The Effects of Lump Sum Transfers on the *Gini Index*
Implications for Inequality Reduction when we Treat Taxation and Spending as Two Sides of the Same Coin

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ABSTRACT

We provide useful analytic results about exactly how lump sum distributions that are universalistic rather than targeted in character can lead to important post-tax redistributive consequences in terms of the Gini Index. Our key results hold under any tax regime and for any initial income distribution. Following Meltzer and Richard (1981, 1983), we suggest further that some types of services that can be publicly provided that can substitute for private goods, e.g., education and health care, and thus can be regarded as analogous to (expectationally) uniform lump sum transfers. While our results have implications for optimal levels of taxation, unlike classic work such as that of Meltzer and Richards, most of our results are not limited to a flat tax regime, nor are they limited to changes in inequality generated by tax increases that might be in equilibrium in that the median voter would not wish for further change, though they also include that case. Our work strongly reinforces the claim of Rothstein (1998), based on his analysis of the Swedish welfare system, that "universal" spending can be a powerful force for equality promotion even though not targeted specifically on the less well off.

I. Introduction

Advocates of inequality reduction within nations, especially those in the U.S., have tended to focus on two direct remedies: a progressive income tax scheme that lowers post-tax inequality as compared to pre-tax inequality, and government spending specifically targeted (in a Rawlsian fashion) on the least well off.[1] Sometimes a third element is regarded as also important, namely mechanisms that foster wage compression and thus create a more equal pre-tax distribution (see esp. Kelly 2009).[2] In contrast we emphasize a fourth factor; namely, government spending policies that are universalistic in character rather than targeted and can be thought of (in expectational terms) as a lump sum payment giving equally to all individuals or households services that they might otherwise have to pay for privately (e.g., for education or health care).[3]

We examine the changes in the post-tax Gini Index generated by any uniform lump sum distribution. We show analytically exactly how lump sum distributions that are universalistic rather than targeted in character can lead to important redistributive

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[1] It is standard to distinguish between progressive, flat and regressive taxes. A flat tax is technically one that imposes a tax that is the same fixed rate on <u>all</u> taxable incomes, but in practice, in the U.S., even flat tax advocates allow for the possibility that there may be some threshold such that incomes below that threshold are not taxed at all. We consider the implications of such thresholds later in the essay.

[2] For example, the recent concern about the very high and growing ratios of chief executive's salaries to those of workers in the same company indicates a concern with what we might call *relations of market equality*.

[3] Our focus in on within-nation measures of inequality, but the results we give would also apply to any uniform per capita transfer mechanism. Some advocates of global reduction in inequality have argued for direct cross-national cash transfers that are redistributive in character, seeking to create something like a global tax regime.

consequences in terms of the Gini Index. Our key results hold under any tax regime and for any initial income distribution, although a few are specific to a flat tax regime

In the next section we offer in summary form both a synthesis of previous analytic work on the analytics of the Gini Index and a number of new results that are original with the present authors on what happens to the Gini when we when have a distribution of some or all of the tax collected that can be thought of as expectationally uniform for all citizens (or families). Technical statements of these results along with some minor corollaries, and formal proofs of the results, are given in an Appendix that is available on-line.

Then, in the concluding discussion, we consider the implications of these results for discussions about optimal tax policy. Here we argue that taxation and spending are two sides of the same coin, and that, contrary to claims in classic economics literature such as Meltzer and Richard (1981, 1983), understanding what tax regime is going to be chosen cannot be understood unless one also examines how the tax that is collected is going to be used – or at least how voters and those in power expect it to be used. We need to take both taxation and spending into account if we are to understand the effects of government choices on the actual economic consequences for citizens. [4] Relatedly, a focus on the

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[4] In this essay we limit ourselves to the effects of taxation and spending on income, and do not discuss wealth effects, including wealth accumulation that is cross-generational (see e.g., Keister 2000 for a discussion of the debate about inheritance taxes). It is well recognized that income is likely to be less unequally distributed than wealth. One reason is that disposable income (i.e., money not committed to basics such as clothing, food and shelter) rises much more steeply with income than income itself. One use of disposable income is investment. Thanks to the power of compound interest, small differences in income, leading to large differences in disposable income for investment purposes, will magnify themselves dramatically over time in terms of wealth generation. We also limit ourselves to the effects of taxes and spending on inequality, and will not consider issues such as the effects of such policies on market incentives or economic growth; nor will we consider other types of policies that might affect equality, such as promotion of full employment, or incentives for smaller family sizes, or the end of primogeniture, or changes in gender empowerment.

