Positive and Normative Judgments Implicit in U.S. Tax Policy, and the Costs of Unequal Growth and Recessions

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Abstract

Calculating the welfare implications of changes to economic policy or shocks to the economy requires economists to decide on a normative criterion. One way to make that decision is to elicit the relevant moral criteria from real-world policy choices, converting a normative decision into a positive inference exercise as in, for example, the recent surge of so-called "inverse-optimum" research. We find that capitalizing on the potential of this approach is not as straightforward as we might hope. We perform the inverse-optimum inference on U.S. tax policy from 1979 through 2010 and argue that the results either undermine the normative relevance of the inverse-optimum approach or challenge conventional assumptions which economists routinely rely upon when performing welfare evaluations. Specifically, U.S. tax policy over at least the last 25 years, and perhaps over the last 40, consistently implies that either the perceived efficiency costs of redistributive taxation or the welfare weights implicitly assigned to high income earners are much greater than what is usually assumed in optimal tax research.

Introduction

Economists are put in an awkward position when asked to calculate the welfare consequences of changes to economic policy or of shocks to the economy: we are asked to act as moral philosophers. Though we have largely converged on a standard approach to that task—i.e., by using a generalized form of utilitarianism—we have left room for a wide range of normative perspectives within that approach. For example, in optimal tax models we have remained agnostic about the values of the so-called marginal social welfare weights that determine the value of transferring resources across individuals (see Emmanuel Saez, 2001). Choosing a more specific normative perspective, for example choosing the values of the marginal social welfare weights, remains an uncertain and basically unwelcome task.

A potential solution to this awkwardness is to take our normative cues from society, eliciting the relevant moral criteria from real-world policy choices.[1] Progress along these lines has been facilitated by the recent "inverse-optimum" research that, following Francois Bourguinon and Amedeo Spadaro (2012), uses analytical results from optimal tax theory and assumptions on economic parameters to infer the marginal social welfare

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[1]See Saez and Stantcheva (2015), Weinzierl (2014*a*), and Weinzierl (2014*b*) for analyses that look for underlying principles that inform the inferred marginal social welfare weights.

weights (MSWWs) currently prevailing in a number of developed economies.[2] While that literature has largely refrained from using the inferred weights for welfare evaluation, the potential for doing so is clear. For example, related work by Nathan Hendren (2014) uses a similar inference exercise to calculate the implicit welfare costs of rising inequality in the modern United States, given mainstream estimates of the distortionary costs of taxation.[3] In principle, these inference exercises would allow us to convert the selection of a normative perspective into an empirical question, exempting economists from some difficult choices.

In this paper, we find that capitalizing on this potential solution is not as straightforward as we might hope. The problems start when we extend the previous literature by performing the inverse-optimum inference analysis intertemporally, using official data on U.S. income distributions and standard theoretical conditions on optimal marginal tax rates to infer the combinations of positive and normative judgments implicit in U.S. tax policy from just after the Tax Reform Act of 1986 (TRA86) through 2010. We find that tax rates are consistently (for more than two decades) much lower on high earners, and to a lesser extent middle-income earners, than conventional optimal policy analysis would recommend.

We describe the interpretative challenge this finding poses in the form of a trilemma in which at most two of the following conditions can hold: the inverse-optimum exercise yields normatively-relevant results on MSWWs (e.g., they are not biased by manipulation of the political system); society's perceived size of the distortionary cost of taxation (the elasticity of taxable income, or ETI) lies within conventional ranges; and society's true pattern of MSWWs is consistent with conventionally-assumed principles (e.g., where the highest earners receive minimal marginal weight). In other words, the results from 1987 through 2010 either undermine the normative relevance of this inference exercise or challenge conventional assumptions upon which economists routinely rely when performing welfare evaluations. Addressing this challenge is thus, we argue, a prerequisite to fulfilling the promise of this empirical approach to normative questions and, more generally, an important task for economists interested in welfare analysis.

The interpretive challenge deepens when we extend the analysis to policy prior to TRA86. The inferred normative and positive judgments for much of the 1970s and early 1980s are substantially different from those for later years, with either the perceived distortionary costs of taxation or the MSWWs on high earners appearing to be much lower prior to TRA86 than after. If these results accurately capture the desired shift in tax policy over these two decades, the trilemma described above worsens. Specifically, in

[2]François Bourguignon and Amedeo Spadaro (2012) estimate the MSWWs for France in 1995 and find that they are negative on high earners unless the labor supply elasticity is small, similar to our findings in U.S. for the early 1980s. Amedeo Spadaro, Lucia Mangiavacchi, and Luca Piccoli (2012) estimate and compare average MSWWs on five income-earning groups for 26 European countries, finding substantial variation across them. Olivier Bargain, Mathias Dolls, Dirk Neumann, Andreas Peichl, and Sebastian Siegloch (2013; 2014*a*; 2014*b*) include the United States (as well as European countries) in their analyses. In Bargain et al. (2013), they study how tax policy has affected inequality in the United States from 1979-2007 and find partisan effects on policy consistent with the trends we show below. In Bargain et al. (2014*a*) and Bargain et al. (2014*b*) they examine 2005 U.S. policy and data, estimate the relevant labor supply elasticities, and calculate implicit MSWWs that are quite flat across the income distribution relative to many European countries, consistent with our findings for the same time period if elasticities of taxable income are perceived to be small. Floris Zoutman, Bas Jacobs, and Egbert L.W. Jongen (2013*a*; 2013*b*) analyze in detail the Dutch tax system and proposals for it by Dutch political parties to infer prevailing and preferred MSWWs in the Netherlands. In Zoutman et al. (2013*a*) they find that top MSWWs are negative unless the elasticity of labor supply is small, consistent with the Bourguinon and Spadaro results for France and ours for the United States. In Zoutman et al. (2013*b*) they show (among other things) that the tax proposals by Dutch political parties have the same feature. Other related works include Mera (1969), Moreh (1981), Kopczuk et al. (2005), Christiansen and Jansen (1978), Pirttilä and Uusitalo (2010), Bargain and Keane (2010), Stern (1977), Amiel et al. (1999), and Pfingsten and Schneider (1994).

[3]Specifically, Hendren (2014) formalizes an isomorphic alternative to MSWWs called the inequality deflator that does not rely on the existence of a social welfare function, and he uses it compare alternative economic environments in the spirit of the Kaldor-Hicks compensation principle. He calculates the implicit weights put on marginal income across the U.S. income distribution in 2012, finding a pattern similar to what we infer for 2010. He then estimates the costs of unequal dollar increases in income since 1980 at 15–20 percent of total economic growth in his baseline calibration. When we replicate his approach using our data, we find a very similar result (16 percent), though our preferred estimate—which gives the cost of unequal *percentage* increases in incomes—is much smaller at 4.3%, as discussed in the text.

that case welfare analyses using the results of the inverse-optimum exercise are sensitive to the year for which it is performed, and to use those results we would have to accept not only unconventional values for some key assumptions (i.e., in the 1987-2010 period) but also changes in these values over time. Alternatively, one might argue that the purpose of TRA86 was to reform aspects of the tax code that poorly implemented society's normative and positive judgments, which themselves were largely stable over time. In that case, the challenge posed by the original trilemma extends across approximately the last 40 years, not 25, of modern U.S. tax policy. Even more puzzling results appear if we extend our analysis back to the early twentieth century (where our data are more limited).

To demonstrate both the potential for, and the challenge of, using the inverse-optimum exercise to inform welfare calculations, we apply our results to two prominent features of the U.S. economy over the three decades from 1980 to 2010. First, we calculate the welfare cost of the inequality in income growth over that period, using the normative judgments implied by policy after TRA86 and conventional values for the perceived ETI. We estimate that this cost was equivalent to 4.3 percent of total economic growth in our baseline specification (with robustness checks yielding estimates between 1% and 10%). These results may seem remarkably small relative to what public discourse on the topic would imply, but they reflect the pattern of MSWWs inferred from recent tax policy in which an extra dollar of disposable income for a high earner is worth dramatically more in welfare terms than is commonly assumed in optimal policy analyses. Larger estimates for the cost of unequal growth obtain if we assume that the perceived ETI took an unconventionally large value or that the inferred MSWWs fail to reflect society's true normative judgments, thereby illustrating the trilemma noted above.[4] Similarly, we can illustrate the instability problem (potentially) introduced by policy prior to TRA86 by showing that the estimated costs of unequal growth are three times as large when we use inferred MSWWs from that earlier period. Second, in what we believe is a novel application of this approach, we calculate the welfare costs of business cycles during this period and show that the concentration of some recent recessions on top earners means that the inferred pattern of MSWWs matters substantially for welfare calculations.

Identifying the solution to the interpretive challenge posed by our inverse-optimum results is difficult, as we cannot observe directly the societal judgments that we would need to determine which leg of the trilemma to abandon. As a first step, we present suggestive empirical evidence—both existing and new—on perceived ETIs and MSWWs.

On ETIs, unfortunately we have found no evidence on the level perceived by the public, though some imperfect data suggests fluctuations in the perceived incentive costs of taxation over the latter part of this period that qualitatively fit with policy. Academic research over this period consistently found that the average ETI (or elasticity of labor supply) was small. Some larger estimates for high earners that were obtained during the 1990s were later attributed to taxpayer responses that should not be included in the ETI used for welfare analysis.[5] Finally, official government estimates of the ETI were small and stable throughout the period. In sum, although we cannot rule out this explanation, we find no evidence that perceived ETIs took the unconventionally large values required to explain our inference results.

If a higher-than expected perceived ETI is not the solution, our choice comes down to whether the inferred

[4]This discussion is consistent with the point-in-time inverse-optimum calculations of Peter Diamond and Emmanuel Saez (2011), who note that conventional MSWWs imply that "The current [U.S. top marginal tax] rate, $\tau = 42.5$ percent, would be optimal only if the elasticity e were extremely high, equal to 0.9. [...ftnt:] Alternatively, if the elasticity is $e = 0.25$, then $\tau = 42.5$ percent is optimal only if the marginal consumption of very high-income earners is highly valued, with $g = 0.72$."

[5]See, for example, Feldstein (1995). These large estimates may have been driven by time shifting of earnings among high earners rather than a change in labor supply (Goolsbee, 2000), or by avoidance activities in which the social cost of avoidance is less than the private cost (Chetty, 2009).

MSWWs on high earners were larger than expected over this period because policy failed to reflect society's true normative judgments (which fit with conventional assumptions) or because society's true normative judgments were at odds with conventional assumptions. To study this choice, we show evidence that a minority of public opinion survey respondents believe that public officials or policy are interested in or influenced by the concerns of the average citizen and that a substantial majority of Americans consistently say they want high earners to pay more in taxes. These data appear to support the hypothesis that implicit top MSWWs are biased upward, thereby suggesting that the results of inverse-optimum exercises have limited normative applicability. However, we present (preliminary) new survey evidence that these results may be sensitive to the information provided to survey respondents, preventing us from ruling out the possibility that the normative preferences implicit in prevailing policy are accurate representations of society's normative judgments.

As this discussion makes clear, existing data are simply insufficient to identify the true explanation for our results. Given the different explanations' substantial implications for policy design and evaluation, this indeterminacy means that a main lesson of this paper is that better data on the perceived costs and benefits of redistribution will be essential for progress along the revealed preference approach to normative policy analysis.

Fortunately, not all of our contributions in this paper are negative. We help develop the inverse-optimum literature in three ways. First, our focus on intertemporal analysis allows us to test the stability of the inferred positive and normative judgments required to explain policy, the importance of which is made clear by the instability we find when we extend our scope before 1986. Second, as part of trying to explain these puzzling features, our paper also emphasizes the importance for policy inversion exercises of the *perceived* distortionary costs of taxation. Finally, as far as we are aware, the application of this approach to the costs of recessions is new to this paper.

In addition, our paper's novel survey evidence contributes to two active literatures: one in economics on stated preferences toward redistribution (as in Ilyana Kuziemko et al. (2013)) and one in political science on the potential link between economic and political inequality in the modern United States (as in Larry Bartels (2008) and Martin Gilens (2012)). The interpretation of our findings depends in part on how well policy over this period represents Americans' true redistributive preferences, and our new survey results demonstrate the sensitivity of evidence on these preferences to the information that is made salient to survey respondents.

The paper is structured as follows. In Section 1 we describe the theory and data behind our inverse-optimum exercise. We then perform that exercise for U.S. tax policy from 1979 through 2010, deriving and discussing the combinations of MSWWs and ETIs implied by that policy and pointing out the interpretive challenge these results pose. For reference, in the Appendix we extend the inference of top-income MSWWs and ETIs back to 1920 using more limited evidence. Section 2 applies the inference results of Section 1 to compute the revealed preference costs of rising inequality and recessions over the last three decades in the United States. In Section 3 we frame the interpretive challenge as the trilemma discussed above, and we examine suggestive evidence pertaining to MSWWs and ETIs as a first step toward finding a solution. Section 4 concludes.

1 Positive and normative judgments inferred from U.S. tax policy

In this section we show how the Diamond (1998) and Saez (2001) formula for optimal marginal tax rates can be used to infer combinations of the perceived costs and benefits of redistributive taxation underlying modern U.S. tax policy.[6] In that famous formula, these perceived costs and benefits depend on specific quantities, namely the elasticity of taxable income (ETI) and the pattern of marginal social welfare weights (MSWWs). We then describe the data we use for the inference exercise. Finally, we present our results on the possible patterns of the ETI and MSWWs that can explain the evolution of U.S. tax policy since 1979.

1.1 Inverting the optimal marginal tax rate formula

As described in Bourguignon and Spadaro (2012), the inversion exercise is best understood as the dual of the standard Mirrlees (1971) optimal taxation problem. We follow their example and focus on the special case of quasilinear individual utility, a concave social welfare function, and a uniform ETI, as considered in Diamond (1998). (Income effects typically raise optimal marginal tax rates, especially at high incomes—see, for example, Saez (2001), Table 1 and Figure 5. Including them in our analysis would therefore be likely to make even greater the departures from conventional assumptions required to explain the evolution of policy.) In this case the first-order condition for optimal marginal tax rates takes a particularly simple and transparent form. We use the version of that expression derived in Saez (2001), written as a function of observable earnings y, the earnings distribution $F(y)$, with assumed density $f(y)$, and the elasticity of taxable income ε:

$$\frac{T'(y)}{1-T'(y)} = \frac{1-F(y)}{\varepsilon y f(y)} \int_y^\infty \frac{1-g(z)}{1-F(y)} dF(z). \tag{1}$$

This is analogous to expression (4) in Bourguignon and Spadaro, though by using Saez's expression we avoid the need to back out the underlying skill distribution.[7]

In this expression, $g(y)$ denotes the MSWW of an individual earning y, which we will use to characterize the implicit social preference for redistribution, i.e., the social welfare function.[8] In other words, $g(y)$ is the social welfare generated by a marginal increase in consumption for an agent earning y, expressed in terms of public funds. By construction, $\int_0^\infty g(z)f(z)dz = 1$ under the optimal tax policy; the planner is indifferent between a marginal dollar of public funds and a dollar equally distributed across the population. Thus a value of $g(y') = 0.5$, for example, indicates that the planner is indifferent between an evenly distributed \$0.50 of income and a rise in consumption of one dollar for an agent earning y'.

