schedules of most of the advanced econmies, and certainly of all OECD countries (Snyder and Kramer, 1988; Gwartney et al., 2000) are progressive. One possible explanation for the prevalence of this type of tax schedule is that the central authority designs it to maximize some utilitarian social welfare function. An alternative, interesting approach towards explaining this empirical regularity starts from the presumption that modeling income taxation as a direct outcome of a voting mechanism mirrors the actual public choices made in designing tax systems. Unfortunately the literature on the connection between progressive taxation and voting is still very inconclusive: it seems that the analyeses are confined to either linear or quadratic tax functions for technical reasons and thus are of limited descriptive content (see, among others,

---

[1] For an overview of the theoretical developments on the design of the tax structure based on optimality properties, see for example Stiglitz (1987) and Boadway et al. (1994).

Cukierman and Meltzer, 1991). The main reason why this literature falls short of obtaining definitive results about the popular support of progressive taxes is that the problem of voting over a nonlinear set of tax functions is a multidimensional problem, and the conditions which are necessary for the existence of a stable outcome in such voting problems are quite restrictive (Marhuenda and Ortuno-Ortin, 1995; Mitra, Ok and Kocksen, 1998; Roemer, 1999).

A few studies have tried to explain differences in progressivity across U.S. states. Jacobs and Waldman (1983) find that greater income inequality leads to more progressive tax systems, while a higher percentage of blacks is associated with more regressivity. Lowery (1987) finds that the degree of political competition is positively correlated with the degree of tax progressivity. Morgan (1994) hypothesizes that a better informed electorate is more likely to resist progressivity in taxation. Measuring the degree of information by newspaper circulation, he finds that more circulation has a negative effect on tax progressivity. More recently, Chernick (2001) finds that deductability of state and local income taxes has a significant effect on tax progressivity. A negative effect of income provides evidence for the role of benefits-received financing in determining state tax structure, while a positive effect of welfare benefits suggests that redistribution through expenditures and tax progressivity are complements, rather than substitutes.

A little more developed is the empirical literature that investigates the economic and political determinants of the tax mix in a political economy framework. An early contribution stems from Pommerehme and Schneider (1983) who develop and test a model of a monopolistic government that can influence its chance of re-election by the shape of the tax structure. A government in power is urged to follow the preferences of a majority of voters if an election approaches; otherwise, the government can follow its ideological preferences. The scope of this study is limited since they focus on Australia, a country with a typical institutional framework and a bipolar political system, during the seventies; still they find some interesting results. Hettich and Winer (1984, 1988, 1999), who have been inspired by this work, develop and test for a cross section

of U.S. states a probabilistic voting theory of the choice among different tax instruments and of the tax structure based on the political cost of taxation.

An extension of the work based on the probabilistic voting model can be found in the interest group approach. Including in the analysis the size or the strength of various interest groups and the gains and losses from the policy process that these groups expect is one way of investigating the importance of heterogeneity of political influence in the determination of tax structure. Empirical studies adopting this approach, such as Renaud and van Winden (1987), Hunter and Nelson (1989) and Inman (1993) provide weak evidence of the role of interest groups.

Another possible way to deal with this issue is to analyze how different politico-institutional settings shape electoral outcomes and consequently the mix of tax instruments and the degree of progressivity. Devereux and Wen (1998) provide support to the correlation between political instability and capital taxation; Inman and Fitts (1990) test the impact of the decline of the centralized authority in the U.S House of Representatives on tax policy, while Matsusaka (1995) focuses on the impact of direct legislation on the structure of the taxation. Metcalf (1993), Borge (1995), Volkerink and de Haan (1999), Feld and Matsusaka (2000) and Kenny and Winer provide the most inclusive empirical analyses of the choice of the tax mix respectively for U.S states, Switzerland, OECD countries and a large sample of 100 developed and developing countries.

3. *Specification of the hypotheses*

Virtually all advanced democracies have adopted income taxes with considerable progressivity in marginal tax rates. As matter of fact the economies of the OECD countries have developed from minimalist states, relying mainly on indirect taxation, to welfare states where the growing pressure for redistribution and the need to raise more revenues increased the importance of income taxes and of the progressivity of the marginal tax rates.