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differences between pre-tax and post-tax income inequality misses one of the most important things government does toward inequality reduction in "effective" income, namely provide services such as education, clean water, roads and other transportation services. These are outputs that would have to be paid for privately if they were not publicly provided or publicly subsidized. Such services do not show up in the standard measures of income, nor do they show up on government accounts as transfers.[5]

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[5] We may distinguish, at least in principle, spending that is specifically targeted to the poor (usually captured as "transfers") or programs that operate with a means test; and government spending that is universalist in character, and operates in expectational terms much like a lump sum transfer that is uniform across individuals or households, though the line between the two blurs in practice. This point is made in classic work in economics, such as Meltzer and Richards (1983). One kind of spending is on various public works that are available to all the citizenry -- or at least to all the citizenry of a certain age or family status (e.g., transportation networks, water and sewage, K-12 education in public schools, old-age and incapacity-related benefits); the other is on targeted social services where there is some form of means test (e.g., low-income housing programs, Medicaid, other forms of subsidies for the poor). Of course, public services of some kinds are most likely to be used by the least well off, and the rich may choose to provide themselves a superior level of service privately. And there are clearly some kinds of publicly provided services that are more likely to be used by those of middle class or above (e.g., publicly provided higher education, publicly subsidized airports) but we neglect such complications in the discussion that follows. Rather we assume that some share, t, of the tax revenues collected will either be distributed in the form of a lump sum uniform payment to all citizens and/or in the form of public services that can be regarded as expectationally the same for all citizens.

II. Summary of Propositions about the Gini Index and Lump Sum Transfers, with Some Results Specific to the Flat Tax

Recognizing that the **Gini index is a linear operator (Lemma 1),** our first observation is that **a flat tax has no direct effect on inequality (Proposition 1).** In the appendix with a we provide a very simple proof of that proposition

We then show how even flat taxes can affect inequality reduction when coupled with equal per capita redistributions, or its equivalent in terms of the provision of uniformly provided public services. Indeed, as we show in **Proposition 2, for any tax regime, the Gini index after a uniform lump sum distribution to citizens of the total share, t, collected in the (new) tax is simply** $(1-t)$ **times the Gini index before the lump sum distribution**. This simple result is the cornerstone of the many of the claims we make in the discussion section of the paper.

Proposition 3 (a previously known result) shows that, with a flat tax and direct uniform lump sum transfers of the revenue so collected, we are providing a negative income tax to all the members of the population with income below the mean. But this result generalizes:

Proposition 3': For any monotonic non-decreasing tax regime, a uniform lump sum transfer of the revenue so collected provides a negative income tax to all the members of the population with income below <u>that of the taxpayer who pays the mean tax</u>.

A direct corollary of this result is that:

Corollary 1 to Proposition 3' is that, **under a lump sum distribution, for a fixed t, the higher the Gini index, the more income is redistributed from those who pay above the mean tax to those who pay below the mean tax.**

The effect of uniform lump sum transfers on inequality reduction is, as we would expect, also enhanced when those below a certain income level pay no taxes. Proposition 4 provides more precise results. Observations 1 and 2 and subsequent discussion in the Appendix focuses on the implication of the oregoing results for different initial income distributions, including linear, triangular, Pareto, gamma, and exponential. **Proposition 5 looks at taxation effects on inequality in terms of a tiered tax system rather than a simple flat tax,** while **Proposition 6 compares the effects of targeted and**

lump sum distributions on inequality reduction. Here we demonstrate the obvious result that both progressive taxation and targeted distributions concentrated among the least wealthy can have even greater effects on inequality reduction than a flat tax or a uniform lump sum distribution, and we also provide some simple examples to compare effect magnitudes.

