A Positive Theory of Tax Reform

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Abstract

The political impediments to reform and the forces allowing its success are studied in a model where the tax base and statutory rate are separate instruments of tax policy. The model predicts that big bang reforms—large changes in the tax code—may be easier to enact than marginal reforms. Preferences over the tax base face a tipping point where even the beneficiaries from tax exemptions can be persuaded to support reform. At such a “reform moment”, tax reform is Pareto improving. Politically feasible tax reform occurs when fiscal strain is large, but will nonetheless involve reductions in marginal tax rates. There is strategic complementary in lobbying for tax reform, resulting in multiple equilibria. Evidence from tax-base changes in a panel of OECD countries supports a number of the main predictions.

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1 Introduction

In an era of fiscal austerity, questions of tax reform have once again taken center stage. In recent U.S. debates, both political parties expressed support for reform.\(^1\) During the debt crisis in Southern Europe calls to reform the tax systems of Spain, Portugal, Italy and Greece could be heard. Tax reform has been one of the most contentious issues facing the current Indian parliament. Why has the passage of reform been so difficult? Why do inefficient tax systems persist? Are there economic or political conditions that are particularly propitious for tax reform?

This paper details a political economy theory of tax reform in a general equilibrium setting to shed light on these questions. In this theory, tax exemptions provide rents to special interests. Each exemption causes small deadweight losses, but the combination of rents accrued to numerous special interests may have larger general equilibrium effects. When total efficiency losses are small, economic actors ignore these costs and devote their energy to secure targeted tax breaks. But when these deadweight losses are large enough, the public, and even the favored special interests themselves, might be harmed significantly through the general equilibrium costs to the economy. The theory illustrates that there comes a tipping point when special interests can be persuaded to forgo their rents in favor of tax reform.

I propose a tractable model where a government meets its revenue needs through a choice of not only the tax rate, but also the tax base. In doing so, I draw on Yitzhaki (1979), Wilson (1989), and Slemrod and Kopczuk (2002). In the model, the policy maker may benefit specific groups through tax exemptions. All agents and goods are identical ex-ante and there is no economic rationale for such exemptions. A broader tax base is more efficient, as it removes a wedge between the prices of taxed- and tax-exempt goods. In political equilibrium, certain goods may nevertheless be exempt from taxation. The rents from tax exemptions are large and concentrated, while their costs are diffuse. If a powerful interest benefits from a tax preference, she will secure a tax break despite its inefficiency. This phenomenon is familiar from our understanding of special interest politics.\(^2\)

The novelty is the study of the general equilibrium implications of the

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\(^1\) Broadening the tax base was central in the tax policy platforms of both presidential candidates in 2012. See http://www.whitehouse.gov/economy/reform/tax-reform and http://www.outheissues.org/2012/mitt_romney_tax_reform.htm

\(^2\) See Grossman and Helpman (2002), for example.
inefficient policies that result. While a tax exemption increases the relative demand for a good, the resulting inefficiencies reduce aggregate demand. The model yields a simple expression that quantifies the general equilibrium losses borne directly by the very beneficiaries of tax exemptions. When inefficiencies in the tax code reach a critical point, even the beneficiaries themselves are willing to forgo their benefits in favor of tax reform: the elimination of all tax exemptions.

Interestingly, no (small) special interest would forgo its tax break in isolation. The rents from a single exemption are large, but the general equilibrium gains from its elimination are negligible. At the same time, a broad coalition of special interests may agree collectively to give up their tax breaks for tax reform. Marginal reforms are therefore politically difficult, while “big bang” reforms become feasible via a grand bargain. I study the (minimum) coalition size that would collectively forgo its tax exemptions for the enactment of tax reform. I show that the size of this coalition is decreasing in the government’s need to raise revenues. The scope for tax reform is therefore greater when the government wishes to raise more revenues, do to high levels of public debt or demand for public goods, for example.

I explore political equilibrium in a simple lobbying framework. The insights of the model are robust to a variety of collective choice frameworks, but lobbying captures succinctly the conflict between special- and general-interests, central to the politics of tax reform. Any citizen is free to lobby the government, but incurs a fixed cost to do so. Ally lobbyists bearing this cost are then represented equally in the policy maker’s objective function. I show that there are strategic complementarities in lobbying choice. The intuition for the complementarities is straightforward. The equilibrium tax base is narrower the greater is the number of lobbyists. Attaining the same revenues with a narrower base requires higher statutory tax rates on other citizens. A tax break therefore becomes more valuable giving greater incentive to lobby. As in other settings, strategic complementarities may lead to multiple equilibria. In one equilibrium, the tax base is comprehensive and citizens do not lobby for tax breaks. In the other equilibrium, lobbyists enter the political fray and secure tax breaks if public good needs are small. However, there is a critical level of public goods, above which special interests forgo their exemptions in favor of tax reform.