This section presents a selection of certain economic and political variables to be included in an empirical model to explains tax progressivity. Given that data on tax rates are limited, I opted for the statutory top marginal tax rates on personal income as measure of tax progressivity. The statutory marginal tax rates often do not coincide with effective tax rates, as they do not account for tax deductions, exemptions, evasion and the like. Also, the extreme rates may be to some degree misleading since often they apply to only a small portion of the taxpayers. However, what is relevant here is the actual choice of the degree of marginal rate progressivity made by the government and to this purpose the statutory top marginal tax rates seem to be the most appropriate variable.

Of course, income taxation is only part of the redistributive story. In most industrialized countries, social security contributions and various cash payments also affect net disposable income. Including these factors complicates the picture, making it very difficult to calculate 'full' marginal tax rates.

I have identified three kinds of variables that may have an effect on the progressivity of income tax: economic variables, that mainly measure the need for redistribution of income; interest groups variables, that measure the impact of different groups of voters on progressivity; and politico-institutional variables, that capture the characteristics of the government which are likely to favor tax progressivity.

3.1 *Economic variables*

The benefits-received principle suggests that variables affecting the demand for public expenditures may have an impact on tax structure (Chernick, 2001). An obvious candidate is per capita income (*PCINC*). Although the positive impact of income on public expenditure is relatively uncontested (as far as a positive income elasticity od demand for public goods can be presumed), there are no clear hypotheses about its effect on tax progressivity (Feld amnd Matsusaka, 2000). It might be hypothesized that the richer a country, the less it relies on progressive income taxes since

the rich have to pay higher tax bills due to progression effects. On the other hand, a large progressivity of the income tax schedule may enable higher spending.

Alternatively, the unemployment rate (*UNR*) and the real GDP growth rate (*GY*) are included in the model to capture the impact of the business cycle on tax progressivity. The sign on the coefficient of real GDP growth rate (unemployment) is expected to be negative (positive), because it triggers lower (higher) public spending and higher (lower) tax bases to be taxed. Some room for a reduction (increase) of tax progressivity emerges.

I also expect that the fraction of the government expenditures on transfers and subsidies (*TR*) has a positive effect on progressivity because governments that redistribute income for welfare programs should be more inclined to the well-being of the low-income families. While there might be less need for tax progressivity if governments redistribute through spending programs, it seems more likely that government that want redistribute income will do so through both their spending and tax policies.

Personal income tax and social security contributions may be considered potentially competing tax ratios, rather than complementary. Therefore an increase in the share of social contributions (*SC*) may reduce the need for tax progressivity. However, the available evidence suggests that even taking into account social security payments and cash transfers, the marginal tax rate rises with income, on average, in two-thirds of OECD countries, at least over the range of incomes between half and twice that of the average worker (Messere, 1993).

I include in the model a measure of openness (*OP*) as exports and imports of goods in percentage of GDP and a dummy for EU membership (*EU*) to control for the impact that increasing economic integration has had on the degree of tax progressivity in the OECD countries. Absent the ability of national or supranational governments to tax individuals on a worldwide basis, openness and EU membership increases the cost of progressivity, because it increases the elasticity of taxed activities (Slemrod, 2000). In particular people have increasing flexibility about the choice of their country of residence. Negative coefficients on both these variables are expected.

Finally, we include in the model a variable that measures the income inequality. According to the standard theory of optimal progressivity, a more disperse wage distribution should increase the amount of redistribution because it increases the weight placed on the equity gain from redistribution relative to the efficiency losses. The prediction of the 'rational' theory of the size of government proposed by Meltzer and Richard (1981), according to which increased inequality increase mean income relative to the income of the decisive voter, and thus makes redistribution more attractive to him goes in the same direction. Therefore we expect a positive coefficient on the income inequality variable (*YIQ*), measured by the Gini coefficient (OECD, 1998).

3.2 *Interest groups variables*

I identify three interest groups that possibly affect the degree of tax progressivity in the countries: 1) The unionized labor force (*UN*). A stronger influence of trade unions entails a higher tax burden for the high-level incomes. 2) The labor force participation rate of women (*LPW*). Since women generally earn lower salaries than men, they are likely to favor more progressivity on the tax system. 3) The percentage of elderly in the total population (*POP65*). As the percentage of the population over the age of 65 increases, tax progressivity may increase, because of two possible reasons: the need of public spending for the care of the elderly and for health services and the shift of the tax burden to the young workers (*P0PY*), i.e. the percentage of the population between 16 and 65 years. As the elderly increases, the potential conflict between old and young people might reinforce the negative effect of the younger age cohorts on progressivity.