The standard Mirrlees approach specifies an individual utility function and social welfare function and solves for the tax function that satisfies (1); here we invert that approach, taking the observed tax function as given and solving for the social welfare function that would rationalize it (see Bourguignon and Spadaro for a thorough discussion of the conditions under which this inversion is possible). To implement this inversion,

[6] In addition to the concerns with this inverse-optimum approach that are the focus of this paper, we may be concerned that actual tax policy reflects priorities not well-captured in this standard model. For instance, Smith (1776) famously recommended a "simple" tax system, a feature neglected by modern theory. One way to interpret our findings that policy differs from conventional recommendations is that we are measuring the impact of such non-standard factors. That possibility raises arguably even greater problems for the inverse-optimum approach, and for modern optimal tax theory in general, than a story in which parameters of the model take unexpected values.

[7] A technical point: as discussed in Saez (2001), $f(y)$ actually denotes the "virtual"earnings density—that which would obtain if the tax code were linearized around $T(y)$. While the virtual density is not identical to the observed income density, it is closely related, and therefore we view the empirical calibration of the observed income distribution, discussed in Section 1.2, as a good approximation of the virtual density. An alternative approach, followed by Bourguignon and Spadaro, is to infer an underlying ability distribution based on observable earnings and an assumed utility function.

[8] Strictly speaking, MSWWs correspond to the derivative of the full social welfare function, but because the intercept of the social welfare function is immaterial, these weights are sufficient statistics for redistributive preferences.

we rearrange (1) to write:

$$\int_y^\infty \frac{g(z)}{1-F(y)} dF(z) = 1 - \frac{T'(y)}{1-T'(y)} \frac{\varepsilon y f(y)}{1-F(y)}. \tag{2}$$

Given the observed tax code, a calibrated income distribution, and an assumed ETI the right side of this equation can be computed as a function of income. Differentiating (2) with respect to y yields

$$g(y) = -\left(\frac{1}{f(y)}\right) \frac{d}{dy} \left[1 - F(y) - \frac{T'(y)}{1-T'(y)} (\varepsilon y f(y))\right], \tag{3}$$

where the expression in brackets can be computed using numerical differentiation.[9] This provides an estimate of the MSWW $g(y)$ as a function of income.

In all of these expressions, the elasticity ε is written as a constant, but in fact it need not be. For example, if the elasticity varies with income, we might replace the constant ε with $\varepsilon(y)$, so that the results above apply when using the local elasticity of taxable income at each income y.

Concerns about model misspecification The optimal tax model on which this inversion exercise is based is clearly a stark simplification of reality, raising concerns that we may make incorrect inferences of the component factors. One possible misspecification is that the model focuses entirely on the intensive labor supply margin (the question of how much to work), while ignoring the extensive margin (the question of *whether* to work). Although extensive margin elasticities have important implications for optimal tax design (Saez, 2002), we view our approach as a useful simplification for two reasons. First, the extensive margin is particularly important for low incomes, while our analysis focuses primarily on MSWWs on high incomes.[10] Second, representing the perceived distortionary costs of taxation through a single parameter simplifies and facilitates the derivation and exposition of our results. Provided that we view the intensive ETI as a proxy for the overall perceived distortionary costs of taxation, we believe our results would be similar in a richer model incorporating other margins of adjustment. Another possible misspecification is that the model we use is static, while the implications of dynamic factors (such as financial and human capital accumulation) for optimal taxation have received much attention in recent years.[11] As with the extensive margin, to the extent that these factors primarily affect the distortionary costs of taxation, our use of a single parameter to capture perceptions of those costs is flexible enough to (at least roughly) accommodate them. In addition, while the theoretical benefits of a tax system that takes into account earnings histories, age, and other complications may be large, actual policy design thus far is arguably better described by the simpler static Mirrleesian model.[12]

Finally, the results of the inverse-optimum exercise are useful even though policy in the real world is (of course) not made by a single representative agent reasoning through a Mirrleesian optimal tax model and many features of the prevailing political economy are not captured directly by the model. For these reasons, our inferred MSWWs and ETIs should be regarded as implicit, in the sense that they are the weights that *would* give rise to the observed tax schedule if a policy maker favoring these weights and assuming

[9] The algebra behind this derivation is shown in the appendix.

[10] Consistent with this, Bourguignon and Spadaro (2012) demonstrate that incorporating an extensive margin yields qualitatively similar results, particularly at the top, and Hendren (2014) ignores the extensive margin for those with incomes above EITC eligibility cutoffs.

[11] The relevant literature is usually said to start with Golosov, Kocherlakota and Tsyvinski (2003). See Stantcheva (2014) for a recent examination of human capital in the model.

[12] See Golosov, Kocherlakota and Tsyvinski (2003), Farhi and Werning (2007), Weinzierl (2011), and Best and Kleven (2014).

those elasticities had freely selected a tax schedule. If such a decisive policy maker is believed to exist—for example, a self-interested median voter, or a particular Congressional committee—then our results should be regarded as the revealed judgments of that entity. In fact, we discuss evidence on whether policy appears to be biased relative to the public's preferences in Section 3. Moreover, the results of the inverse-optimum exercise translate the potentially complicated mix of factors behind real-world tax policy into the simple, formal determinants of tax policy in the Mirrleesian approach that dominates modern optimal tax research. In that way, deviations of the inferred values from conventional assumptions provide a quantitative appraisal of the importance of considerations outside the scope of the conventional analysis that are relevant to policy makers (such as economic growth) or to the decision process (such as political representation). This argument applies as well to changes to the factors outside the scope of the standard analysis, in that they are implicitly translated by this approach into variation in the key inputs to the model.[13]

1.2 Data

As described above, the estimation procedure for MSWWs depends on the market (pre-tax) income distribution $F(y)$ and the schedule of marginal tax rates $T'(y)$. To compute welfare costs of economic changes, these MSWWs are then applied to disposable income (after taxes and transfer). We obtain these data from two sources—the U.S. Congressional Budget Office (CBO) for pre-tax and post-tax income, and the National Bureau of Economic Research's TAXSIM utility for the marginal tax rate schedule.

Income distribution Since 1979 the CBO has produced annual data describing the distribution of market and disposable incomes across U.S. households.[14] These data consists of average market and disposable income levels for households in eight quantiles, partitioned by percentiles 20, 40, 60, 80, 90, 95, and 99. Throughout the paper, all real figures are given in 2010 U.S. dollars as computed using the Personal Consumption Expenditures price index from the U.S. Bureau of Economic Analysis.

The CBO data's coarse level of aggregation creates two important limitations for our purposes. First, we are unable to infer variation in MSWWs within quantiles reported by CBO. This is particularly important for the bottom four quantiles, which each represent 20% of the population. Mitigating this concern, much of our analysis will focus on MSWWs of high earners, where the smaller buckets provide a finer picture of the distribution. Second, we are unable to account for variation in marginal tax rates within the quantiles reported by the CBO. Rather, we will feed the average income levels from each quantile into NBER's TAXSIM utility to obtain marginal tax rate estimates, effectively treating each bucket as a representative agent, weighted by its population share. Although we do not believe these shortcomings qualitatively affect the nature of our results, universal data (such as that used by Hendren (2014)) surely provide a more precise measure of the distribution.

Nevertheless, in two respects the CBO data are particularly well-suited for the purposes of this paper. First, to compute the costs of unequal growth and recessions as we do in Section 2, we need to apply MSWWs to changes in disposable (post-tax) income. The CBO data are intended to provide a consistent and carefully-constructed measure of this income, combining internal U.S. Treasury tax return data with data from the Consumer Population Survey (CPS) of the U.S. Census Bureau. As the CBO argues in its documentation, combining these data sources is important because tax records exclude people who do not

[13] We thank Stefanie Stantcheva for prompting this discussion.

[14] We use the term "disposable income" to indicate income after federal taxes and transfers. This implicitly assumes property taxes and other local taxes are a component of consumption—see the appendix for further discussion of such taxes.

file federal tax returns as well as information on some government cash transfers and in-kind benefits that are captured by the CPS, while CPS data are sparse at the upper end of the income distribution relative to tax return data.

Second, the CBO data occupy a prominent place in public debates over taxation and the distribution of income in the United States.[15] This paper seeks to infer the combination of positive and normative judgments from existing policy, so using an official data source that is (and has been) salient for policymakers over the last several decades is arguably preferable to using more precise data that was less visible to them.

To compute the MSWWs, we include all market income other than capital gains in our analysis. Thus, we include dividend income and other capital income. In part, this choice is guided by the policy treatment of this income: capital gains are generally taxed separately from other forms of personal income in the United States, so it is natural to exclude them.[16] We also use this definition of income to increase comparability to the well-known data on the concentration of income produced by Piketty and Saez (2007), as they also compute series excluding capital gains. Table 1 compares the shares of market income excluding capital gains that each data source assigns to three groups—the 90-95th percent, the 95-99th percent, and the 99-100th percent of the population—at four points over the period.

Comparison CBO and Piketty and Saez (2007) data

	99-100 share		95-99 share		90-95 share	
Year	CBO	P&S	CBO	P&S	CBO	P&S
1980	8.0	8.2	12.0	13.0	10.5	11.7
1990	11.7	13.0	12.5	14.1	10.7	11.8
2000	14.3	16.5	13.6	15.0	10.8	11.6
2010	14.0	17.5	14.1	16.3	11.2	12.6

Table 1: Comparison of income concentration in top quantiles according to CBO data and Piketty and Saez (2007).

As the table shows, these series track each other directionally, though the CBO data indicate a lower degree of income concentration at the very top over time. This difference may be due to factors discussed in Richard Burkhauser, Shuaizhang Feng, Stephen P. Jenkins, and Jeff Larrimore (2012), for example the focus on households in the CBO data rather than tax-paying units (also see related calculations in Hendren (2014)). To the extent that our use of CBO data thereby underestimates the incomes of higher earners, we will infer lower MSWWs on high earners for any given ETI, especially over time as inequality has risen.[17]

[15]For one recent example, the CBO's report on the distributional impact of tax expenditures in May 2013 presented the data in exactly the same form as the data we use in this paper. That CBO report was widely covered in the press and referred to by policymakers, such as the House Ways and Means ranking member Sander Levin, (see http://democrats.waysandmeans.house.gov/press-release/levin-statement-cbo-report-distribution-tax-expenditures)

[16]In any case, our basic results remain the same if capital gains are included in market income.

[17]Given the relatively low income at which the top marginal tax rate applies in the United States, we assign the same marginal tax rate to these households even if we somewhat understate their incomes.

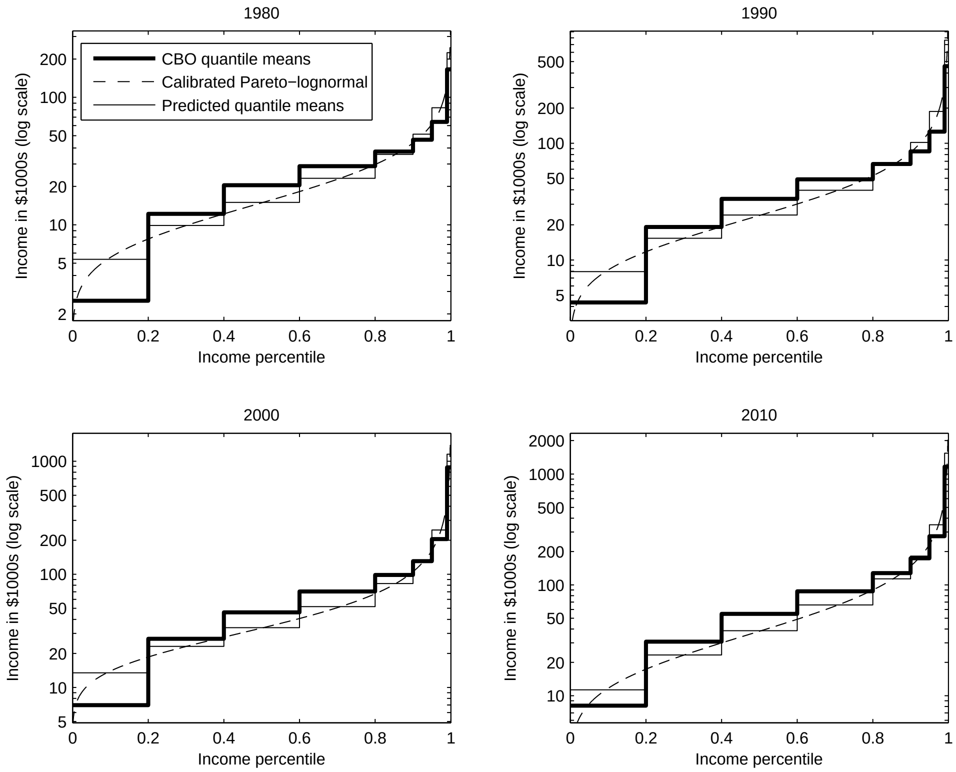


Figure 1: The reported and calibrated distribution of market income in the US for years 1980, 1990, 2000, and 2010. The bold lines represent the mean income within the quantiles reported in CBO data. The dashed line is the best-fit Pareto-lognormal distribution, selected by minimizing the sum of squared errors between the reported quantile means and those predicted by the calibrated distribution—denoted here by the thin solid line. (Income is reported in nominal terms.)

The process for backing out MSWWs described above requires a continuous income distribution. We calibrate a Pareto lognormal distribution to the eight moments reported in the CBO data each year. This parametric form, introduced in Colombi (1990), fits observed income distributions quite well, both in the middle of the distribution and in the top tail (see Reed and Jorgensen (2004)). The distribution has a Pareto upper tail, the importance of which for computing optimal income taxes is highlighted in Saez (2001) and Diamond and Saez (2011). The Pareto-lognormal distribution is characterized by three parameters, one of which is the Pareto parameter for the distribution toward which the Pareto-lognormal converges in the upper tail. We constrain this parameter to equal the Pareto parameter implied by data reported in Piketty and Saez (2007), which is based on tax returns and thus should represent the top tail of the distribution well. We calibrate the remaining two parameters to minimize the squared errors between the observed means within the quantiles reported by CBO and the means within those quantiles predicted by our calibration. Figure 1 displays averages reported by CBO and our best-fit calibration over the range of years for which we have data.

The figure indicates that this fit is imperfect—in particular, our calibration underestimates incomes in the center of the distribution, while overestimating incomes at the very bottom. Nevertheless we view this approach as a good approximation given the sparse nature of the CBO data; in particular, since the optimal top tax rate depends only on the ETI, the top limiting MSWW, and the Pareto parameter (see Saez (2001)), our use of the Piketty and Saez Pareto parameter estimates ensures that our computed top welfare weights approach those under the true income distribution.[18] Our calibrations capture the well-known increase in concentration of income over this period, as we show in the Appendix through Lorenz curves for 1980, 1990, 2000, and 2010.