The model has a number of predictions on the politics of tax policy. First, tax reform is more likely when revenue needs are high. Revenue needs are modelled as an exogenous level of public goods to be financed. In practice,
revenue needs may be high due to a high burden of public debt or other factors. Using data on corporate tax legislation in a panel of OECD countries, I show in section 4 that legislation to broaden the tax base is indeed associated with high existing statutory tax rates and with high public debt, both reflections of the revenue needs of the government.

Second, there is a tipping point that triggers tax reform. When it is reached, policy changes discretely rather than gradually or on the margin. In this setting, a reform-minded policy maker would be advised to propose a large “big bang” reform that takes on numerous special interests at once, rather than gradually picking off individual interests. This provides a counterpoint to theories of gradualism in reform (e.g. Dewatripont and Roland, 1992) and much of the political economy literature of reform, where small or gradual policy changes are typically easier to enact. In the appendix, I provide a historical overview of a number of recent tax reforms in OECD countries. Many of these were large changes rather than tinkering on the margin of the tax code. The Tax Reform Act of 1986 in the United States, for example, lowered the top marginal income tax rate from 50% to 28%. As Birnbaum and Murray (1987) write:

“Congress was a slow and cumbersome institution that usually made only piecemeal, incremental changes. Tax reform proposed something very different: a radical revamping of the entire tax structure.” Kindle Loc. 504.

Third, tax reform typically involves a broadening of the tax base and a reduction in marginal tax rates. A decrease in marginal rates may seem surprising when public good needs are large. But not so if one recognizes that the change in the tax base is discrete and large in a “big bang” tax reform. This frees revenues to decrease marginal tax rates—politically necessary to compensate losers from reform. This prediction contrasts with normative theories of the tax base, where the tax base and tax rates increase in tandem. In section 4, I show empirically that base-broadening reforms are associated with cuts in statutory tax rates. Birnbaum and Murray (1987) suggest that this combination was central to the politics of tax reform in the U.S.:

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3 There is also a long tradition in public economics that assumes that the tax system can only be altered on the margin due to political constraints. See Feldstein (1976) and more recently Golosov, Tsyvinski and Werquin (2014).
“Merging the lower rates of the supply-siders with the base-broadening of the liberal tax reformers was the glue that held the 1986 tax bill together... The ability of this unholy alliance to stick together throughout an arduous process... was the key to success.” Kindle Loc. 162.

Fourth, at a reform moment of this sort, tax reform is may obtain unanimous support—even from the very special interests vying for tax breaks. The model provides conditions that lead to unanimous support for tax reform.

A large literature has studied the political shaping tax policy. Homing in on tax reform is motivated by a number of observations, which help highlight this paper’s contribution. First, the landmark tax reforms of recent decades involved changes in not only statutory tax rates, but also the tax base. Broadening the tax base was one of the main objectives of the Tax Reform Act (TRA) of 1986 in United States. Value-Added-Tax reforms in Canada and Sweden, both enacted in 1991, involved significant increases in the tax base. The 2000 corporate tax reform in Germany similarly involved a substantial broadening of the base. In existing theories of the political economy of taxation, the tax base is typically exogenous and usually comprehensive. The large normative literature building on Mirrlees (1971) has individuals each taxed at a distinct rate and it is difficult to distinguish the notion of the tax base from a continuum of statutory rates. Given the prominence of the tax base in reform proposals, a model that makes such a distinction may contribute to our understanding of the politics of tax reform.

Second, the existing literature focuses primarily on vertical discrimination in taxation. In contrast, much of the discourse surrounding tax reforms concern horizontal equity. For example, the TRA in the U.S. was explicitly designed to be neutral in its impact on vertical income distribution. This paper intentionally abstracts from questions of vertical equity and sharpens the discussion on horizontal inequities in the tax code.

Finally, the tax system changes in leaps and bounds. The tax base remains unchanged over long periods, with some tinkering with statutory rates and tax exemptions within the existing tax system. These are punctuated with occasional reforms that change the tax system more substantially. This paper explores the politics of these reform moments.

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The paper also relates to the literature on politics of economic reform.\(^5\) A common thread in this literature is the tension between particularistic interests and overall economic efficiency. This tension is present in this paper as well, but it differs in its general equilibrium setting. General equilibrium allows us to assess the individual losses and general equilibrium gains from tax reforms. This provides new insights, such as the complementarity in special interests’ lobbying incentives. It also provides a prediction that contrasts with most existing studies of the political economy of reform: the political benefit of big bang reforms.