In Proposition 7, we show that, if income inequality is high enough, and the magnitude of the lump sum distribution share of taxes collected, t, is high enough, under any monotonic tax regime, we can have the lump sum transfer considerably larger than the post-tax income of many people/families. For example, for any distribution, any individual with initial income below $t/(1-t)$ times the mean initial income would receive a lump sum transfer greater than his/her after-tax income. Thus, if, say, $t = 0.2$, this threshold is one fourth the mean income.

Proposition 8, also a previously known results allows us to show exactly how, for highly unequal distributions, a very large proportion of the burden of taxation is born by those in the upper half of the income distribution when there is a flat tax. We observe that, under a flat tax the proportion of tax paid by any bottom quantile q is the same as the proportion of cumulative income in that bottom quantile, i.e., the quantity $L(q)$, the Lorenz curve evaluated at the quantile q. Hence, the proportion paid by the corresponding top quantile is $1 - L(q)$; in particular, that paid by the upper half is $1 - L(0.5)$. For the exponential distribution, this quantity is 0.847, i.e., those above the median income pay about 85 percent of the total tax burden under a flat tax regime For the gamma distribution with $\alpha = 2$ and $\beta = 1$, the quantity is about 0.763, those above the median pay about 76 percent of the total tax burden.

III. Discussion

It is striking to what extent there is an implicit division of labor across disciplines such that tax issues are left almost entirely to economists (and law professors and accountants), but spending is in the purview of both economics and political science, [6] while the analytics of income distribution has been studied in many disciplines including economics, sociology, statistics, and even physics. The main contribution of the paper is in offering a synthesis of past work on the Gini Index and useful new analytic work on what happens to income inequality when we have lump sum transfers of a share of the moneys collected as tax revenues.

For any given level of tax increase, a uniform lump sum post-tax transfer, directly affects the Gini index, while a lump sum transfer in conjunction with knowledge of the mean tax burden determines which voters gain and which lose by the lump sum transfer. Analytically we have shown exactly how larger, uniformly applied lump sum transfers reduce the Gini. And we have shown how a two-tiered system, e.g., exempting the income of the least well off from taxation, affects subsequent income inequality. We have also shown that the greater the initial income inequality the greater is the absolute reduction in the Gini value generated by a lump sum transfer share of magnitude, t. Moreover, we have shown how income inequality affects the share of taxes paid by different income classes.

However, while our work can be related to that of Meltzer and Richard's (1978, 1981, 1983) use of the flat tax and uniform lump-sum transfers as a modeling tool, our concerns are quite distinct from those authors, and can be regarded as complementary. We emphasize the link between the size of government and government's ability to affect "effective" equality by its provision of universalistically provided services at the post-tax

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[6] A sampling of recent political science work on income distribution includes Rueda and Pontusson, 2000; Bradley et al. 2003; Kelly 2004, 2005, 2009; Pontusson and Kenworthy 2005; Bandolini and Smeeding 2006; Bartels 2006, 2008; Barnes 2012, 2014; and Ansell and Adams 2014--with Hibbs and Dennis 1988 an important early reference.

phase, rather than seeking to model redistributive preferences and their implications for bargaining about tax burden and its implications of the size of government in modeling focused on the magnitude of the flat tax to be collected such that the median voter, in equilibrium, will have her preferences satisfied. Our focus is what happens, post-tax, with the revenues collected, rather than on tax structure.

We are certainly not the first to argue the obvious point that spending on public goods has consequences for inequality reduction or that taxation and spending both need to be taken into account if we are to understand what governments do (see e.g., Mirlees, 1971), and yet it is remarkable how the recent debate about inequality reduction at both the national and the global level has focused on tax progressivity and redistributive transfers. And, in the U.S., the flat tax is attacked by those on the left as simply a tool to benefit the most well off segments of a society[7] --- an attack facilitated by the fact that those advocating a flat tax are uniformly on the conservative side of the spectrum and that the advocacy of a flat tax is invariably coupled with a proposal to shrink the size of government by limiting the amount of money collected in taxes. [8] But it is analytically