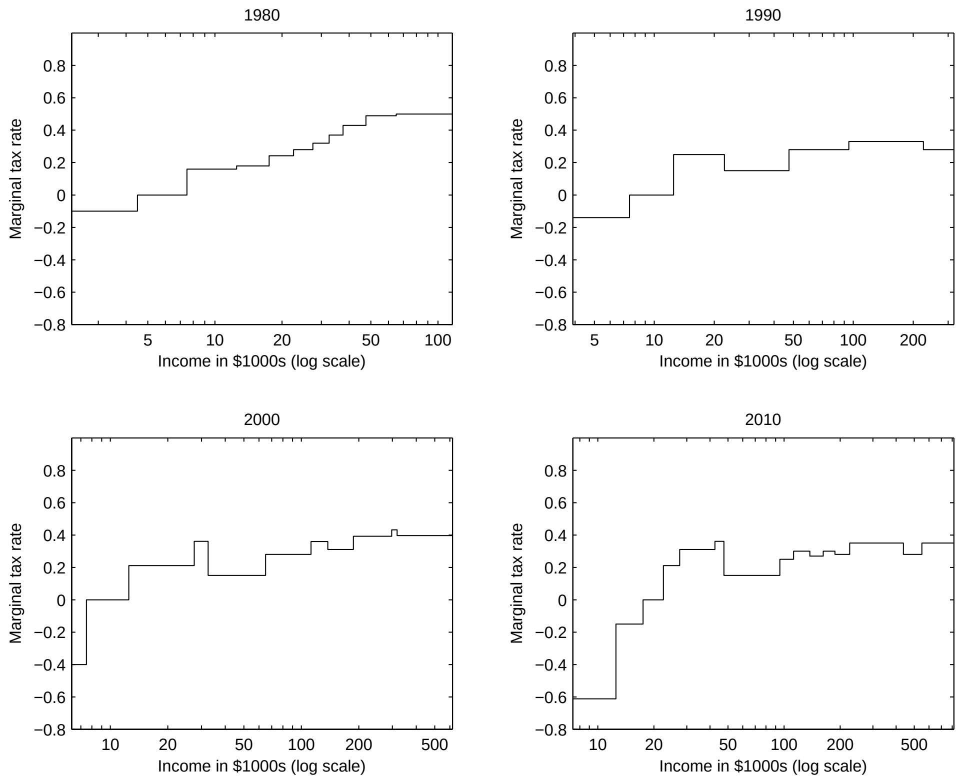


Figure 2: Marginal tax rate schedule as reported by NBER's TAXSIM for 1980, 1990, 2000, and 2010. Taxes on capital gains and at the state and local level are not included. Tax rates are computed for a family of two adults, filing jointly, with two dependents under age 17.

Marginal tax rate schedule We use the NBER's TAXSIM tool to obtain marginal tax rates on earned income at each of the CBO's reported income levels from 1979 through 2010. We obtain the marginal tax rate on taxpayer earnings by assigning all of the household's income to the taxpayer in a joint-filing household with two adults of working age, two dependents under the age of 17, and no state tax liability or capital gains. We construct a piecewise-constant marginal tax schedule from the TAXSIM marginal tax rates reported for a fine grid of incomes between $1 and $10 million; Figure 2 displays the marginal tax rate schedule for the years 1980, 1990, 2000, and 2010. The figure shows substantial negative marginal tax rates at the bottom of the income distribution, driven by the Earned Income Tax Credit, and top marginal tax rates between 28% and 50%. We discuss the changes due to TRA86 below when interpreting the results of the inference exercise.

Focusing on federal income tax rates ignores a number of important components of the tax system,

[18] Outside of the top tail, an underestimate of income at a particular percentile is likely to bias upward MSWWs above that income relative to those below. Intuitively, underestimating income at a given percentile is equivalent to overestimating $F(y')$, where y' is the estimated income level. Then raising the marginal tax rate at y' will have smaller redistributive benefits than the calibration suggests, and thus a given tax rate must correspond to a greater commitment to redistribution than the calibration suggests. This effect is complicated by the dependence of the optimal tax rate on the density of earners at y', so a directional claim cannot be made with certainty, but provided the latter effect is small, this reasoning suggests our MSWWs are likely to be biased down at low incomes, biased upward for middle incomes, and approximately correct at high incomes.

including the phase-out of certain transfers and in-kind benefits such as SNAP (food stamps) and housing vouchers, and state and local taxes. This simplification allows us to make better comparisons across time, for which we lack fine-grained data on transfers and local tax policies. Nevertheless, we present alternative calibrations in the appendix to demonstrate that our main findings are likely robust to these considerations.

1.3 Implicit MSWWs and perceived ETIs

Using the theory and data described in the preceding subsections, we can compute the combinations of MSWWs and perceived ETIs implicit in U.S. tax policy for each year from 1979 through 2010.

We will repeatedly compare the implicit MSWWs to those that are implied by conventional social welfare functions (such as in Diamond (1998) or Saez (2001)). By "conventional" we have in mind two features: MSWWs are everywhere nonnegative, and MSWWs approach zero toward the top of the income distribution. These two features arise from the intuitively plausible and commonly-imposed assumptions that society's preferences respect the Pareto principle (i.e., non-negative weight is given to an increase in any person's consumption, all else the same) and that the marginal social welfare of income is decreasing (which may be due to diminishing marginal utility at the individual level or a social judgment). Diamond and Saez (2011) give a standard illustration of the latter feature: "For example, if the social value of utility is logarithmic in consumption, then social marginal welfare weights are inversely proportional to consumption. In that case, the social marginal utility at the $1,364,000 average income of the top 1 percent in 2007 (Piketty and Saez, 2003) is only 3.9 percent of the social marginal utility of the median family, with income $52,700 (U.S. Census Bureau, 2009)."

Similarly, we will compare the implicit ETIs to the "conventional" levels of the elasticity of labor supply or, as available, the elasticity of taxable income estimated in the empirical labor literature. The Congressional Budget Office (2012*b*) for example, reviews that literature and finds "substitution elasticities [of labor supply] for the total population that range from 0.1 to 0.3." Consistent with this judgment, the survey article by Saez, Slemrod, and Giertz (2012) concludes "While there are no truly convincing estimates of the long-run elasticity [of taxable income], the best available estimates range from 0.12 to 0.40...[and]...there is no compelling evidence to date of *real* economic responses to tax rates...at the top of the income distribution."

1.3.1 MSWW schedules and ETIs

In what follows, we characterize the general features of the schedule of the MSWWs and ETIs consistent with tax policy over the period for which we have data. We begin by showing the MSWW schedules consistent with policy over time assuming the ETI equals 0.3, a conventional value. Figure 3 shows the averages of these MSWWs within each of the eight CBO income groups for 1980, 1990, 2000, and 2010.[19] In addition, the dashed line plots MSWWs for a conventional utilitarian benchmark, equal to $1/c$ (normalized to sum to one across the population). Consistent with conventional assumptions, these implicit MSWWs are generally positive and decreasing with income.

[19]To generate this figure, we begin by computing the right side of (2), which represents the average MSWW above a given level of income (called "S weights" in Bourguignon and Spadaro (2012)) and which we denote with the function $S(y) = \int_y^\infty g(z)dF(z)/(1-F(y))$. For the interested reader, we show $S(y)$ for 1980, 1990, 2000, and 2010 in the Appendix. We then differentiate $S(y)$ to compute the MSWW schedule $g(y)$ as given in equation (3). Since these weights represent the marginal social value of consumption, they are properly viewed as a function of real, disposable income, and thus are plotted against income after federal taxes and transfers, as reported by the CBO. As with market income, only average disposable income is reported within each quantile, so we plot the average MSWWs within each market income quantile against reported average disposable income within that quantile. For the lowest quintile, we average MSWWs over the values of y such that $0.01 \leq F(y) \leq 0.2$, to avoid numerical issues from MSWWs approaching infinity as y approaches zero.

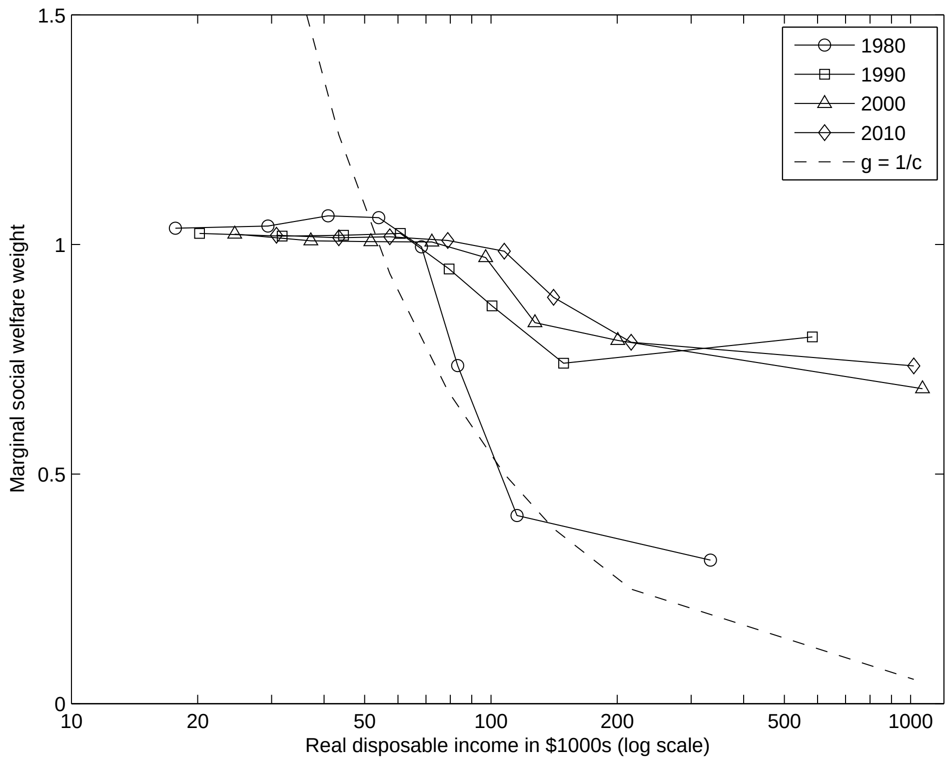


Figure 3: Average MSWWs, plotted against disposable income in 1980, 1990, 2000, and 2010. Points represent the average MSWWs within eight partitions of the market income distribution as reported by CBO, bounded by the following percentiles: 20, 40, 60, 80, 90, 95, 99. These averages are plotted against average income after federal taxes and transfers within each partition, in real 2010 dollars. Weights are computed assuming an elasticity of taxable income of 0.3. The dashed line shows a benchmark "conventional utilitarian" case with weights equal to $1/c$ (then normalized), where c is the vector of disposable incomes within each quantile in 2010.

The first feature of these results we highlight is the consistent, unconventionally flat pattern of MSWWs in 1990, 2000, and 2010. In particular, the MSWWs on the highest one percent of earners are above 0.7 in all three of these years (relative to an average of 1.0 for the entire population), while conventionally they would be assumed to be very small. Similarly, MSWWs are nearly identical for all earners up to and including those at the 80th percentile, while conventional assumptions would have the MSWW at $60,000 be only one third of that at $20,000.

Figure 3 also shows a marked increase in the average MSWW for high earners between 1980 and 1990, corresponding to the dramatic reduction in the top marginal tax rate on earned income (from 50% to 28%) in TRA86.[20] It is unclear, however, whether this large inferred impact of TRA86 truly captures a shift in judgments over this period. Instead, judgments prior to TRA86 may have closely resembled those we infer from policy after the reforms if TRA86's reforms simply improved the design of policy so that society's true, and stable, underlying judgments were better reflected in policy. Clarifying the meaning of the inference results in this period is difficult because of the many options for translating the complicated real-world U.S. tax system into the single tax function of earnings required by the model. For example, TRA86 included substantial base-broadening reforms, likely because of a perception that the effective marginal tax rate on high earners prior to this reform was lower than the 50 percent statutory rate. But, some of this

[20]As shown in the Appendix, if we extend our analysis back to the early 20th century the variation in implied high-income MSWWs (or perceived ETIs) is enormous.

broadening may not have affected marginal earnings choices of high-income taxpayers (e.g. changes to retirement savings deductibility) so that TRA86 would have lowered the effective marginal distortion on them. Moreover, TRA86 included increases in the taxation of corporate and capital income, but the proper way to incorporate those sources income into this static inverse-optimum exercise is uncertain. In this paper, we simply point out the potentially deeper puzzles posed by extending the analysis to years before TRA86 and focus most of our analysis on our results after 1987.

Figure 4 shows average MSWWs for 1980 and 2010 for ETIs ranging from 0.1 to 0.6.

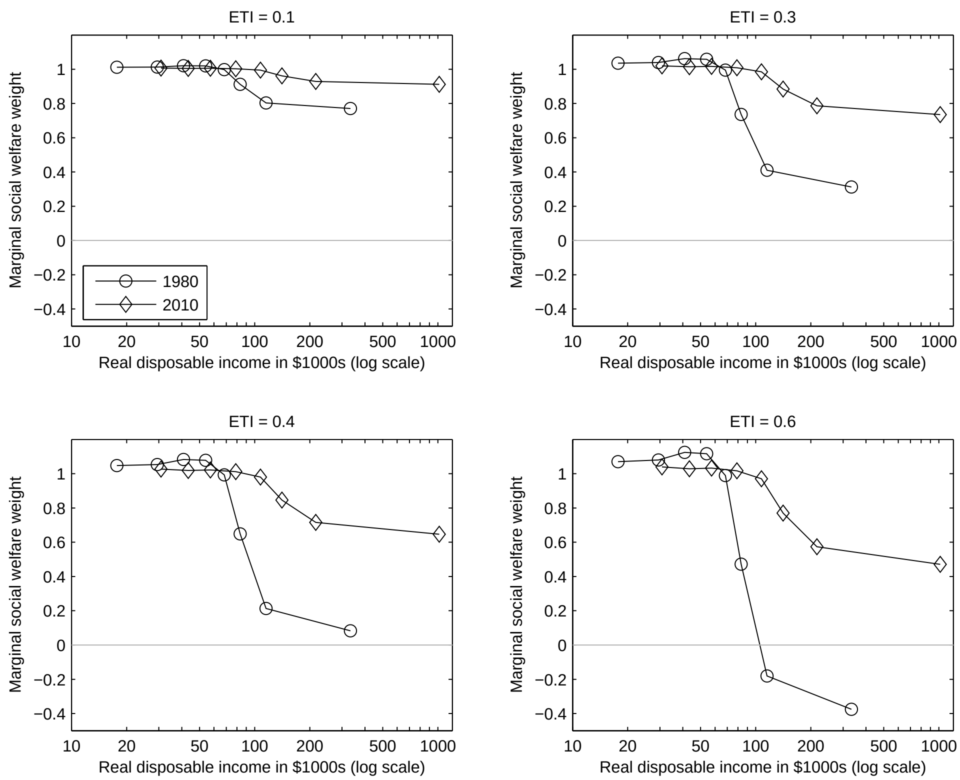


Figure 4: Average MSWWs in 1980 and 2000 for a range of elasticity assumptions, plotted against income after federal taxes and transfers within each partition, in real 2010 dollars.

Figure 4 shows that a larger perceived ETI reduces the inferred MSWWs at the top of the income distribution, as a given tax rate must reflect less weight on high earners if the efficiency costs of taxing them are perceived to be greater. Note, however, that perceived ETIs would have to rise well above the upper bound of most conventional estimates to generate conventional high-income MSWWs: for example the estimated top MSWW remains greater than 0.4 for an ETI of 0.6 in 2010. Moreover, larger ETIs make the apparent shift in high-income MSWWs corresponding to TRA86 especially dramatic and imply that the 1980 tax schedule was not Pareto efficient. In contrast, small values for the ETI reduce the apparent jump in average MSWWs on high incomes from TRA86, but at the cost of these weights being even further above conventional levels.

As noted in the Introduction and discussed below in Section 3, these lessons pose an interpretive challenge. Does society believe that the distortionary costs of taxation are large enough so that the implied MSWWs at high incomes shrink to the values implied by standard social welfare functions? If not, are the unconventionally flat MSWW schedules accurate reflections of society's normative judgments, or do they reflect a biased political process that favors high-earners? Before exploring that challenge in more detail, however, we show how the results of this inverse-optimum exercise can be used to make welfare evaluations of two prominent policy issues.