The paper relates more generally to the large literature on the role of special interest politics, the nexus between political and economic power, and public choice mechanisms, among other explanations for “political failures” of this sort.\(^6\) Tax reform is just one instance of policy reform albeit one where we can cast light on the persistence of inefficient policy more generally. Illustrating these general points through the lens of tax policy has a number of advantages. First, the deadweight losses of inefficient tax policies are readily assessed in a familiar public finance context, as are the benefits of tax provisions targeted to special interests. Second, tax policy is a popular vehicle for targeting special interests in practice. The Congressional Budget Office (CBO, 2013) estimates that the United States Treasury forgoes over one third of potential individual income tax revenues through “tax expenditures”. This sum is of a similar magnitude to all discretionary spending in the U.S.\(^7\) While some of these lost revenues were due to evasion or difficulties in tax administration, others were lost by the very design of the tax code, likely motivated by political, not only economic, factors. Given the sums involved and the prominence that tax policy takes in political debate, it is of independent interest to understand the politics of tax expenditures.\(^8\) Third, the emphasis on tax policy relates the current study to a rich literature on the political economy of taxation and redistribution. As noted earlier, the main innovation relative to existing studies of the political economy of tax-

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\(^5\)See Acemoglu and Robinson (2000); Alesina and Drazen (1991); Fernandez and Rodríguez (1991); Jain and Mukhand (2003).

\(^6\)See Grossman and Helpman (2002), Acemoglu and Robinson (2001), and Besley and Coate (1998), respectively, as examples.

\(^7\)GAO estimates: http://www.gao.gov/key_issues/tax_expenditures/issue_summary

\(^8\)Tax expenditures are not a uniquely U.S. phenomenon. Tax expenditures in Australia and Italy are estimated at 8% of GDP, 6% in the U.K., and 4% in Spain, for example. Source: Tyson (2014).
ation is in the clear distinction between the tax base and tax rates in the politics of taxation. Political conflict over tax policy is not only on the overall size of government and the progressivity of the tax code, but also on whether tax revenues should be raised by increasing tax rates or broadening the tax base. The model presented here gives a theoretical context for such base-versus-rates debates.

The remainder of the paper is organized as follows. Section 2 describes the economic environment and derives citizens’ policy preferences. Section 3 describes the political model and political equilibrium. Section 4 provides some supportive evidence from corporate tax legislation in OECD countries. Section 5 concludes and discusses avenues for future research. Proofs are in the appendix. The appendix also provides a narrative history of recent tax reform in major economies and relates these experiences with the model’s predictions. Some further derivations alongside robustness checks and extensions can be found in the online appendix.

2 The Economy

This section outlines the economic structure of the model, how the economy responds to tax policy, and citizens’ resulting policy preferences. The economic structure builds on a normative literature of the optimal tax base: Yitzhaki (1979), Wilson (1989), and Slemrod and Kopczuk (2002). Citizens have CES preferences over the consumption of a measure-one continuum of goods varieties. Goods are taxed at a statutory tax rate $\tau$, but some goods are exempt from taxation. The measure of exempt goods is given by $1 - f$, so that $f$ can be thought of as a measure of the tax base. This gives two clear dimensions to tax policy: statutory rates and the tax base. Differential taxation of these identical goods is inefficient and in the normative literature, the policy maker trades off the cost of this inefficiency with the administrative cost of enforcing a broader tax base.

The model that follows differs by adding three general equilibrium components, each of which is essential to the discussion. First, competition in the goods market is monopolistic. This gives producers positive profits that are increasing in the demand for their variety. Producers therefore have a vested interest in securing a tax break for their variety. One could conceive of other ways to generate rents via tax exemptions, but monopolistic competition casts the problem in the familiar Dixit-Stiglitz (1977) framework.
Second, production is endogenous, using elastically-supplied labor as an input. This contrasts with the endowment economy studied in Yitzhaki (1979) and others. Endogenous output creates feedback from tax policy to aggregate demand and back to firms’ profits. A narrow tax base increases the labor wedge and induces a substitution from consumption to leisure, thus lowering output and aggregate demand. The tension between the rents provided by individual breaks and the aggregate-demand costs of a narrow tax base are central to the analysis.

Finally, while the existing literature is normative, the analysis here is positive, with policy set due to political factors. In this section, we take policy as given; the political determinants of policy are then studied in Section 3.

2.1 Model Setup

Agents and Preferences The economy consists of a government and a continuum of identical citizens of unit measure and indexed by $j \in [0,1]$. Each citizen is a worker, consumer, entrepreneur, and citizen—terms that I will use interchangeably. The citizen values streams of consumption $x^j$ and hours worked $h^j$ according to the function

$$u^j = x^j \left( h^j \right)^{1+\frac{1}{\eta}} \frac{1}{1+\eta}.$$ (1)

Citizens’ Income Each hour worked is compensated at a wage of $w$ units of the consumption good. In addition to labor income, consumer $j$ earns profits $\pi^j$ from a single firm she owns; it is one of a unit measure of firms indexed by $i \in [0,1]$. Firms’ indexes are matched to their owners’. The non-diversified ownership structure is somewhat stark, as is the assumption that all citizens derive positive profit income. As I discuss in Section 2.2, any other ownership structure can be easily accommodated in this framework.