3.3 *Political variables*

Ideology, degree of instability and power dispersion of the governments are the political factors that may have an impact on tax progressivity. As far as the ideological component is concerned, we extends the arguments of the partisan cycle models that right-wing governments tend to follow a different fiscal policy than left-wing governments, to the idea that the latter tend to favor

progressive taxation. The ideology of the government is measured with a dummy variable *RIGHT* that takes the value 1 if there is a right-wing domination in both government and parliament and if right-wing or centre parties make up between 33.3% and 66% of the government; 0 otherwise. Alternatively, the dummy variable *RIGHTR* provides a stricter definition of right-wing domination since it takes the value of 1 only if the government is formed by a right wing coalition with an absolute majority in both government and parliament and 0 otherwise. A negative sign is expected on the coefficient of *RIGHT* and *RIGHTR*.

The variables *CH* and *NGV* indicate, alternatively, the degree of political instability. *CH* is a dummy that takes the value of 1 if there is any change in government for a given year, whereas *NGV* is the actual number of government present in one year. It has been argued that unstable governments are not able to cut expenditures or increase taxes, and thus have a deficit bias (De Haan and Sturm, 1994). In a similar way, it could be argued that increasing taxes (or marginal tax rates) is easier than decreasing government expenditures in case the government (as it is the case for the European countries) has to take fiscal austerity measures. Reducing public spending requires a strong government. This may implies that unstable governments may favor tax progressivity.

The same indeterminacy concerns the coefficient of the coalition variable (*COA*) that measures the power dispersion in the government. We use the index of power dispersion as in Roubini and Sachs (1989) to identify the type of government. The variable *COA* takes the value of 1 in the presence of a coalition government, 0 otherwise, i.e. in the presence of a single-party majoritarian government and a minority government. More competition among parties in the government might result in higher spending and deficits since coalition governments may have problems to balance the (partially) different interests and tend to oppose higher taxes for their constituencies (Roubini and Sachs, 1989). Again, it could be argued that increasing taxes (or marginal tax rates) is easier than decreasing government expenditures in case of a binding budget constraint.

4. *Empirical results*

I have applied a fixed effects panel data model with weighted least squares estimation and White heteroskedastic consistent standard errors and covariance matrix on a panel of 16 OECD countries. The choice of the longitudinal technique depends on the fact that most of the empirical test of the determinants of tax progressivity has been based on time series or cross sectional variation in tax structure and degree of progressivity within a country, and did not take advantage of the relevant variation that exists among countries.

The choice of the fixed effects model is based on the Hausman test for correlation between the error and the regressors according to which differences in coefficients are systematic (i.e. the slopes of the coefficients are not the same for all countries).

I have tested different specifications of the model by including gradually, once at a time, the three set of relevant variables in order to check the robustness of the results. I also found a clear problem of multicollinearity among variables since there are several proxies that are related to the same underlying economic or political phenomenon. Therefore I have excluded from the final regression *POPY* and *LPW* as well as *EU* and *GY*.

I have also estimated the model using one-period lagged political and institutional variables, since political changes might not instantly affect the revenue structure. The estimates turned out to be robust to these changes. All these results are available upon request.

Table 1 presents the estimates of the final regression. Overall the formulated hypotheses receive some support.

Table 1 – Regression results

Dependent variable: TMTR

Sample period: 1965-1995

Variable	Coefficient	t-stat
PCINC	-0.002	-2.035**
GY	-0.053	-0.911
TR	0.015	2.96***
SS	0.015	1.831*
YIQ	0.004	0.646
OP	-0.004	-1.99**
P65	0.038	1.74*
UN	0.845	4.04***
RIGHT	0.022	1.021
COA	0.086	2.17***
NGV	0.033	2.053***
$R^2 = 0.67$ D-W = 1.94		

Notes: ***, **, and * are significant respectively at the 1%, 5% and 10% level.

As far as the economic variables are concerned, the results suggest that:

1) The coefficient on per capita income is significant at 5% level and shows a negative sign, giving support to the hypothesis that the richer a country, the less it relies on progressive income taxes since the rich have to pay higher tax bills due to progression effects.

2) The real GDP growth rate is included in the regression as an alternative to unemployment rate (*UNR*) since these variables are highly correlated. The sign is negative as expected but non statistically significant.

3) Both the fraction of the government expenditures on transfers and subsidies and the share of social contributions turn out to be positively correlated with tax progressivity respectively at the 1% and 5% level of significance, giving support to the hypothesis of complementarity between redistributive expenditures and social security contributions with tax progressivity.