2 Applications: welfare costs of unequal growth and recessions

Ordinarily, welfare calculations of changes to policy or the economy are controversial because they are sensitive to the modeler's assumptions about the social preferences for redistribution (i.e., the social welfare function). MSWWs inferred from policy are in principle able to provide a more objective basis for comparison, and in this section we use our results from above to measure of the welfare consequences of changes in the policy-inclusive (after taxes and transfers) distribution of income due to unequal growth and recessions in the United States since 1979. We show that these calculations reflect the unconventional nature of the results from Section 1 and are sensitive to how we resolve the interpretive challenge those results pose. These findings thereby warn against reliance on any single such welfare calculation and make clear the imperative of better evidence on society's preferences and beliefs about the fundamental parameters that enter into policy evaluation.

2.1 Costs of unequal growth

From 1979 to 2010, U.S. disposable income has grown by an average 1.5% annually. But as is well-known, income growth has been highly concentrated among high earning households. Figure 5 provides a graphical view of this evolution, plotting average income after federal taxes and transfers for the eight quantiles reported by the CBO. In this section, we use revealed social preferences from various years to compute the implied welfare costs of that unequal growth.

We compute the cost of rising inequality by asking a simple question: How much economic growth would be willingly sacrificed in order to prevent rising inequality? Answering this question requires a means of trading off gains to households with differing income levels, and for this we use the MSWW schedules derived in the previous section.

Note that this is not the only possible definition of the "cost of unequal growth". In particular, our measure will compute zero cost of inequality even if pre-tax income inequality grows, provided the tax system redistributes those gains to prevent inequality in disposable income from rising. An alternative question of interest asks how much economic growth society would be willing to sacrifice to obtain equal growth in wages—i.e., technological change that equally benefits all points of the ability distribution. Here we focus on the former question, as it can be answered using the MSWW schedules derived in the previous section, whereas the latter requires a structural model of labor supply choice.

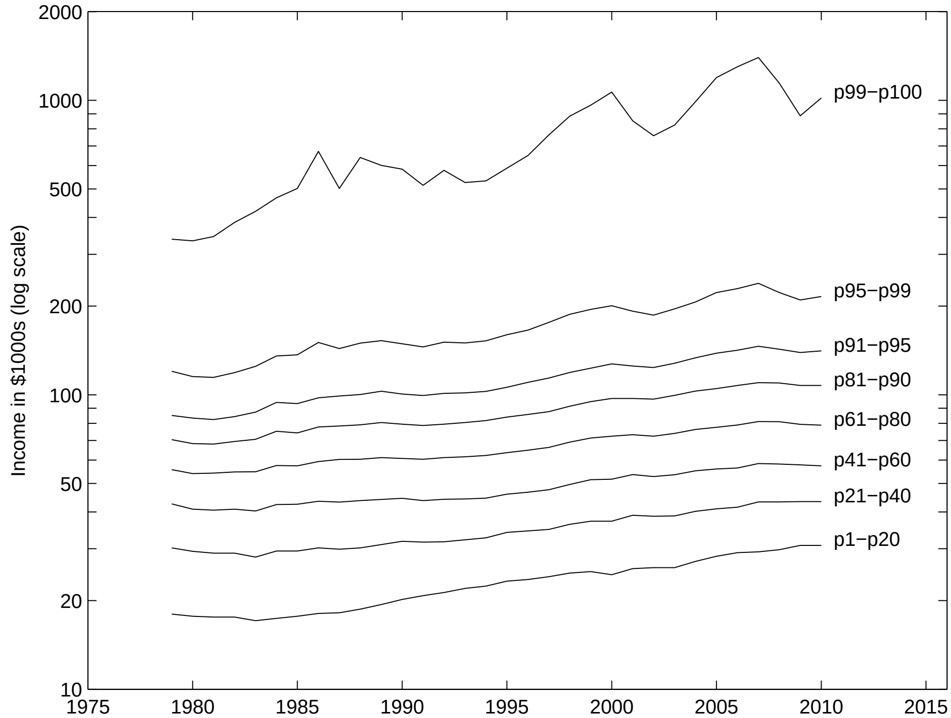


Figure 5: Growth in inequality of disposable income, 1979–2010. Each line represents the evolution of average income after federal taxes and transfers within eight quantiles of market income, as reported by CBO. Income is plotted on the vertical axis in log scale. The top percentile exhibits the strongest positive trend, reflecting rising inequality.

To implement our procedure, we weight changes in average disposable income within each of the eight CBO quantiles by a set of corresponding MSWWs from Section 1.3. Letting $\{g^i\}_{i=1}^8$ denote the vector of welfare weights across quantiles $i = 1 \ldots 8$, and c_t^i the mean disposable income of quantile i in year t, the change in welfare from year m to n, denoted $\Delta W_{m,n}\big|\{g^i\}_{i=1}^8$ is

$$\Delta W_{m,n}\big|\left\{g^i\right\}_{i=1}^8 = \sum_i \left(c_n^i - c_m^i\right) g^i f(y^i). \tag{4}$$

Next we calculate the counterfactual change in welfare $\Delta\tilde{W}_{m,n}(\rho)$ that would result from a given equally-distributed annual growth rate ρ from years m to n under a given vector of MSWWs:

$$\Delta\tilde{W}_{m,n}(\rho)|\left\{g^i\right\}_{i=1}^8 = \sum_i \left(c_m^i(1+\rho)^{n-m} - c_m^i\right) g^i f(y^i). \tag{5}$$

By solving for the ρ such that $\Delta\tilde{W}_{m,n}(\rho) = \Delta W_{m,n}$, we can compute the constant-inequality growth rate that would yield the same gain in social welfare as that experienced in reality. Note that this definition of "equally distributed growth" holds the growth rate of disposable income constant across quantiles, which would result in constant values for many metrics of income inequality, including inter-quantile spreads and the Gini index.

The difference between the actual aggregate growth rate and ρ, as a share of the former, is our measure of the costs of unequal growth. Table 2 shows these costs using MSWWs computed in 1980, 1990, 2000, and 2010 for four values of the ETI.

Cost of Rising Inequality, 1979–2010				
	ETI			
	0.1	0.3	0.4	0.6
1980 MSWWs	3.8%	13%	17.6%	29%
	($1420)	($4560)	($6300)	($10,200)
1990 MSWWs	1.2%	3.6%	4.9%	7.7%
	($430)	($1340)	($1810)	($2810)
2000 MSWWs	1.6%	4.9%	6.7%	11%
	($580)	($1810)	($2450)	($3840)
2010 MSWWs	1.4%	4.3%	5.8%	9.0%
	($510)	($1580)	($2140)	($3300)

Table 2: Cost of rising inequality, 1979–2010. This table shows the share of realized growth which would be willingly sacrificed to preserve 1979 level of inequality in disposable income, using MSWWs implicit in the tax code as computed in 1980, 1990, 2000, and 2010, for a range of elasticities of taxable income. Figures in parentheses represent the corresponding reduction in average income per capita, in 2010 dollars.

It turns out that these costs are strongly dependent on the vector of MSWWs and, therefore, on the explanation one adopts for U.S. tax policy. This exercise therefore illustrates the challenge to researchers interested in using this positive approach to welfare evaluation.

Perhaps the most striking feature of the results in table 2 is how small are the estimated costs of unequal growth when we use MSWWs after TRA86 and conventional values for the ETI. For an ETI of 0.3, the results suggest that Americans in 2010 would have sacrificed only 4.3% of average growth over the last three decades to have had that growth be equal across the income distribution. Of course, this estimate reflects the flat MSWWs inferred above, in that those weights value the unequal growth actually experienced in the United States nearly as highly as equal growth at the same rate. To get a sense for how unconventional this estimate is, consider that the same ETI assumption implies a cost three times as large if we use the more redistributive MSWWs inferred from policy 1980 (though even those give substantially more weight to high-earners than conventionally assumed). Note that the large difference between the costs using 1980 and 2010 weights suggests another challenge in the use of inverse-optimum results: namely, being confident that one has used the right year for inference.

We obtain larger estimates for the costs of inequality if we increase the perceived ETI: table 2 suggests that doubling the ETI roughly doubles the estimated costs. If large values for the perceived ETI are deemed implausible, however, then the unconventionally flat MSWWs–and the low estimated costs of unequal growth–must be either accepted or explained away.

Before moving on to our second application of this approach, we discuss how our calculations of the cost of unequal growth compare to the important work of Hendren (2014), who estimates that adjusting for unequal increases in incomes since 1980 would offset 15–20% of growth. First, the conceptual motivation behind Hendren's approach is different, leading him to focus on unequal changes in income levels rather than unequal rates of income growth.[21] In the context of rising inequality, Hendren's approach computes

[21] Hendren's approach is motivated by the classic Kaldor-Hicks compensation principle, which holds that one environment dominates another if the "winners" in the former could hypothetically compensate the "losers", leaving everyone better off. Hendren proposes an intuitive revision: since actually implementing such transfers through, say, reforms to the income tax would have distortionary effects, those distortions should be included when making welfare comparisons. This can be accomplished by weighting surplus to each individual by an "inequality deflator", representing the distortionary cost of transferring a dollar from the population at large to a specific point in the income distribution. This inequality deflator turns out to be isomorphic

the number of dollars by which every individual's disposable income would have risen if all economic gains had been equally distributed—in dollar terms—over the period between 1980–2010. Under this definition, equally distributed gains *reduce* inequality, as measured by interquantile spreads or the Gini index. Our definition measures the cost of rising inequality relative to equally distributed income growth, which holds measured inequality constant. A second reason our approach differs from Hendren's is that we use different data, employing pre- and post-tax measures of income, averaged across eight quantiles, from CBO, rather than the universe of tax returns, as Hendren does. Our data is less granular and is unable to fully capture heterogeneity in marginal tax rates conditional on income (due to differing family structures, deductions, etc.). At the same time, by employing data from the CPS, the CBO may be better able to capture in-kind transfers and data on households not filing tax returns. Reassuringly, in a calculation designed to replicate Hendren's, using 2010 MSWWs (computed with an ETI of 0.3) to weight the pre-tax gains in *levels* to each CBO quantile since 1980, we find an inequality cost of 16% compared to Hendren's estimate of 15–20%. The similarity of these estimates suggests that the coarseness of our data is not of primary importance to our results.

2.2 Costs of Unequal Distribution of Recessions

A similar methodology can produce estimates of the cost of the unequal policy-inclusive distribution of business cycle downturns. These computations have important implications both for stabilization policy and economic research. If the economic costs of business cycles are small, as suggested by Lucas (2003), then efforts to understand and further mitigate them may be less necessary than if they are large. In particular, we are interested in quantifying the welfare costs from the unequal incidence of recessions, which are not captured by the representative agent approach employed by Lucas.

We start by calculating, for four recessions between 1979 and 2010, the loss in social welfare under a given set of MSWWs, relative to a counterfactual in which no recession occurred. A graphical representation of this counterfactual, showing how we smooth income growth over the recessionary period, is shown in Figure 6,

to $g(y)$ if a social welfare function is assumed to exist (though an innovation of Hendren's work is its applicability in contexts without a rationalizing social welfare function).

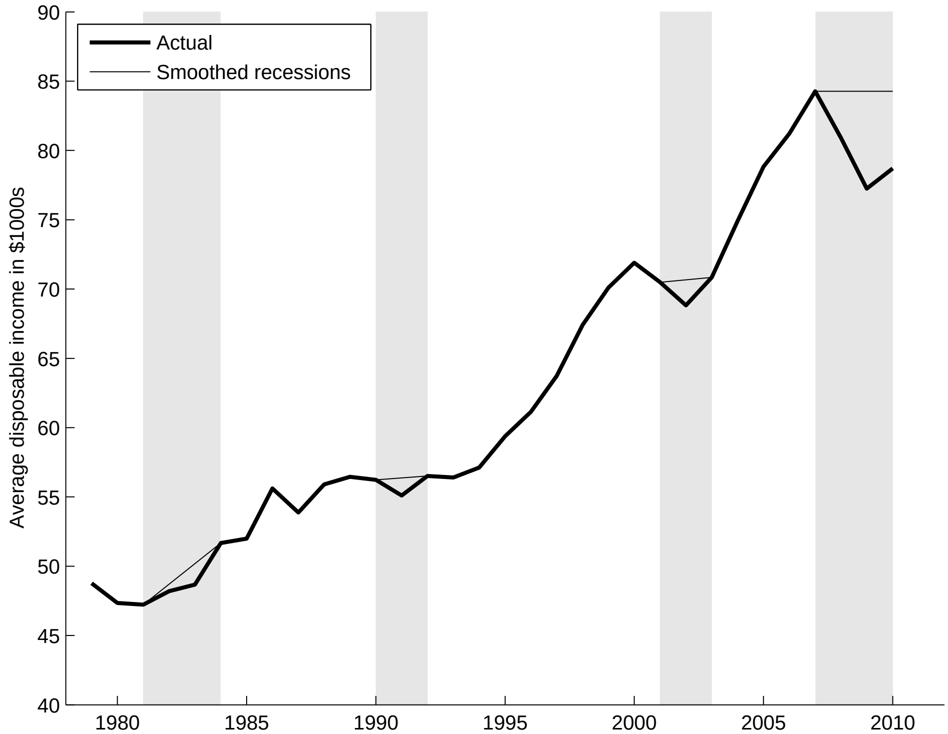


Figure 6: Recessions between 1979 and 2013. The bold line plots average income after federal taxes and transfers; recessionary periods are shaded. To compute welfare under a counterfactual without a recession in each case, we connect a straight line between the income levels at the beginning and end of each recession, as shown above. Because CBO data is only available through 2010, at which time income was still substantially lower than the pre-recession peak in 2007, in that case we simply extrapolate a flat level of mean income. (Income is reported in real 2010 dollars.)

We perform similar smoothing for the income path within each of the eight CBO quantiles. We then weight the lost income in recessions (relative to the counterfactual) by each quantile's MSWW to compute the welfare loss of recessions. Formally, we calculate the social welfare cost of those lower incomes using the MSWW vector $\left\{g^i\right\}_{i=1}^8$ during, say, the 2001–2003 recession, as:

$$\Delta\tilde{W}_m|\left\{g^i\right\}_{i=1}^8 = \sum_{m=2001}^{2003}\sum_i\left(\tilde{c}_m^i - c_m^i\right)g^i f(y_m^i), \tag{6}$$

where c_m^i and $\tilde{c}_m^i$ denote the actual and counterfactual (non-recession) disposable incomes for individual i in year m.

Next, we find a hypothetical recession that yields the same loss in social welfare but in which all types of individuals suffer a common proportional loss of income off of the constant-growth trends $\tilde{c}_m^i$. Formally, for a recession that lies between years m and n, we solve for the value of α that satisfies the following:

$$\sum_{t=m}^{n}\sum_i \alpha\tilde{c}_m^i g^i f(y_m^i) = \Delta\tilde{W}_m|\left\{g^i\right\}_{i=1}^8, \tag{7}$$

which has the same right-hand-side as expression (6). The value of α that satisfies (7) can be interpreted as the uniform recessionary shock (as a percent of no-recession income), that would have yielded the same social welfare loss as the actual recession. We dub α the "equally distributed equivalent loss".

In Table 3, we show these costs for four recessionary periods using MSWWs from 1980 and 2010. All of these calculations assume an ETI of 0.3.

Cost of Unequal Distribution of Recessions, 1979–2010					
	Average change in	Equally-distributed equivalent (α)		Ratio of α to average change	
Recession	disposable income	1980 MSWWs	2010 MSWWs	1980 MSWWs	2010 MSWWs
1981–1984	−4.3%	−2.1%	−2.1%	48%	48%
1990–1992	−2.3%	−1.4%	−2.0%	63%	87%
2001–2003	−2.6%	−1.8%	−2.3%	69%	89%
2007–2010	−12.3%	−2.8%	−5.1%	23%	41%

Table 3: Cost of recessions, 1979–2010. The first column shows the share of annual pre-recession disposable income lost over the course of a recession. The second and third columns show the equally-distributed income loss, α, which would generate the same welfare cost, using 1980 and 2010 MSWWs. The final two columns show the ratio of the equally distributed equivalent to the average loss —this is the amount by which the recessionary shock must be adjusted to account for its unequal impact. These results assume an elasticity of taxable income equal to 0.3.