Consumption and Intermediate Goods Each firm produces a single variety of an intermediate good. Each variety is sold at a price of $p(i)$ and let $x^j(i)$ denote consumer $j$’s demand for variety $i$. Households bundle individual varieties through a CES aggregate to give consumption $x^j$ of

$$x^j = \left[ \int_{i=0}^{1} \left( x^j(i) \right)^{\frac{\varphi-1}{\varphi}} di \right]^{\frac{\varphi}{\varphi-1}},$$ (2)
with $\varepsilon \geq 1$ giving the elasticity of substitution across varieties.

**Tax Policy** Tax structure draws on Yitzhaki (1979), Wilson (1989), and Slemrod and Kopczuk (2002). Public good needs are exogenously give as $g$ and the government must raise sufficient tax revenues to finance them.\(9\) I show in the online appendix that the model’s results are robust to an endogenous demand for public goods. Tax policy consists of two instruments: the tax rate $\tau$ and the tax base $f$. Personal income $w_{ij} + \pi_j$ is taxed at a uniform rate $\tau$. However, varieties of intermediate goods in $i \in [f, 1]$ are fully deductible from income taxation.\(10\) With $f = 1$, no goods are tax deductible and the statutory tax rate $\tau$ applies to the entire tax base. Setting $f = 0$ means that all consumer purchases are deductible and tax revenues are zero. It is therefore natural to think of a higher value of $f$ as a broader tax base.

Given that intermediate goods are identical (e.g. in their elasticity of demand), there is no economic rationale to provide a tax exemption to any specific variety. The theory of uniform commodity taxation, harking back to Ramsey (1927) suggests that a social welfare maximizer would set $f = 1$ always. Moreover, unlike the literature on the optimal tax base, I assume no administrative costs to tax enforcement.\(11\) Any deviation from a complete tax base is therefore due political, rather than economic, forces.

This tax structure is a simple way to capture realistic features of the tax code, namely that tax exemptions can be individually targeted to special interests, but also that such exemptions tend to provide a discrete, rather than a marginal, benefit to their recipients. It is not essential that deductible goods qualify for a 100% tax refund. Some of the results in this paper do rely, however, on tax deductions providing a discrete benefit. Allowing for a continuum of tax breaks would muddle the distinction between the tax base and the tax rate. In the online appendix, I allow the tax system to be determined

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9The public good is assumed to be a specific variety: $i = 1$. The government purchases this good from firm $i = 1$ at a price of 1, which I will later show to be the market price of the good in the absence of government intervention. In other words, the government does not exploit its market power to affect the public good’s price, nor can the firm exploit its position as the monopolistic provider of the public good to charge an unusually high markup. The assumption that the government purchases a specific variety is for analytical convenience, but does not affect any of the insights delivered by the model.

10Identifying tax exempt goods as those with higher $i$ indexes is for notational convenience and without loss of generality.

11Allowing for administrative costs would not alter the model’s results and would unnecessarily obfuscate the political motivations for a narrow tax base.
endogenously, with a policy maker who can set the size of exemptions freely, and show that the main insights do not rely on discrete exemptions. However, administrative factors may limit the number of existing tax brackets in practice: see Hettich and Winer (1984) for a discussion.

Modeling the tax base in this way mirrors the main “holes” in the U.S. income tax base, for example. The largest tax exemptions include mortgage interest deduction ($67 billion in fiscal year 2014) and exclusion of employer provided health insurance ($195 billion in fiscal year 2014).\textsuperscript{12} Income used for the purchase of these goods is (partially) deductible from income taxation.

**Budget Constraint and Consumer Choice** Given tax policy \( \{\tau, f\} \), the consumer’s budget constraint is given by

\[
\int_{i=0}^{1} p(i) x^j(i) \, di \leq (1 - \tau) \left( w h^j + \pi^j \right) + \tau \int_{i=f}^{1} p(i) x^j(i) \, di \tag{3}
\]

Consumer choice is then to maximize (1) through a choice of varieties \( \{x^j(i)\}_{i=0}^{1} \) and labor supply \( h^j \), subject (3).

**Consumption Bundle and Demand for Varieties** Consumer demand for individual varieties is given by

\[
x^j(i) = \left(1 - \tau(i)\right) \frac{p^c}{p(i)} \epsilon x^j, \tag{4}
\]

where \( \tau(f) \) is the statutory rate \( \tau \) for all intermediate goods in the tax base \((\forall i \in [0, f])\) and zero for all tax-exempt goods \( i \in [f, 1] \). \( p^c \) is the after-tax consumer price index

\[
p^c \equiv \left(\int_{i=0}^{1} \left[\left(1 - \tau(i)\right) p(i)\right]^{1-\epsilon} \, di\right)^{\frac{1}{1-\epsilon}}. \tag{5}
\]

**Firms** Each firm \( i \) has a technology that transforms \( h(i) \) units of labor into \( z h(i) \) units of good \( i \). Firms are identical in their productivity; firms with heterogeneous productivities are studied in the online appendix. Each firm

\textsuperscript{12}GAO estimates. See http://www.gao.gov/key_issues/tax_expenditures/issue_summary
faces a fully competitive labor market, but a monopolistically competitive (Dixit and Stiglitz, 1977) goods market. Monopolistic competition aides our analysis in two ways. First, firms’ profits are decreasing in the tax imposed on their variety, so that tax exemptions are redistributive. Second, firms’ profits are proportional to the demand for their varieties, so that firms benefit from higher aggregate demand, allowing for a general equilibrium demand externality.