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[7] The flat tax is the darling of U.S. conservatives such as Malcolm ("Steve") Forbes, who made a 17% flat tax a centerpiece of his campaign for the office of President in 1996 and 2000. His espousal of the flat tax was attacked by progressives as a disguised form of self-advancement, with one (probably exaggerated) estimate suggesting that, over his lifetime, the change he proposed would save him over a billion dollars.
http://ctj.org/ctjreports/1996/02/malcolm_s_forbes_jrs_19_billion_tax_cut_--_for_himself.php
Similarly, Donald Trump's initial proposal to flatten the U.S. income tax structure to make it closer to a flat tax by dramatically reducing the marginal tax rate on the wealthy to 25% has been attacked as a form of corrupt use of government power, since the benefits of his proposals for "reform" of the tax system go almost entirely to very very rich, like Trump, himself, and the multimillionaires in his cabinet.

[8] We believe it fair to say that one key element of the hostility of some economists to high levels of government taxation and concomitant high levels of government spending is their emphasis on the role of taxation in reducing work incentives. This point of view is

straightforward (even if politically difficult) to separate out a change to a flat tax from a change in the (expected) total amount of revenue that will be collected.

We see the key implication of our results for policy choices as a very simple reminder. When we take the lump sum transfer to be equivalent to the provision of public or merit goods that individuals might otherwise have to purchase for themselves, we can use our analytic results to understand how government spending allows for considerable reductions in what we have been calling "effective" income inequality as a function of the share of GDP captured by taxation, and the size of government spending on public goods as a proportion of the government revenue. Thus, we cannot understand the role of government in inequality reduction unless we look at both taxes and spending. Even tax schemes that are not progressive can act to substantially reduce inequality when governments use tax income in universalistic ways.

Our analytic results lead us to disagree with the view that substantial inequality reduction can only be achieved by progressive taxation, on the one hand, or by spending that is targeted on the poor, on the other. In sum, our work strongly reinforces the claim of Rothstein (1998), based on his analysis of the Swedish welfare system, that "universalistic"

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exemplified in an extreme fashion by the *Laffer curve*. Another element of this hostility comes from the view that government will simply spend the money it collects in foolish or rent-seeking ways, so the money is better left in the hands of those from whom it was collected. Arguments for the flat tax that exemplify both arguments are found in many conservative publications and some by mainstream economists. A useful academic treatment of the topic is Hall and Rabushka (1985), whose six arguments for a 19% flat tax are mostly couched in empirical terms, such as avoiding reducing work incentives as well as cutting the costs of tax enforcement and the amount of unproductive spending on tax evasion. Those who oppose flat taxes and argue for more explicitly redistributive tax schemes and other efforts to lift the living conditions of those with lower incomes usually offer arguments that are primarily normatively couched. However, they too, may make appeal to empirical arguments, e.g., about the crime-reducing efficacy of greater income equality.

spending, when coupled with a substantially sized government sector, can be a powerful force for equality promotion. Very deliberately, however, our treatment of the implications of lump sum transfers has avoided normative debate about both the desirability of income redistribution, and the "optimality" of some particular tax regime. [9]

Our work also has implications for empirical work on tax choice and size of government. For example, our work lends itself to an argument explaining why non-progressive taxation can be found in countries commonly thought of as progressive if that form of taxation is coupled with high levels of government spending on public services and more or less universalistic programs that operate to reduce "effective" inequality. Relatedly, we expect that, when government services are efficiently provided and allocated in a universalistic fashion, a large government sector can generate wide public support (cf. Rueda, 2018). But exploration of such topics takes us into issues well beyond the scope of the present note.

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[9] Classic work in economics strongly emphasizes the negative incentive effects of tax on effort (see e.g., reviews in Kaplow, 2011; Saez, Slemrod and Giertz, 2012), but there is a large body of other work by economists looking at the production of human capital and its impact on growth (see e.g. Murphy, 2018). We see public goods and merit goods spending generating increases in human capital that ultimately lead to productivity growth and a larger economy to be taxed, on the one hand, while we recognize that the taxes to support the production of such goods has incentive effects that may lower the government tax base, on the other. However, modeling an optimal level of taxation under these very general assumptions, taking both effects (work reduction incentives and human capital generation) into account, is beyond the scope of this paper. Suffice it to say that our results hold for any lump sum transfers whether or not they can be shown to be "optimal," in some sense of that term.

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