One feature of these results stands out: the equally-distributed shock is smaller than the actual (unequal) recessionary shock in all four of these recent recessions. This is driven by the fact that reductions in disposable (not necessarily market) income during these recessions are concentrated on high earners. For example, as can be seen from Figure 5, the CBO reports that disposable income did not fall at all during the Great Recession for the two lowest quintiles. Since MSWWs from all years place a lower weight on individuals at the top of the income distribution than at the bottom, they imply a lower welfare cost of recessions than the average income loss, which places full weight on the large losses of top earners. Related, note that the 2010 MSWWs imply a much greater cost for the Great Recession than the 1980 weights because the former give much more weight to the losses suffered by high earners.

3 A Trilemma and Evidence on Possible Resolutions

In this section, we will use the values of high-income MSWWs as a way to summarize the interpretive challenge posed by our results from Section 1.[22] Denote by g_t^* the average MSWW on the top one percent of income-earners in year t, corresponding to the right-most point on the average MSWW schedules in Figures 3 and 4. Formally, let y_t^* be the 99th percentile of market income in year t, so that $F_t(y_t^*) = 0.99$, then $g_t^* = \int_{y_t^*}^{\infty} g_t(z)dF_t(z)/0.01$. Figure 7 makes clear the negative relationship between g^* and the perceived ETI required to explain the U.S. data for any one year.

Intuitively, a larger g^* means less willingness to redistribute from high earners and thus exerts downward pressure on high-income marginal tax rates, while a lower perceived ETI means less concern for the distortionary cost of redistribution and thus exerts an offsetting upward pressure on high-income marginal tax rates.

[22]We do not discuss in detail the flat MSWWs through the fourth quintile, though that is a promising topic for further study.

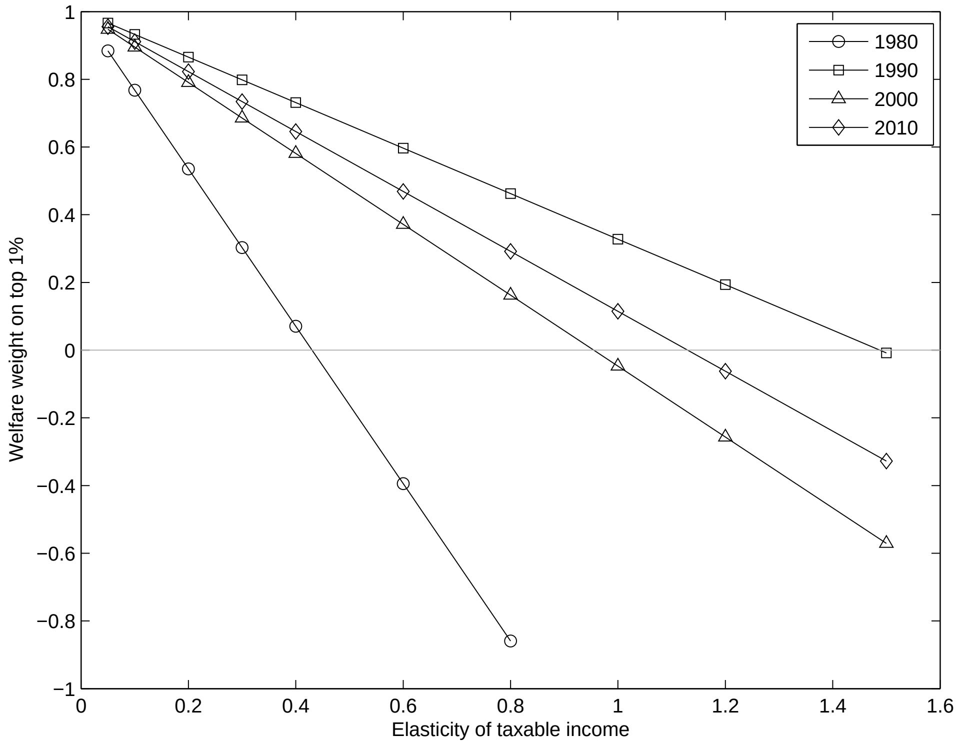


Figure 7: The implicit welfare weight attributed to the top 1% of earners under various elasticities of taxable income for years 1980, 1990, 2000, and 2010.

This figure also shows that our results are inconsistent with having three potentially appealing conditions hold simultaneously, a situation we label a trilemma. Those conditions are: 1) the inverse-optimum exercise yields normatively-relevant results on MSWWs; 2) society's perceived ETI lies within conventional ranges; and 3) society's true pattern of MSWWs is consistent with conventionally-assumed principles. To see why at most two of these conditions can hold at a time, start with assuming that the first and second hold and examine figure 7. Condition 2 restricts us to the left-hand-side of the figure, at an ETI no greater than 0.4, while Condition 1 means that the normatively-relevant MSWWs are given by the intersection of the chosen ETI with the lines explaining tax policy in a given year. In that case, MSWWs are either always much greater than conventionally assumed or, if the pre-TRA86 results are taken at face value, are also highly unstable over this time period. Therefore, condition 3 does not hold. Next, assume that conditions 1 and 3 hold, so that we are restricted to where the lines explaining tax policy cross positive values of g^* near zero. In this case, the perceived ETI range from around 1.0 to above 1.4, well above the conventional ranges described in Section 1 and in violation of condition 2. Finally, if conditions 2 and 3 hold we are restricted to a region of figure 7 that does not intersect any of the lines explaining policy since TRA86. In other words, the MSWWs inferred from policy must not reflect the true (conventional) MSWWs that condition 3 assumes to hold, so the inverse-optimum exercise does not yield normatively-relevant information and condition 1 cannot hold.

The way in which we resolve this trilemma has substantial implications for either the usefulness of the inverse optimum approach to welfare evaluations or for our assumptions when making welfare evaluations more generally.

If we believe that perceived ETIs take values well above conventional ranges, do those perceptions reflect the collective wisdom of the population, perhaps taking into account dimensions of the response to taxation that lie outside the scope of traditional estimates? If so, economists' optimal policy recommendations and their evaluations of policy proposals in general ought to be based on far greater costs of redistribution than they typically are. Another possibility is that public perceptions of the ETI are misperceptions—perhaps due to the influence of propaganda from those opposed to progressive policies. In that case, we will infer incorrect values for the MSWWs from inverse-optimum exercises that use professionals' estimates of the ETI, since those estimates are not what determines voters' policy preferences, and only when we have reliable estimates of perceived ETIs can inverse-optimum results be trusted.

On the other hand, if we conclude that the inferred high-income MSWWs accurately reflect society's normative judgments, most economists' default approach to welfare calculations—i.e., unweighted utilitarianism with diminishing marginal utility of disposable income—is inconsistent with revealed social preferences of Americans. In that case, it will be important for economists to identify the policy objectives that actually prevail in society if we hope to make welfare evaluations that respect society's preferences.

Finally, the simplest resolution–and perhaps the boldest–is to simply jettison the inverse-optimum approach and assign the unconventional results in Section 1 to political bias or other factors that push policy away from a truly optimal design. The challenge facing that resolution is that it views real-world tax policy as being divorced from society's true preferences despite it being a highly prominent and repeatedly-debated issue, and despite the tradeoff between equality and efficiency at the heart of the Mirrlees model having long been well-understood in public discourse.

Ideally, we could use evidence on perceived ETIs and the public's normative preferences to resolve this trilemma. We now turn to an attempt at this approach.

3.1 Suggestive evidence on possible explanations for the evolution of policy

In this section we present some suggestive evidence related to the trilemma described above. We emphasize that this evidence is far from conclusive and that we view this effort as a preliminary examination upon which we hope future work, with better data, will be able to build. In particular, a clear lesson from this section's analysis is that more data, especially over time, on the perceived costs and benefits of redistributive taxation would be invaluable to researchers interested in the questions we ask in this paper. We believe both that obtaining such data is feasible and that doing so will require careful survey design. Our new survey evidence on attitudes toward current levels of redistribution illustrates, we hope, both of those beliefs.

3.1.1 Evidence on perceived ETIs

We begin by focusing on whether a plausible explanation for U.S. tax policy over the last several decades is that the public perceives the ETI, in particular of high earners, to be larger than is conventionally assumed.[23] Because the data are limited, we draw on three sources of evidence: popular opinion, academic research, and official government estimates. In sum, though we cannot rule out this explanation, we find no strong evidence in support of it.

Public opinion First we look for direct survey evidence on popular perceptions of the incentive effects of taxation. Unfortunately, direct data on the general voting public's perceptions of these costs are very limited–in fact, we have found no evidence that would give a quantitative estimate of the perceived level

[23]In the Appendix, we discuss and find no evidence for a possibility not directly related to ETIs, namely that the perceived importance of complementarities across workers in the spirit of Stiglitz (1982) increased over this period.

of these incentive effects. The World Values Survey provides what little, highly-imperfect evidence we have found on changes to public perceptions. The World Values Survey (WVS) asked respondents in the United States in 1990, 1995, 1999, 2006, and 2011 to indicate where on a 10-point scale they would "place their views," where 1 was "Incomes should be made more equal" and 10 was "We need larger income differences as incentives." This question is far from ideal for the purposes of gauging the perceived elasticity of taxable income, but it does prompt the respondent to consider the incentive effects of redistribution. To that extent, a higher numeric response reflects a greater perceived distortionary cost of taxation. Figure 8 shows the distribution of responses to this question, as well as the mean response, from 1990 through 2011.

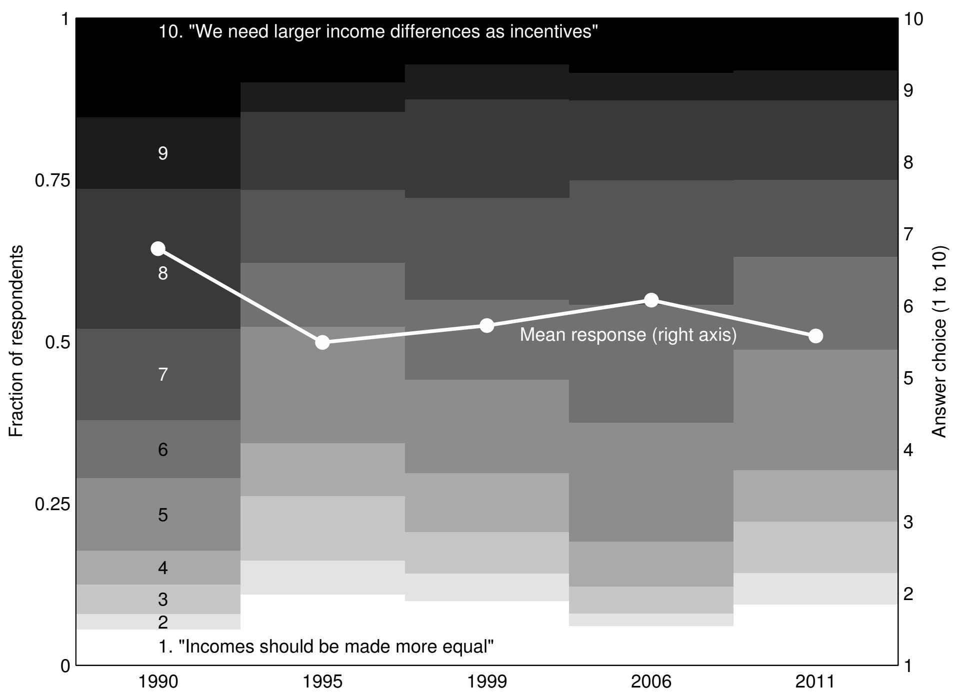


Figure 8: Responses to the World Values Survey question in which 1 is "Incomes should be made more equal" and 10 is "We need larger income differences as incentives." The solid line shows the mean answer in each year, as measured by the right axis.

The evolution of responses shown in this figure is qualitatively consistent with the evolution of ETIs that would be consistent with policy over this period (shown in appendix Figure 19), where the implied ETIs decline between 1990 and 1995 and then gradually rise. Of course, the data in Figure 8 cannot tell us whether the high *levels* of the ETIs required to explain recent tax policy are consistent with the public's perceptions.

Academic research Given the limited data available on public perceptions, we turn to the extensive academic literature estimating the true (not necessarily the perceived) incentive effects of taxation, with the implicit idea that public perceptions may track professional opinion. In particular, we focus on surveys of this literature by the CBO (1996), Blundell and MaCurdy (1999), Keane (2011), and Chetty (2012) to gauge the estimated compensated elasticity of taxable income (or labor supply, as available) of prime-aged men over time.[24] We include estimates of the elasticities of both taxable income and labor supply because

[24]Excluding estimates for female elasticities means that we ignore the dramatic increased participation of women in the workforce and the subsequent decline in their elasticity: see Heim (2007) and Blau and Kahn (2007). Another survey of the literature, showing consistent results, is Bargain and Peichl (2013).

the latter was the main empirical target for researchers during the early years of our sample. While the ETI includes margins of adjustment in addition to labor supply, the most recent surveys of the literature suggest that the quantitative difference is very small between the portions of these elasticities representing lost economic activity, rather than temporary shifts or strategic reporting of economic activity (see the Saez et al. (2012) summary in section 1.3, and see Chetty (2009) for a discussion of the components of the ETI).

The CBO's 1996 report provides a survey of surveys, giving the mean labor supply estimates from nine literature reviews spanning 1979 through 1993. Figure 9 plots the mean estimates reported by the survey papers in the CBO report and four other surveys, along with the point estimates from each of the papers reviewed in the very recent Keane and Chetty papers.[25]

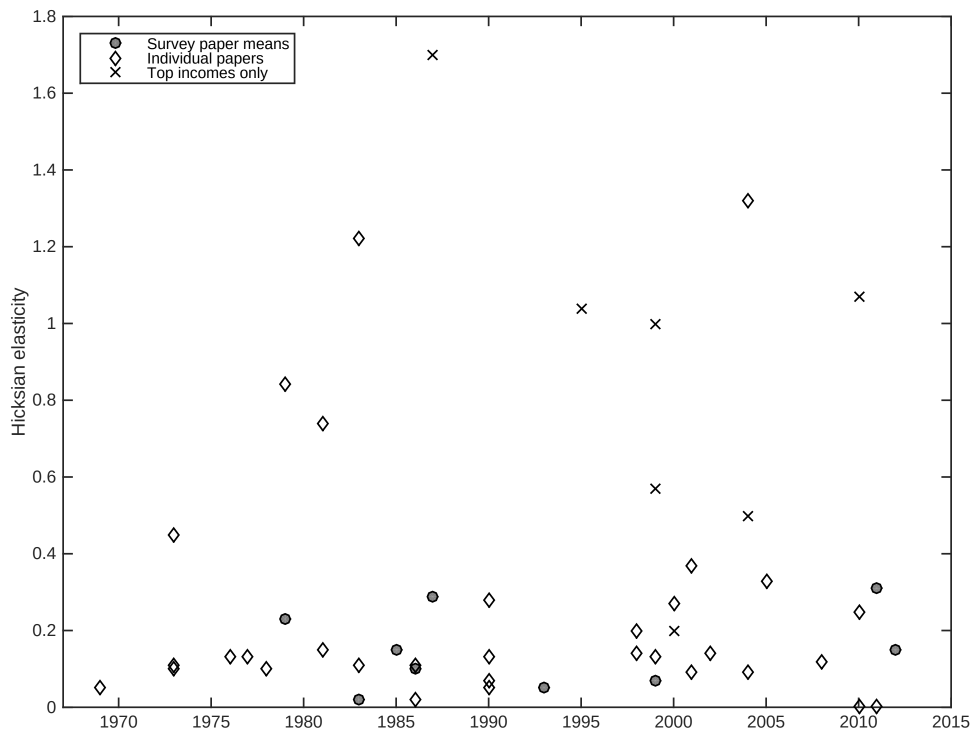


Figure 9: Elasticity estimates in the economics literature over time, drawn from the following survey papers: CBO (1996), Blundell and MaCurdy (1999), Keane (2011), Saez et al. (2012), and Chetty (2012).