Each firm hires workers at the market wage $w$ and sells its intermediate good at price $p(i)$. Profit maximization gives the standard result that prices are set at a constant markup $\mu \equiv \frac{w}{z}$ over marginal costs:

$$p(i) = \mu \frac{w}{z}.$$  

(6)

Normalizing the producer price (identical for all firms) to one, the consumer price index (5) can be written as

$$p^c = \frac{1}{1 - \hat{\tau}}.$$  

$\hat{\tau}$ is the effective tax rate defined as

$$1 - \hat{\tau} \equiv \left[ f (1 - \tau)^{\epsilon} + (1 - f) \right]^{\frac{1}{\epsilon}}.$$  

(7)

This effective tax rate is the labor wedge caused by the tax policy $\{f, \tau\}$. It is useful to anticipate at this point that raising one unit of revenues via an increase in the statutory tax rate $\tau$ will always increase the effective tax rate by more than raising the unit of revenues via an expansion of the tax base $f$. Thus increases in tax rates are always less efficient than broadening the tax base.

Finally, Firms’ profits are directly proportional to demand for their varieties: $\pi(i) = \frac{x(i)}{\epsilon}$.

**Government** The government collects tax revenues

$$\rho = \tau \left( w h + \pi - \int_{i=f}^{1} p(i) x(i) \, di \right),$$  

(8)

which are revenues from income taxation net of deductions. The government uses these revenues to supply the public good, so that $\rho \geq g$. 

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Labor Supply and Consumption  Workers’ first order condition for the supply of labor gives

\[ h = h^j = \left( \frac{\eta z (1 - \hat{\tau})}{\mu} \right)^{\eta}. \] (9)

Consumer \( j \)’s consumption can now be written as

\[ x^j = (1 - \hat{\tau}) (w h^j + \pi (j)). \] (10)

2.2 Indirect Utility

The utility of citizen \( j \) is given by (1). \( h^j \) is determined by (9) and \( x^j \) is given by (10), so that the indirect utility of a citizen \( j < 1 \) can be described by

\[ u^j = \eta \left( \frac{z (1 - \hat{\tau})}{\mu} \right)^{\eta+1} \left( \frac{1}{1 + \eta} + (\mu - 1) \frac{(1 - \tau (j))^{\bar{\varepsilon}}}{(1 - \hat{\tau})^{\bar{\varepsilon} - 1}} \right). \] (11)

This indirect utility function can be separated into two easily-interpretable terms. The first reflects the utility of the citizen in her role as worker; the second, in her role as entrepreneur. Absent wealth effects these terms are additively separable. The model can thus be easily adapted to other assumptions regarding the distribution of ownership, monopoly rents, and income in society. The assumption that every citizen owns a firm can be easily altered, as can the assumption that workers do not share in the monopoly rents of their employers.

The first term,

\[ u^W = \frac{\eta}{1 + \eta} \left( \frac{z (1 - \hat{\tau})}{\mu} \right)^{\eta+1} \]

is the utility of citizen \( j \) as a worker. It gives the utility of consumption from labor income net of the dis-utility of suppling this labor: \( w h - \frac{h^{1+\frac{1}{1+\eta}}}{1+\eta} \). It is immediately apparent that all workers derive the same utility. In addition,\footnote{Although \( \mu \) is a function of \( \varepsilon \), I treat the two as separate parameters in what follows. This is without loss of generality and in fact more general, as it leaves leaves \( \mu = \frac{\varepsilon}{\varepsilon - 1} \) as a special case. De-linking markups from the elasticity of substitution is readily obtained in a model with a two-tiered CES with the markup deriving from the elasticity of substitutions between closely-substitutable varieties within industries whose goods are substitutable with an elasticity of \( \varepsilon \).}
the effects of tax policy on this component of utility is entirely captured by
the effective tax rate \( \hat{\tau} \), given in (7), and is therefore decreasing in both the
tax rate \( \tau \) and the breadth of the tax base \( f \). As consumers, all citizens wish
fewer goods to be taxed and for taxed goods to be taxed at a lower rate. We
will see, however, that raising a unit of revenues by increasing the statutory
tax rate \( \tau \) increases the effective tax rate \( \hat{\tau} \) by more than raising revenues
through a broadening of the tax base \( f \). Workers therefore always prefer the
broadest possible tax base.