4) The increasing economic integration has a negative impact on the degree of tax progressivity in the OECD countries, providing some evidence to the idea that fiscal competition may be an incentive to reduce tax progressivity.

5) Finally, we do find significant evidence of the positive relation between income inequality and tax progressivity.

As far as the interest groups variables are concerned, the unionized labor force and the elderly variables are the ones that better perform.

Finally, the number of parties in the government as well as the instability of the government have a significant positive impact on tax progressivity, giving support to the argument that increasing marginal tax rates is easier than decreasing government expenditures in case the government (as it is the case for the European countries) has to take fiscal austerity measures.

Surprisingly, the ideological orientation of the government - the more convincing political variable of the model - does not play a role in the determination of tax progressivity, even though

the its coefficient shows the expected sign. The explanatory power of this variable is though reduced by the inclusion in the regression of an income inequality measure.

5. *Conclusion*

While tax progressivity is a central question in public finance, most of the research has focused either on the measurement issue, or on normative aspects of progressivity. Given the complexity of the problem, however, there has been very little empirical work to explain observed differences in progressivity, both between countries and within countries.

In this paper I propose various hypotheses that relate tax progressivity to some economic and politico-institutional explanatory variables and tests them by applying panel data analysis on a sample of OECD countries for the period 1965-1995. I get some interesting results with respect to most of them. However, these results are only preliminary in the sense that further robustness tests have to be carried out. To this end it may also be necessary to perform other estimation tecnique, such as the seemingly unrelated regression method and, in order to get a more comprehensive picture, estimate a whole system of equations that include the other components of the structure of taxation.

Appendix: Data Description

The panel consists of 16 OECD countries (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Sweden and the U.K. and covers the period 1965-1995. Greece, Iceland, Luxembourg, Portugal, Spain and Turkey have been excluded because of missing data; the U.S. and Switzerland because I focus on parliamentary democracies.

Data on the top marginal tax rates and on the size of the transfers and subsidies as percentage of GDP (*TR*) come from Gwartney, J. and Lawson, R., *Economic Freedom of the World - 2001 Annual Report*, Fraser Institute.

Data on social security contributions are from OECD *Revenue Statistics*, various years.

Data on the rate of growth of real GDP are from the *OECD Economic Outlook*, various years.

Data on the income inequality come from Atkinson et al., *Income Distribution in OECD countries*, OECD, 1998.

Data on exports and imports of goods as a percentage of GDP come from IMF, *International Financial Statistics*, various years.

Data on union density, i.e. the percentage of the nonagricultural labor force that is unionized are from the *Europa Yearbook*.

Data on population distributed by age, female labor force participation rate, unemployment rate are taken from OECD, *Labor Force Statistics*, various years.

The political data come from Woldendorp et al. (1993), "Special Issue: Political Data 1945-1990: Party Government in 20 Democracies", and updates published in the *European Journal of Political Research* and from Roubini and Sachs (1989).

Bibliography

Boadway, R. - Marchand, M. - Pestieu, P., "Towards a Theory of the Direct-indirect Tax Mix", *Journal of Public Economics*, 55, pp. 71-88.

Borge, L.-E., "Economic and Political Determinants of fee Income in Norwegian Local Governments", Public Choice, 83, 1995, pp.353-273.

Chernick, H., On the Determinants od Sub-National Tax Progressivity in the U.S., mimeo, 2001.

Cukierman, A. - Meltzer, A.H., "A Political Theory of Progressive Income Tax", in A.H.Meltzer - A.Cukierman - S.F. Richard, Political Economy, Oxford, Oxford University Press, 1991, pp.76-108.

de Haan, J., - Sturm, J., "Political and Institutional Determinants of fiscal policy in the European Community", *Public Choice*, 80, 1994, pp.157-172.

Devereux, M. - Wen, J.-F., "Political Instability, Capital Taxation and Growth", European Economic Review, 42, pp.1635-1651.

Feld, L. - Matsusaka, J.G., The Political Economy of Tax Structure: Some Panel Evidence for Swiss Cantons, mimeo, 2000.

Hettich, W. - Winer, S., "A Positive Model of Tax Structure", *Journal of Public Economics*, 24, 1984, pp. 67-87.

Hettich, W. - Winer, S., "The Economic and Political Foundations of the Tax Structure", American Economic Review, 78, 1988, pp. 701-712.