The evidence in Figure 9 shows that estimates of the distortionary costs of taxation are quite stable over this period. First, if we focus on the survey articles (the solid circles in the figure), the apparent consensus in early years that elasticities were quite low appears still to hold today: as Saez, Slemrod and Giertz (2012) wrote just a few years ago, "With some exceptions, the profession has settled on a value for this elasticity [of labor supply] close to zero."

One possibility raised by the data in Figure 9 relates to the estimated elasticities for top incomes, shown as "x" symbols in the figure, which arose relatively recently. Lawrence Lindsey (1987) provided an influential analysis of the effects of top marginal tax rate reductions in the 1981 tax reform, estimating large ETIs—above 1.5—around the time of the 1986 tax reform. Such high estimates were found for the

[25]For the Chetty (2012) mean, we use his calculation of the mean for his Panels A and B of Table 1, which includes hours and taxable income elasticity estimates. We do not adjust for the optimization frictions that are the focus of his important paper, so as to maintain consistency with how the other surveys' evidence is presented. He reports a value of 0.33 when that adjustment is made, bringing him closer to Keane's (2011) estimate.

1986 reforms in the well-known analysis of Feldstein (1995). These large estimates of high-earner elasticities were followed by smaller estimates (e.g., between 0.4 and 0.6) in subsequent work that took into account intertemporal shifting of incomes among high earners (Goolsbee, 2000) and econometric concerns (Gruber and Saez, 2002).[26] In fact, Goolsbee (1999) argued that the empirical results from the 1990s (based on 1980s tax reforms) were aberrations, as similar analyses applied to other periods' tax changes yielded much smaller elasticity estimates. Summarizing the evidence, CBO (2012*b*) writes: "There is little compelling evidence that high-income taxpayers have substantially higher elasticities with respect to their labor input than lower-income taxpayers. Higher estimates of the elasticity of broad income among high-income taxpayers appear to reflect their greater ability to time their income rather than greater changes in their labor supply."

Official estimates Finally, we consider a third source of data on perceived elasticities, in this case focusing on data that likely inform policymakers' beliefs. The Congressional Budget Office is the U.S. government's official provider of budgetary and economic analyses for debates over legislation. In its economic analyses, the CBO uses values for the elasticities at issue in this paper, so evidence on the CBO's chosen values provides one way to gauge the perceived costs of distortionary taxation that were salient to policymakers.

We obtained several documents produced by the CBO that summarize its own views of the literature on the responses of economic activity to taxation.[27] The earliest relevant document was "An Analysis of the Roth-Kemp Tax Cut Proposal" from 1978. While no explicit elasticities are mentioned, the text contains the following statement: "For the labor force as a whole, a 10 percent increase in the disposable wage may lead to a 1 to 3 percent increase in hours worked." We infer from this that the CBO believed in an elasticity of 0.1 to 0.3 (it is unclear whether this was an uncompensated or compensated thought experiment).[28] The CBO's analysis of TRA-86 references Hausman (1985) as providing evidence of secondary-earner responsiveness to tax changes but downplays the response of labor supply to the reform overall. The CBO's 1994 analysis of President Bill Clinton's health insurance proposal states: "...the supply of labor is relatively insensitive to changes in take-home wages. Recent empirical studies suggest that the total hours supplied by U.S. workers would decline on 0.1 percent to 0.2 percent for each 1 percent reduction in their take-home wage," i.e., an elasticity of 0.1 to 0.2. In the 1996 review paper cited above, the CBO stated the range 0.2 to 0.4 from its reading of the literature. In 2012*b*, the CBO reported that it had revised down that range to 0.1 to 0.3. Therefore, the CBO appears to have used roughly the same range for the elasticity controlling the distortionary costs of income taxation since 1978, and not surprisingly that range has been consistent with the academic consensus apparent in Figure 9.

3.2 Evidence on MSWWs

If perceived ETIs are assumed to have been at conventional levels, the trilemma implies that the inferred MSWWs on high earners are larger than conventionally assumed over this period either because policy failed to reflect society's true (conventional) normative judgments or because society's true normative judgments were at odds with conventional assumptions. In principle, we can disentangle these options by using data

[26] Diamond and Saez (2011) comment on the latter of these as follows: "The paper Gruber and Saez (2002) is often cited for its substantial taxable income elasticity estimate ($e = 0.57$) at the top of the distribution. However, its authors also found a small elasticity ($e = 0.17$) for income before any deductions, even at the top of the distribution."

[27] Thanks to Ed Harris of the CBO for his guidance on which documents would have the relevant information.

[28] The report also states "It is generally agreed that the labor supply of all adult males is largely unaffected by changes in marginal tax rates. In most studies, both the substitution and the income effects are very close to zero."

on the extent to which the public agrees with the prevailing progressivity of tax policy.[29]

First, we present survey evidence on the perceived representativeness of the political process. Figure 10 displays the share of respondents agreeing with two relevant statements in the General Social Survey: "Public officials are interested in the problems of the average man" and "The average citizen has considerable influence on politics".

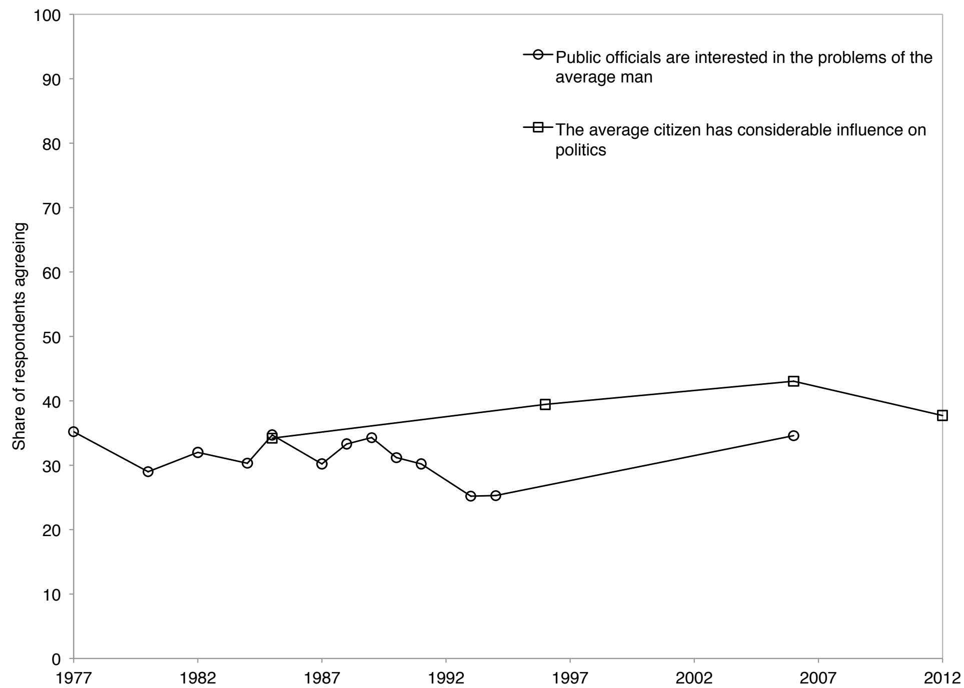


Figure 10: Responses to General Social Survey questions about political representation.

The most striking feature of this figure is that only approximately 35% of respondents believes, and has believed since 1977, that the political process reflects the interests of average citizens. This finding is broadly consistent with related work in the political science literature: Gilens (2012) and Gilens and Page (2014) present evidence that the influence of high earners does not appear to have risen relative to others over this time period but that policy is consistently and substantially more responsive to opinions of high-earners than to median-income constituents.

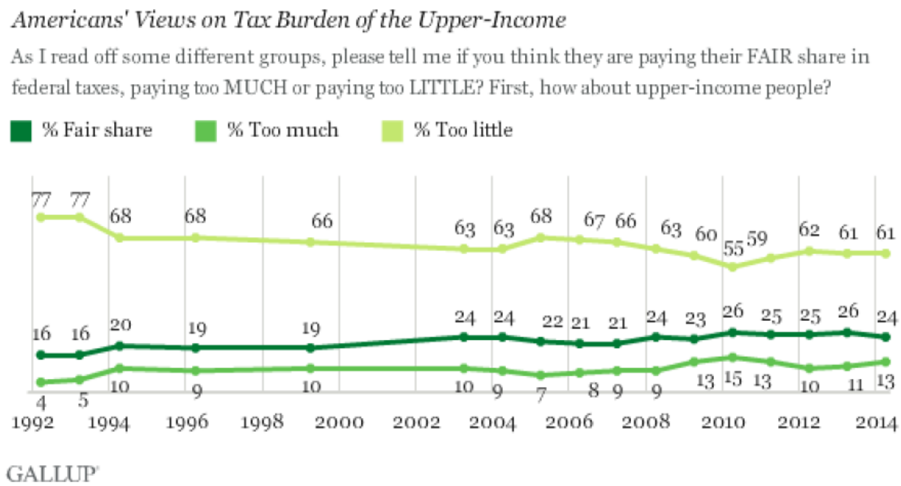
Pew survey results over the most recent decade of this period tell a broadly consistent story.[30] In 1997 and 2010, respondents were asked which of a number of groups—including "poor people", "the middle class", and "business leaders"—get "too much", the "right amount", or "too little attention" from government. Over that period, the share reporting that business leaders get too much attention fell slightly from 50% to 45%, while the share believing the poor get too much attention rose from 10% to 17%. A stable share reported that the middle class gets too much attention; yet the share reporting that the middle gets too little

[29] A side note: data from the General Social Survey presented in an earlier version of this paper shows highly stable preferences for redistribution over time in the United States. Unfortunately, those data do not quantify the implicit MSWWs of respondents nor do they indicate the level of agreement with current policy. Contemporaneous research by Kuziemko and Washington (2014) has documented in detail the overall stability of redistributive preferences among Americans over this period, though they also highlight important variation in trends across demographic groups. One finding of particular relevance is that redistributive preferences have risen among the young but fallen among those over 65 years of age over this period.

[30] See http://www.people-press.org/files/legacy-pdf/606.pdf.

attention rose from 54% to 66%. These results provide further evidence that the level of representativeness is perceived to be persistently low.

For evidence more directly relevant to tax policy, we turn to survey evidence from Gallup. This question asks the respondent to compare the current state of tax policy with his or her ideal, a suitable question for gauging whether a biased political system is neglecting popular opinion. Specifically, respondents were asked whether “upper income people” pay “too much”, “too little,” or their “fair share” in taxes from 1992 through 2014. The results are shown in the following figure:



These Gallup data support the interpretation that the political system is failing to accurately reflect most Americans’ (lower) preferred top MSWWs. In this figure, the share of respondents who say that upper-income people are paying too little is a substantial majority throughout the period 1992 to 2014.[31] Note that, as with the previous evidence, these data do not suggest a worsening of the dissatisfaction with policy.

One concern with any survey evidence, such as Gallup’s, is its robustness to changing the framing or information that is salient to the respondents. In particular, it is unclear in this case what a respondent to Gallup’s survey knows about the current tax burden of “upper-income people.” As research using survey-based evidence on policy preferences has developed, increasing attention has been paid to such questions. For example, Kuziemko et al. (2013) is an important recent study exploring how responsive reported preferences for redistribution (through income or estate taxes) are to the presentation of information.

In this paper, we try to address this uncertainty over the evidence on redistributive preferences by generating novel survey evidence in which we vary the information made salient to respondents. In addition to helping sort out the explanation for high top MSWWs, we hope that this evidence will be more broadly useful in the effort to understand Americans’ redistributive preferences.

The details are as follows. Using Amazon MTurk, we randomize 200 respondents across four information treatments. All treatment groups face the same welcome and permissions screens at the start of the survey. Then, the control group #1 is asked the same questions as in the Gallup survey (except that we use the term “households” instead of “people” to better match the data we present the other groups). Group #2

[31] Changes to this share in response to policy changes are as would be expected. For example, the increase in top marginal tax rates in 1993 appears to match precisely the timing of a drop in the share of respondents who believe the rich pay too little in the Gallup data. The reverse happens after the 2001 and 2003 tax cuts lowered top rates on high earners.

is asked those same questions, but after being shown the distribution of pre-tax and -transfer income across household quintiles from the CBO. Group #3 is shown the distribution of federal income tax payments across these same quintiles, also from the CBO, while group #4 is shown both distributions before being asked the Gallup questions. These informational figures are as follows:

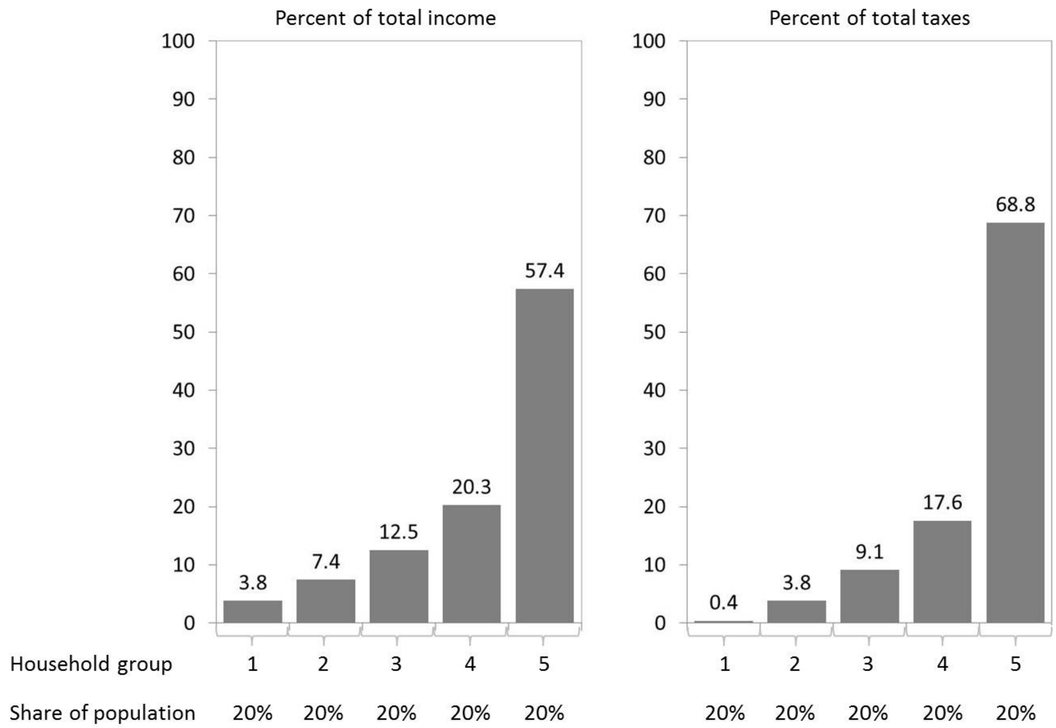


Figure 11: Distribution of market income from CBO (2013) by household income quintile (left panel) and distribution of federal tax payments from CBO (2013) by household income quintile (right panel).