The second term

\[
\pi (j) = \eta^n (\mu - 1) \left( \frac{z (1 - \hat{\tau})}{\mu} \right)^{\eta+1} \frac{(1 - \tau (j))^{\varepsilon}}{(1 - \hat{\tau})^{\varepsilon-1}}
\]

(12)
gives profits or the utility of citizen \( j \) in her role as entrepreneur. Profits
from the total sales of variety \( j \) are affected by both aggregate and relative
demand. The term labeled as aggregate demand is familiar from the utility
of workers, as it is proportional to total consumption. Aggregate demand is
decreasing in the effective tax rate, with an elasticity related to the elasticity
of labor supply.

The term \( \frac{1-\tau}{1-\hat{\tau}} \) is the relative price of good \( j \). Thus \( \left( \frac{1-\tau(j)}{1-\hat{\tau}} \right)^{\varepsilon} \) is the
relative demand for good \( j \). This is the only term in citizens’ preferences
where the statutory tax rate and the tax base appear separately from the
effective tax rate. A higher statutory tax rate \( \tau \) increases the relative price of
and lowers the relative demand for goods that are in the tax base. It lowers
the profits of “taxed” firms; those that do not have a tax exemption.\(^{14}\) The
tax base \( f \) determines whether a specific product is \( j \geq f \) or is not \( j < f \)
sheltered from taxation.

These two terms highlight how firms benefit from tax exemptions, but also
bear a cost, through general equilibrium channels. The value of securing an
individual tax benefit can be gleaned from a comparison between the profits
of a firm directly below, with those of one directly above, the threshold of
\( j = f \). Relative demand for the product of the “exempt” firm—one indexed
\( j \geq f \)–is higher by a discrete margin. Accordingly, this firm’s profits are
higher by a discrete amount. Entrepreneurs have a strong incentive to secure
a tax exemption.

\(^{14}\)Profits of all firms are taxed. I use the term “taxed firms” as shorthand for firms
whose goods are not tax deductible.
For a given revenue need, the effective tax rate is minimized, however, by relying on the broadest possible tax base. Aggregate demand is therefore harmed by a narrow tax base. The aggregate demand term in (12) demonstrates that entrepreneurs internalize, to some extent, the costs of their tax exemption demands. However, the aggregate demand cost of any single tax exemption is infinitesimal, while the benefits to its recipient are not. This highlights that no firm has the interest to unilaterally forgo its own tax benefit. The aggregate demand channel does leave scope, however, for a group of firms to benefit from collectively forgoing their tax exemptions.

Consumers and taxed firms are always harmed by taxation. In contrast, exempt firms may benefit from a higher effective tax rate. A higher effective tax rate decreases aggregate demand, but also increases the average price level, without altering exempt goods’ prices. A higher $\hat{\tau}$ thus increases the relative demand for exempt goods. The aggregate demand cost of taxation outweighs its relative demand benefit if and only if $\eta + 1 > \varepsilon - 1$. More generally, citizens attitude to taxation, before considering the government’s budget constraint, can be summarized in the following Lemma.

**Lemma 1** All citizens prefer a lower tax rate and a narrower base if

$$(1 - \hat{\tau})^{\varepsilon - 1} > (\mu - 1) (\varepsilon - \eta - 2).$$

**Proof.** Appendix A. ■

The lemma ranks utilities, not policy preferences in general, which would incorporate the trade-off between the need to raise public revenues and the costs of taxation. Lemma 1 shows, however, that even in the absence of greater revenue needs, tax-sheltered firms may prefer higher effective tax rates. This may occur only if $\varepsilon - 1 > \eta + 1$, i.e. if relative demand dominates aggregate demand in determining the profits of tax-sheltered firms.

The proposition refers to “taxed firms” and “sheltered firms”, but keep in mind that the tax status of any individual product is endogenous, and depends on the breadth of the tax base $f$. Thus a specific firm may prefer a broader tax base conditional on remaining sheltered, as specified in Proposition 1, but not if tax base were broadened to include the firm’s own product.