Hettich, W. - Winer, S., "The Political Economy of Taxation", in D.C. Mueller, *Perspectives in Public Choice,* Cambridge, Cambridge University Press.

Hettich, W. - Winer, S., *Democratic Choice and Taxation*, Cambridge, Cambridge University Press, 1999.

Hunter, W.J. - Nelson, M.A., "Interest Group Demand for Taxation", Public Choice, 62, 1989, pp.41-61.

Inman, R.P., "Local Interests, Central Leadership and the Passage of TRA86", Journal of Policy Analysis and Management, 12, 1993, pp.156-180.

Inman, R.P. - Fitts, M.A., "Political Institutions and Fiscal Policy: Evidence from the U.S. Historical Records", *Journal of Law, Economics and Organization*, 6, 1990, pp.79-132.

Jacobs, D.- Waldman, D., "Toward a Fiscal sociology: Determinants of Tax regressivity in the American states", Social science quarterly, 64, 1983, pp.550-565.

Kenny, L.W. - Winer, S., *Tax Systems in the World: An Empirical Investigation into the Importance of Tax bases, Collection Costs and Political Regime*, mimeo, 2001.

Lowery, D., "The Distribution of Tax Burdens in the American States: The Determinants of Fiscal Incidence", *Western Political Quarterly*, 40, 1987, pp.137-158.

Marhuenda, F. - Ortuno-Ortin, I., "Popular Support for Progressive Taxation", *Economic Letters*, 48, 1995, pp.319-324.

Matsusaka, J.G., "Fiscal Effects of the Voter Initiative: Evidence from the Last 30 Years", Journal of Political Economy, 103, 1995, pp.587-623.

Meltzer, A.H. - Richard, S.F., "A Rational Theory of the Size of Government", *Journal of Political Economy*, 89, 1981, pp.914-927.

Messere, K.C., *Tax Policy in OECD Countries*, IBFD Publications, Amsterdam.

Metcalf, G.E., "Tax Exporting, Federal Deductibility, and State Tax Structure", *Journal of Policy Analysis and Management*, 12, 1993, pp.109-128.

Mikra, T. - Ok, E.A. - Kockesen, L., "Popular Support for Progressive Taxation and the Relative Income Hypothesis", *Economic Letters*, 1998, pp.69-76.

Morgan, D.R., "Tax Equity in the American States: A Multivariate Analysis", Social Science Quarterly, 75, 1995, pp.510-523.

Padovano, F. - Galli, E., "Tax Rates and Economic Growth in the OECD Countries (1950-1990)", Economic Inquiry, 39, 2001, pp.44-57.

Peters, B.G., *The Politics of Taxation: A Comparative Perspective",* Blackwell, Oxford.

Pommerehne, W.W. - Schneider, F., "Does Government in a Representative Democracy Follow a Mayority of Voters Preferences? An Empirical Examination", in *Anatomy of Government Deficiencies*, Springler-Verlag, Berlin, 1983.

Ramsey, F.P., "A Contribution to the Theory of Taxation", The Economic Journal, 37, 1927, pp.47-61.

Renaud, P.S.A. - van Winden, F., Tax Rate and Government Expenditure, *Kyklos*, 40, 1987, pp.349-367.

Roemer, J.E., "The Democratic Political Economy of Progressive Income Taxation", *Econometrica*, 67, 1999, pp.1-19.

Roubini, N. - Sachs, J.D., "Political and Economic Determinants of Budget Deficits in the Industrial Democracies", *European Economic Review*, 1989, 33, pp.903-938.

Sadmo, A., "Optimal Taxation - an Introduction to the literature", *Journal of Public Economics*, 6, 1976, pp.37-54.

Slemrod, J . - Bakija, J., "Does Growing Inequality Reduce Tax Progressivity? Should It?, *NBER WP*, n.7576, 2000.

Snyder, J.M. - Kramer, G.H., "Fairness, Self-interest, and the Politics of the Progressivity Income Tax", *Journal of Public Economics*, 36, 1988, pp.197-230.

Stiglitz, J., "Pareto Efficient and Optimal Taxation and the New Welfare Economics", in A.Auerbach - M.Feldstein, *Handbook of Public Economics*, vol. II, North-Holland, 1987.

Volkerink, B. - de Haan, J., *Political and Institutional Determinants of the Tax Mix: An Empirical Investigation for OECD countries*, mimeo, 1999.

Widmalm, F., "Tax Structure and Growth: Are Some Taxes Better than Others?, mimeo, Uppsala University, 1998.