The following table shows the distribution of responses to the Gallup question on upper-income people (households, in our survey). The unadjusted data are the raw results of the survey. The adjusted data reflect the fact that the sample from MTurk has a substantially greater share of respondents self-identifying as "Liberal" or "Left-leaning" than holds for Gallup's representative sample. We take Gallup's results on the share of the population that self-identifies as Liberal, Moderate, or Conservative—a question we ask of our respondents as well—and rescale our results to match the same population shares. This gives us a result for the "No information" treatment that is much more similar to Gallup's than our unadjusted results.

The table shows substantial sensitivity of respondents' preferences to information. Perhaps surprisingly, providing information on the concentration of income reduces the share of respondents believing that upper-income households pay too little. Most important for our purposes is the loss of the clear majority who say that upper-income people pay too little in taxes when information on tax shares is provided, even if that information is combined with information on income shares. This finding suggests that the mismatch between policy and voter preferences may not be as great as the raw Gallup data indicated.

Unadjusted data

Treatment	Upper-income households pay... Too little	Fair share	Too much	Obs
No information	80%	16%	4%	51
Income shares	70%	22%	7%	54
Tax shares	48%	33%	19%	39
Both income and tax shares	54%	33%	13%	52

Adjusted data (scaled to match Gallup shares of political affiliation)

Treatment	Upper-income households pay... Too little	Fair share	Too much	Obs
No information	71%	22%	7%	51
Income shares	59%	29%	12%	54
Tax shares	34%	40%	26%	39
Both income and tax shares	48%	28%	24%	52
Gallup results	61%	24%	13%	1,026

Table 4: Results by treatment, raw and adjusted for political composition.

The sensitivity of preferences apparent in Table 4 is, in a sense, disappointing. If preferences had been unchanged across treatments, we would have strong evidence that most Americans robustly wish that taxes were more progressive and, in terms of what is at stake in this paper, that the large top MSWWs we inferred from policy are likely due to a political process that fails to reflect those wishes. Instead, a fundamental uncertainty remains: is policy not more progressive because most Americans are satisfied with policy as it is, or because they do not have the political influence to change it?

4 Conclusion

This paper extends the recent surge of so-called inverse-optimum research, which seeks to use data on prevailing policy to infer society's normative preferences, across time to explain U.S. tax policy from 1979 to 2010. We characterize the set of positive and normative judgments that are implied by the joint evolution of tax policy and the income distribution over this period and, for reference, back to 1920. Our main finding is that policy after the Tax Reform Act of 1986 has consistently implied less redistributive preferences or higher perceived distortionary costs of taxation than are conventionally assumed to apply. If we look to results for policies prior to 1986, we add to the puzzle that implied societal judgments may have been highly unstable over time. We apply our results to estimates of the welfare costs of unequal growth and recessions in the United States over this period, demonstrating both the potential for using the results of the inverse-optimum approach to make welfare evaluations and the difficult questions raised by doing so with recent U.S. tax policy.

These results leave researchers with a difficult choice: we must question either the relevance of this approach to normative welfare evaluations or some of the assumptions we typically bring to such welfare evaluations. In this paper, we attempt to determine which of these choices is best supported by the limited relevant data, drawing on public opinion surveys, academic research, official government estimates, and our own novel survey evidence. Most of the evidence is, unfortunately, inconclusive. Perhaps the best case can be made for the claim that bias in the political system makes policy depart systematically from society's true preferences, undermining the normative relevance of this inverse-optimum approach. Even that evidence, however, appears not to be robust to minor interventions in survey design. Better data bearing on this choice are therefore essential if we hope to resolve the challenge posed by the results of this paper and, potentially, use this revealed preference approach to avoid putting key normative decisions in the hands of the economists doing welfare analysis.

5 Appendix

Derivation of expression (3). Expression (2) can be written:

$$\int_y^\infty g(z)dF(z) = 1 - F(y) - \left(\frac{T'(y)}{1-T'(y)}\right)\varepsilon y f(y). \tag{8}$$

Using the Leibniz rule, differentiating both sides with respect to y yields

$$-g(y)f(y) = \frac{d}{dy}\left[1 - F(y) - \left(\frac{T'(y)}{1-T'(y)}\right)\varepsilon y f(y)\right], \tag{9}$$

and dividing by $f(y)$ provides (3).

Lorenz curves for calibrated income distributions. Figure 12 plots the Lorenz curves for our calibrated distributions of market incomes across four decades. This progression demonstrates the well-documented concentration of income among high earners.

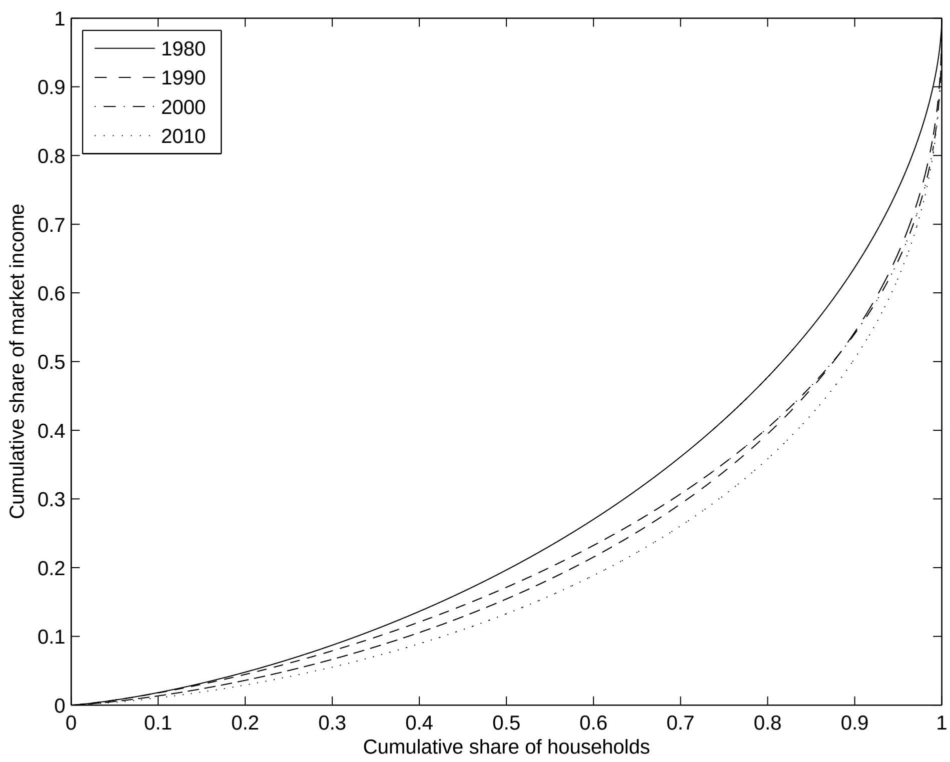


Figure 12: Lorenz curves for the calibrated distribution of market income in 1980, 1990, 2000, and 2010.

Calculating MSWWs via numerical differentiation. Figure 13 displays our calculated S weights and their smoothed version. This computation is sensitive to the assumed elasticity of taxable income—here we assume a value of 0.3. A technical complication is that discontinuities in the marginal tax rate schedule carry through to $\frac{\int_y^\infty g(z)dF(z)}{1-F(y)}$, generating points at which the schedule is not differentiable and the MSWWs are not defined. Since this feature is likely an artifact of the desire for a simple tax code, rather than a feature of underlying social preferences, we use a Gaussian kernel smoothing regression to smooth the schedule of S weights, rendering it differentiable, as shown in Figure 13. We use a bandwidth of 10% of the mean income in the 7th CBO bucket (the 95th to 99th percentile), which preserves the shape of the distribution while fully smoothing the kinks.

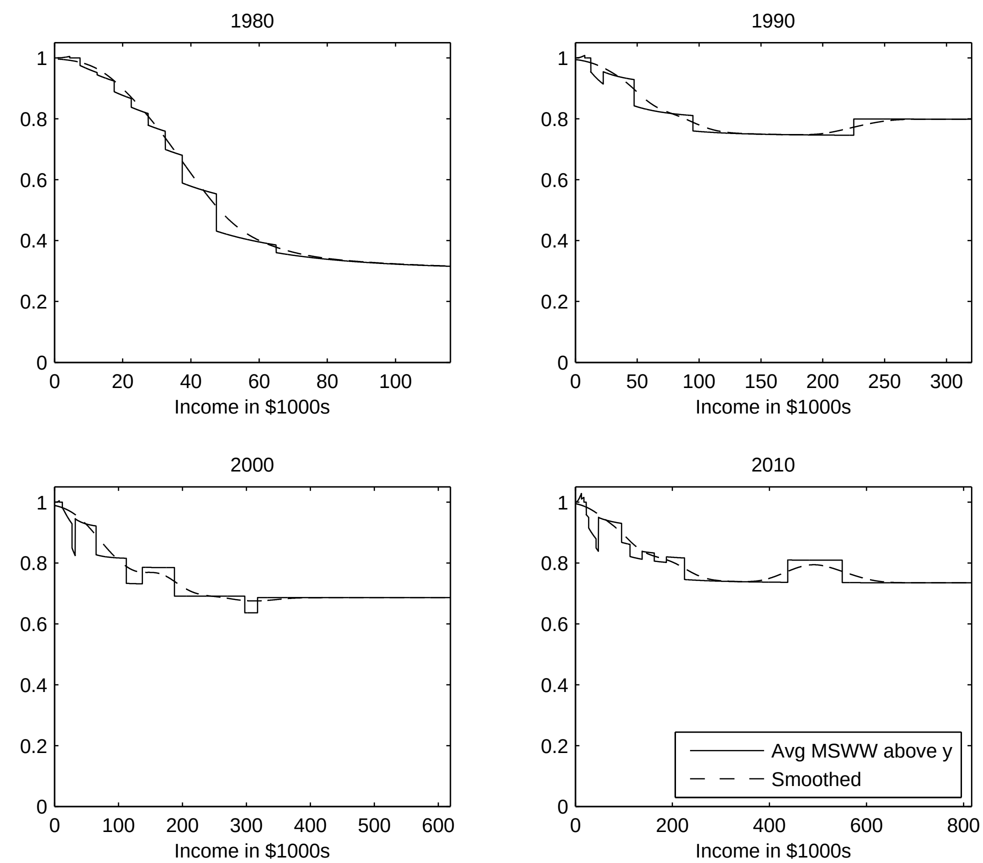


Figure 13: Average MSWWs above each income level, $\frac{\int_y^{\infty} g(z)dF(z)}{1-F(y)}$, in 1980, 1990, 2000, and 2010. Discontinuities are generated by kinks in the income tax schedule. Dashed lines are computed using Gaussian kernel smoothing regression with bandwidth equal to one tenth of the mean income in 95–99 percentile CBO bucket. Results are computed assuming an elasticity of taxable income of 0.3.

Accounting for transfers and state and local taxes As mentioned in the text, our measure of marginal tax rates excludes two important components of the overall tax burden. First, it does not include phase-outs of transfer programs such as SNAP (food stamps) and housing vouchers. The effect of such phase-outs are likely strongest at low incomes, whereas our focus is largely on policy toward high earners. Nevertheless, we explore the possible extent of rising transfers (and thus, rising implicit marginal tax rates from phase-outs) by imposing an alternative tax schedule for 2010. Specifically, for those with annual earnings below $30,000, we replace the marginal tax rate as reported by TAXSIM with a constant rate of 40%, intended to approximate the effect of incorporating phase-outs according to the Congressional Budget Office's 2012*a* report on marginal tax rate's among low and middle income households. The evolution of MSWWs under this alternative specification is displayed in Figure 14. As expected, this modification lowers MSWWs for low and middle incomes in 2010

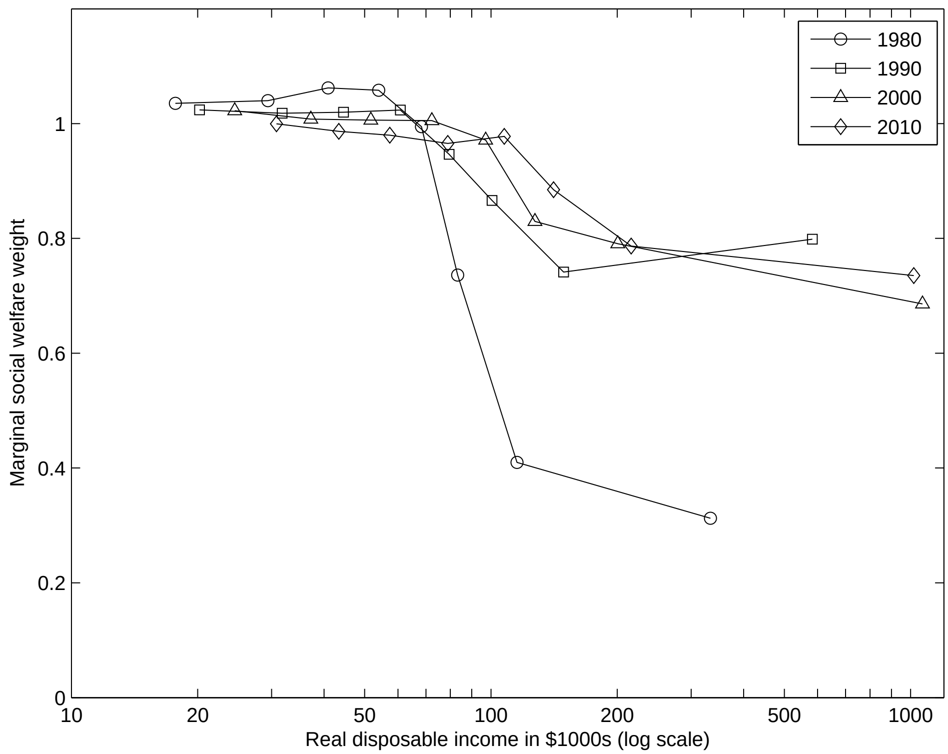


Figure 14: Average MSWWs, plotted against disposable income in 1980, 1990, 2000, and 2010. The 2010 marginal tax rates are set to 40% for those earning less than $30,000 annually, to approximate the effect of implicit marginal tax rates due to transfer phase-outs during that year.

Another important component of the total tax burden ignored in our baseline analysis is state and local taxes. As pointed out in Hendren (2014), to the extent that these taxes represent implicit fees for local amenities, such as school quality, it is appropriate to exclude this component of the tax burden. Nevertheless, to explore the effect of state taxes, we add a flat 8% marginal tax rate at all levels of income. In practice, state taxes appear mildly regressive (Institute on Taxation and Economic Policy, 2013), making this a conservative assumption with respect to our main results.

The effect of this modification is displayed in Figure 15. The higher marginal tax rates serve to make the schedule of MSWWs (calculated assuming an ETI of 0.3) decline more sharply with income, but top MSWWs remain well above conventional values from 1990 through 2010.