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15This echos the result in Auerbach (1985) that the relative magnitudes of own- and cross-elasticities are critical in determining the excess burden of taxation.
The possibility that tax-sheltered firms may prefer higher levels of taxation may have some interesting implications, but these go beyond the scope of this paper and needlessly complicates analysis. In what follows, I therefore restrict attention to parameter values such that all citizens, including those that are sheltered from taxation, dislike higher taxes. Formally, I assume (13) holds. Let us define this region of the state space as one where citizens are tax averse and maintain this assumption throughout the remainder of the analysis.\textsuperscript{16}

### 2.3 Policy Preferences

**Revenues** Preferences over policy must take the government’s budget constraint into account. The logarithm of tax revenues $\rho(\tau, f)$ in (8) is given by

$$
\log(\rho(\tau, f)) = \log \tau + \log f + \eta \log (1 - \hat{\tau}) + (\varepsilon - 1) \log \left( \frac{1 - \tau}{1 - \hat{\tau}} \right) + \zeta(z, \eta, \varepsilon),
$$

where $\zeta(z, \eta, \varepsilon)$ is a term that does not contain the tax instruments $f$ and $\tau$. An increase in either the tax base or the tax rate brings a direct proportional increase in tax revenues, as captured by the first two terms in (14). The remaining terms reflect changes in taxable income due to household incentives. First, an increase in the effective tax rate decreases revenues proportionally to the elasticity of labor supply: the standard disincentive effect of labor taxation. But it is the effective rather than the statutory tax rate that determines the labor wedge.

\textsuperscript{16}Citizens disliking taxes is appealing a-priori, but also holds for realistic parametrizations. To see what it would take to violate (13), let us set $\eta$ to the lower-end of its estimated range at $\eta = 0.3$, where (13) is less likely to hold. The parameter $\varepsilon$ is the elasticity of substitution between varieties of goods. In our case, the relevant elasticity is that between taxed and tax-exempt goods. While some differentiated taxation exists between narrowly defined products, the more relevant elasticity would appear to be between broader categories, such as food items vs. housing vs. automobiles. I therefore set $\varepsilon = 3$, following Broda and Weinstein (2006). With these parameters, the effective tax rate $\hat{\tau}$ would need to exceed 41% to violate (13). To put this in further perspective, with a tax base of $f = 80$%—almost certainly an overestimate for the U.S., based on CBO estimates (CBO, 2013)—this implies average statutory tax rates $\tau$ exceeding 60%. This tax rate is on the higher bound of those observed across the world, and moreover exceeds the peak of the Laffer curve, given the chosen parameter values and the assumed tax base.
Tax revenues are further affected by revenue efficiency, captured by the term \( \frac{1}{1-\tau} \): the ratio of the statutory and the effective net-of-tax rates. Tax efficiency is decreasing in the tax rate, as a higher rate on the existing tax base incentivizes substitution into tax-free goods. Higher statutory tax rates therefore introduce a second distortion: substitution from taxable to non-taxable good, which lowers tax revenues. Revenue efficiency is increasing in the tax base, which reduces the range of tax-sheltered products, making tax avoidance via substitution into tax-sheltered goods more costly.

Figure 1 plots the government’s budget constraint for a number of \( g \) values. Each curve plots in \( \{f, \tau\} \) space a set of tax base and rate combinations that provide the same revenues. The curves are downward sloping as broadening the base allows the government to decrease statutory rates without losing revenues. These equi-revenue curves are increasing in the revenues they generate as we move from the bottom left to the upper right corner of the figure. Increasing revenues requires some combination of a broader tax base and a higher tax rate.

**Policy Preferences of Citizen \( j \)** We can now solve for the policy preferences of a given citizen given an exogenously-determined need for revenues \( g \). Obviously, the citizen prefers the good he produces to be tax exempt. Let us therefore take the tax status of the good produced by citizen \( j \)’s firm as given and ask how the citizen wishes to raise tax revenues from the remainder of the tax base. The preferred policy of citizen \( j \) is given by

\[
\max_{\tau, f} u^j \quad \text{s.t.} \quad \rho(\tau, f) \geq g.
\]  

(15)

An interior policy choice satisfies the optimality condition:

\[
MCPF^T(j) = MCPF_f(j),
\]

(16)

\(^{17}\)In this and all subsequent figures, the following parameter values are used. The Frisch elasticity of labor supply is set at \( \eta = 0.5 \), an elasticity in the neighborhood of recent studies using microeconomic data. The elasticity of substitution across varieties is set to \( \varepsilon = 2 \), following Broad and Weinstein (). The relevant elasticity is that between taxable and tax exempt goods, which are typically in broad product classifications such as healthcare, housing or basic foodstuffs. The markup is set to \( \mu = 1.1 \), as is common in the macroeconomics literature, e.g. All results hold for any parameter values. The chosen values—while empirically relevant—are primarily for graphical convenience.
where
\[ MCPF^\tau (j) \equiv -\frac{\partial u^j}{\partial \tau} / \frac{\partial \rho}{\partial \tau} \quad \text{and} \quad MCPF^f (j) \equiv -\frac{\partial u^j}{\partial f^f} / \frac{\partial \rho}{\partial f^f}, \]
are the marginal costs of public funds when a unit of tax revenues is raised by increasing the tax rate and broadening the tax base, respectively. This optimality condition is intuitive: the citizen wants both policy instruments to be used up to the point that the private marginal costs of raising an additional unit of revenues using the instruments are equalized.