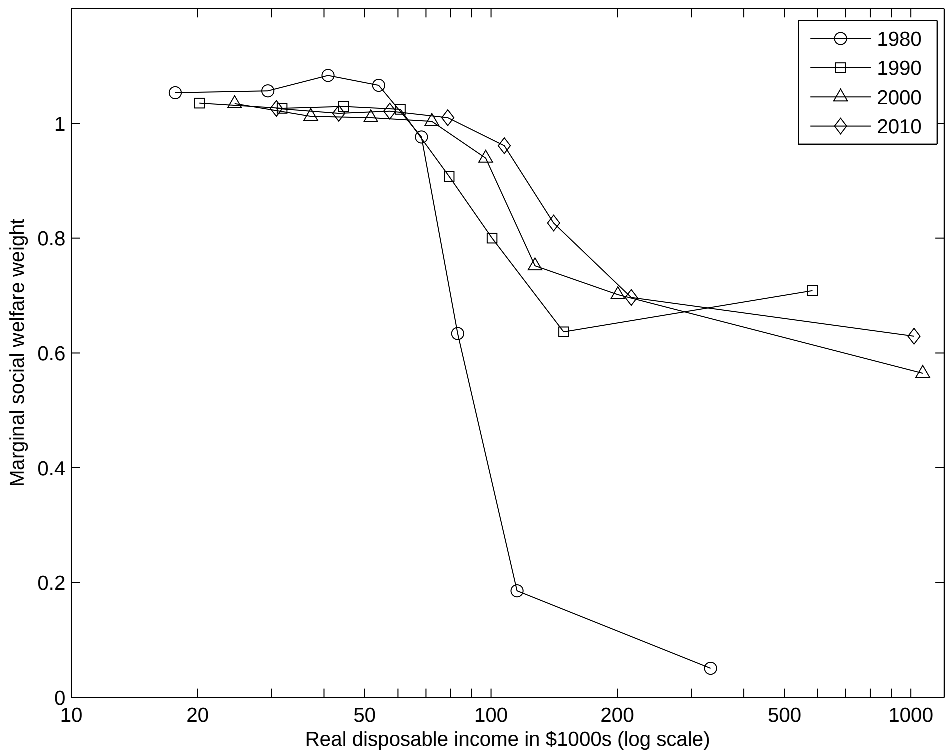


Figure 15: Average MSWWs, plotted against disposable income in 1980, 1990, 2000, and 2010, with an additional 8 percentage points added to the marginal tax rate at each income level to approximate state and local taxes.

Computing the evolution of MSWWs due solely to tax changes. The evolution of MSWWs displayed in Figure 3 is driven both by rising inequality in market incomes and changes to the progressivity of the tax code. To isolate the effect of policy changes alone, Figure 16 shows what this evolution would have looked like if market income inequality had not risen over time. This figure is constructed by scaling the market income distribution in 1980 by the change in average market incomes over time, so inequality (as measured by interquartile spreads or the Gini index) remains fixed. The schedule of MSWWs is plotted against the same vector of real disposable income as Figure 3 for comparability. As would be expected, MSWWs on high earners are somewhat lower when the effect of rising inequality is removed. Yet the qualitative resemblance between Figures 3 and 16 demonstrates the importance of tax reforms as the key driver of large changes to the implicit MSWWs—i.e., the large increase in the MSWWs on high earners from 1980 to 1990 is virtually identical in the two figures.

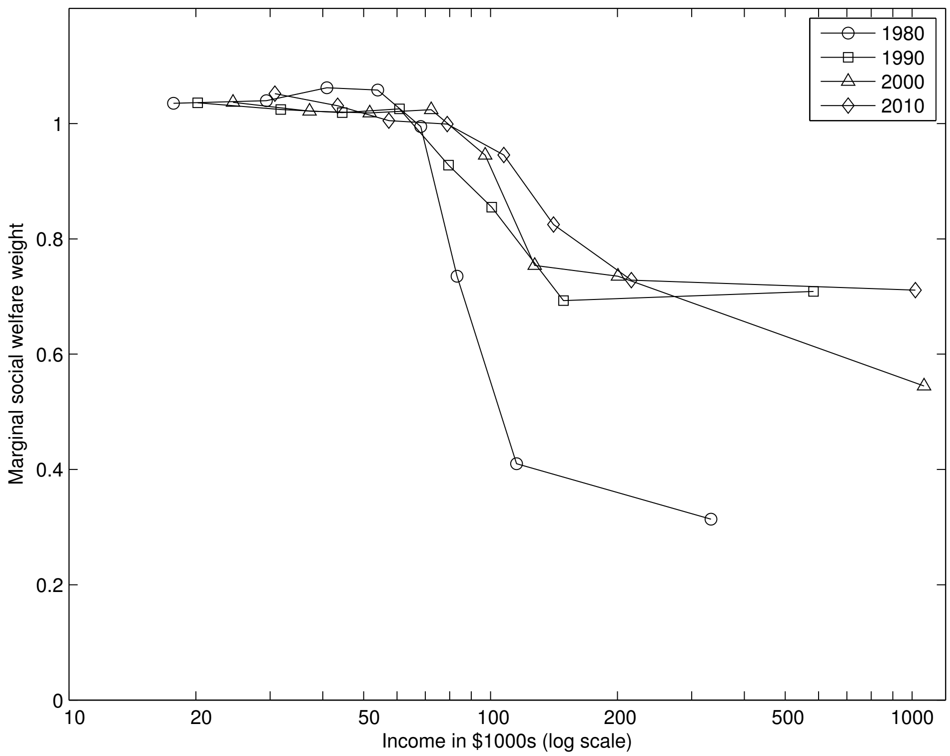


Figure 16: The evolution of MSWWs due to tax changes. This figure is identical to Figure 3, except the inequality of market income is held constant over time.

Beliefs in complementarities across skill levels "Trickle-down economics" was the pejorative term applied in the 1980s to the idea that stimulating economic activity by high-earners would benefit low-earners, as well. Stiglitz (1982) is the best-known formalization of the idea in the optimal tax literature, and Rothschild and Scheuer (2013) recently expanded on his work. The basic idea of these analyses is that workers of different skill levels are complementary in production, so that an increase in effort by high-wage earners will raise the marginal productivities, and thus wages, of low-wage earners. That general-equilibrium dynamic is absent from our analysis thus far, and it may provide an alternative explanation of our findings. That is, if Americans strongly believed in the idea of trickle down economics, they would have voted for policies much as if their perceptions of the distortionary costs of taxation were higher than conventionally assumed.

We can again look to the GSS for some (limited) evidence on this question. The GSS asked respondents in 1987 and 1996 whether they strongly agreed (5), agreed, felt neither way, disagreed, or strongly disagreed (1) with the statement: "Allowing business to make good profits is the best way to improve everyone's standard of living." The mean responses in 1987 and 1996 were 2.73 to 2.66. Though of course only suggestive, these results suggest only a moderate, and stable, belief in complementarities of the sort at work in Stiglitz (1982) over this period.

Extending the analysis to the early 20th century Figure 17 shows the evolution of high-income MSWWs g_t^* for each year of the 1979-2010 period and three fixed ETI values at or above the conventional range of empirical estimates.

Figure 17: Implied social welfare weight on the top 1% for a range of elasticities of taxable income.

We can extend the analysis in Figure 17 farther back in time. We use data from Piketty and Saez (2007) to calibrate the Pareto parameters at the top of the income distribution from 1916 to 2012. We then use the U.S. statutory marginal tax rate schedule (on earned income), the same set of ETI values from Figure 17, and the simplified formula for the top marginal tax rate from Saez (2001) to back out the implicit g_t^* over this nearly 100-year period. Figure 18 shows the results.

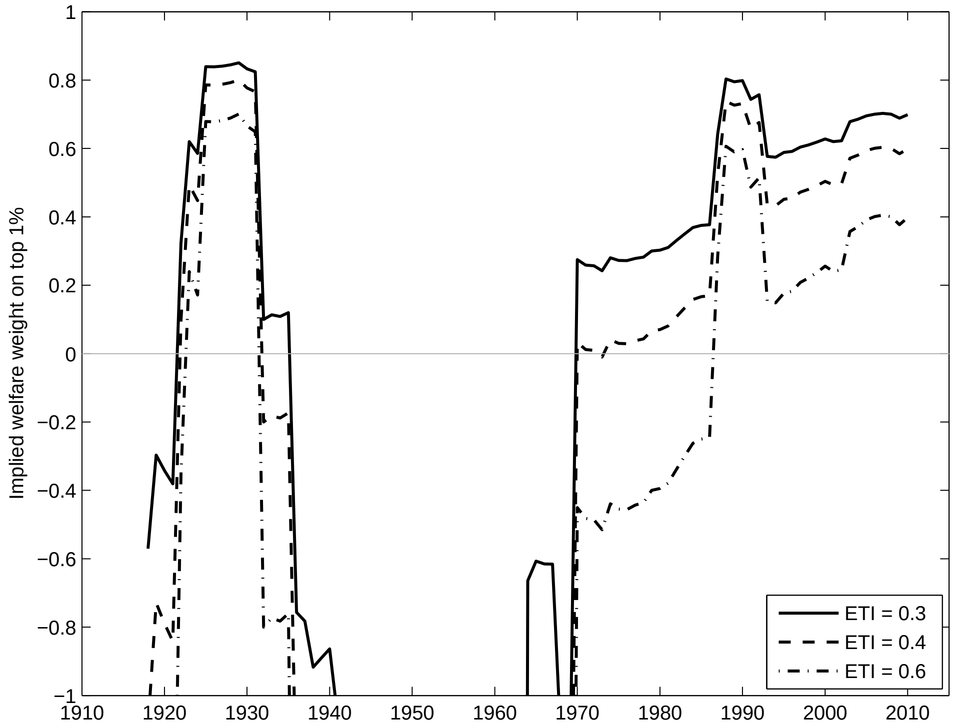


Figure 18: Implied social welfare weight on the top 1% for a range of elasticities of taxable income, for the full history of the US income tax. This figure is constructed using the highest marginal tax rate on wages and other earned income, as reported at `www.ctj.org/pdf/regcg.pdf`.

As with the now-familiar figures from Thomas Piketty and Emmanuel Saez (2003) showing the U-shaped evolution of income inequality over this time period, Figure 18 demonstrates that the recent implicit values of g_t^* are higher than any since the early 1930s.

The complementary analysis is in Figure 19, which shows the evolution of required ETIs for each year of the 1979–2010 period given four g^* values (note that the smallest of these values is the "conventional" assumption).

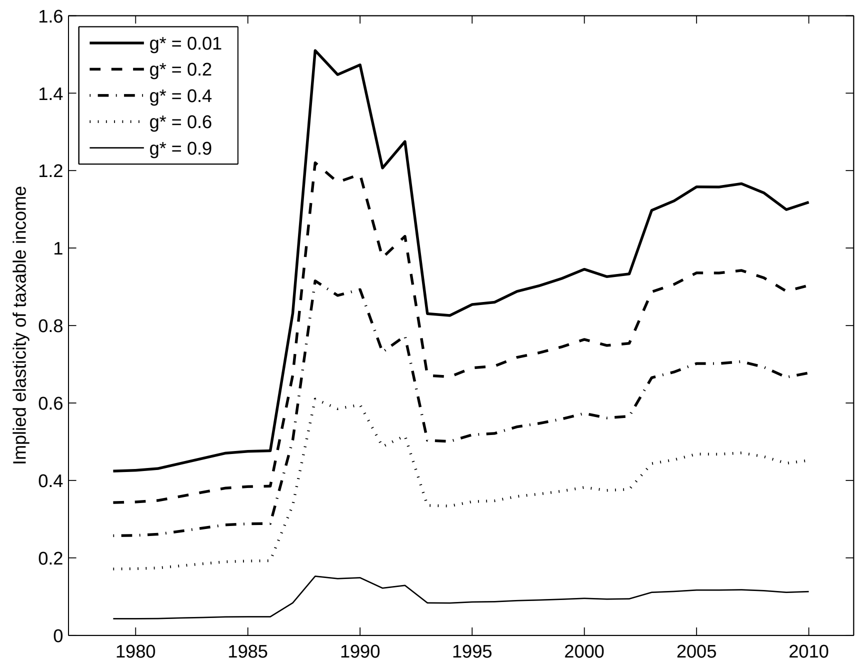


Figure 19: Implied elasticities of taxable income which would place a welfare weight on the top 1% of earners, denoted g_t^*, of 0.01 (the "conventional" case), 0.2, 0.4, 0.6, or 0.9.

Using the same approach as with the previous explanation, we can extend this analysis back over the last century. Figure 20 shows the results.

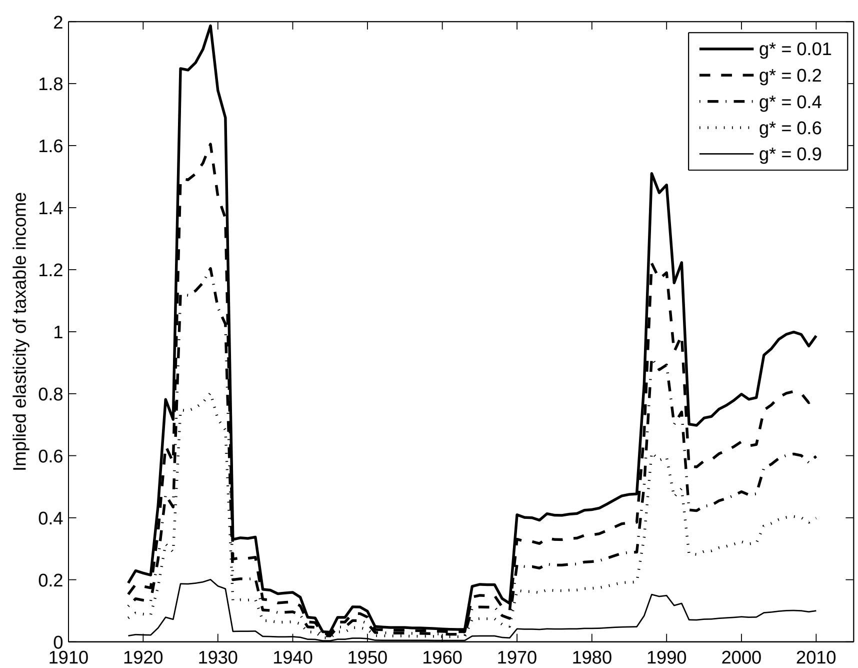


Figure 20: Implied elasticities of taxable income for various welfare weights on the top 1% for the history of US income tax. This figure is constructed using the highest marginal tax rate on wages and other earned income, as reported at `www.ctj.org/pdf/regcg.pdf`.

As this figure makes clear, the perceived ETI implied by U.S. policy for the mid-20th century was extremely low for a wide range of high-earner MSWWs.

Examination of the reforms in 1964 provides a useful illustration of the ambiguity at the heart of this paper. The most important features of the 1964 reforms, for the purposes of this paper, were its substantial reductions in high-income marginal tax rates, for example from a top rate of 91 percent to a top rate of 70 percent on incomes over $200,000. President John F. Kennedy gave an argument for the 1964 reforms that stressed the distortionary costs of high marginal tax rates:

> "Our present tax system, developed as it was, in good part, during World War II to restrain growth, exerts too heavy a drag on growth in peace time; that it siphons out of the private economy too large a share of personal and business purchasing power; that it reduces the financial incentives for personal effort, investment, and risk-taking."

Kennedy's arguments are consistent with idea that the true ETI was too high for a top marginal tax rate of 91 percent to be optimal in peacetime, while during the war it had another—unconventional—justification.At nearly the same time, Ronald Reagan, soon to be the Governor of California and then President of the United States, gave a speech supporting Barry Goldwater, the Republican nominee for President in 1964. In it, he made a very different argument for a flatter marginal tax rate structure:

> "Have we the courage and the will to face up to the immorality and discrimination of the progressive tax, and demand a return to traditional proportionate taxation? Today in our country the tax collector's share is 37 cents of every dollar earned. Freedom has never been so fragile, so close to slipping from our grasp."

Reagan's arguments are consistent with the idea that the true welfare weights on those paying the top marginal tax rate were relatively too large for a 91 percent rate to be optimal.

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