However, as the following proposition states, the solution to the maximization problem is always a corner solution at \( f = 1 \). All citizens prefer raising revenues by broadening the base than by increasing tax rates as long as this does not affect their own tax status. It is obviously assumed that the value of \( g \) is feasible, i.e. that there exists a tax policy \( \{f, \tau\} \) that can raise sufficient revenues to finance government purchases. Citizens are identical, except for the tax status of the good they produce. We use \( E \) to denote any citizen producing a tax-exempt good and \( T \) to denote any citizen whose product is in the tax base.

**Proposition 2** All citizens prefer raising taxes by broadening the base rather than increasing rates, keeping their own tax status constant: 
\[ MCPF^\tau (j) > MCPF^f (j), \quad \text{for any} \quad j \in \{E, T\} \quad \text{and any} \quad \{f, \tau\}. \quad f = 1 \quad \text{is the preferred policy of all citizens, keeping their own tax status constant.} \]

**Proof.** Appendix A. ■

This implies directly that a social welfare planner—putting an equal and infinitessimal weight on the discrete tax preferences of each citizen—would always set \( f = 1 \).

The intuition for this proposition is straightforward. There are two implications of a broader tax base. First, revenues are with a broader tax base and a lower tax rate, i.e we shift down and to the right along an equi-revenue curve in Figure 1. This affects all citizens positively through a decrease in the effective tax rate \( \hat{\tau} \). A broader base brings the statutory rate down and thus decreases the wedge between the taxes on taxed and exempt goods. The uniform commodity taxation result implies that a broader base is therefore less costly, reflected in a lower value of \( \hat{\tau} \).

Second, individual tax exemptions are eliminated. This factor is irrelevant for a citizen whose tax status remains unchanged. This all citizens unambiguously prefer the broadest possible tax base.
Obviously, it is impossible to have a complete tax base of $f = 1$ without eliminating the tax exemption of individual citizens. If a citizen could set policy in a dictatorial way, she would choose $f \equiv 1$ while maintaining a tax exemption for herself. This tension between a desire for a broad tax base on one hand and for individual exemptions on the other, are central to the politics of tax reform.\footnote{I must credit Senator Russel Long for having stated this proposition much more eloquently—if less rigorously—when he noted that the political ramifications of the tax reform debate amounted to “Don’t tax you, don’t tax me, tax that fellow behind the tree!” (Cited in Mann, 2003 pp. 333).}

This tension is illustrated in Figure 2, which once again plots equi-revenue curves. Each point along a given curve raises the same amount of revenues. The x-axis shows values of the tax base $f$, but keep in mind that a broader tax base gives a lower statutory tax rate, as per Figure 1. The y-axis gives the utility obtained by a citizen facing the implied tax policy. The dashed line shows the utility of an exempt citizen while the solid line shows the utility of a taxed citizen. Looking at the utility function in (11), it should come as no surprise that exempt citizens obtain discretely higher utility. Proposition 2 states that the these two curves are always upward sloping: citizens prefer the broadest possible base. It follows that every citizen’s ideal policy is given at the right-most X marker: Set the broadest possible tax base, while retaining her own tax exemption.

The Value of a Tax Exemption We now turn to a result that will be central in the politics of tax reform, studied in the following section. Namely, a citizen’s willingness to pay for a tax exemption is decreasing in the tax base. This can be seen graphically in Figure 2, where the willingness to pay for a tax exemption at a tax base $f$ is the distance between the utility of the exempt (dotted curve) and the utility of the taxed (solid curve). This gap narrows as one moves from left to right in the figure, meaning that the value of a tax break is decreasing in the tax base. This may not be entirely visually obvious from the figure, but is a general feature of the model, as described in the following proposition.

**Proposition 3** The individual value of a tax exemption is

1) Decreasing in the tax base $f$
2) Increasing in revenue needs $g$
Figure 1: Budget Curves

Figure 2: Utility of Taxed and Exempt citizens
Proof. Appendix A.

The proposition also states that a citizen’s willingness to pay for a tax break is increasing in required public good funding \( g \). This can be seen in figure 2, which shows a similar comparison between the utility of taxed- and exempt-citizens for several values of \( g \). The curves further to the bottom of the figure reflect higher values of public expenditure. As can be seen, the gap between the utility of the exempt and the taxed is larger for curves representing higher public expenditure, so that citizens’ willingness to pay for a tax exemption are increasing in \( g \).

The intuition for these results is straightforward. For a given amount of revenues, a broader tax base allows a decrease in statutory tax rates \( \tau \). The value of a tax exemption is proportional to the statutory tax rate, as can be seen in (11). The value of a tax exemption is therefore decreasing in the tax base.\(^{19}\)

Similarly, for a given tax base, an increase in \( g \) necessitates an increase in the statutory tax rate \( \tau \). This increases the relative cost of being in the tax base and thus increases the value of a tax exemption.

A corollary of Proposition 3 is that there are strategic complementarities in willingness to pay for tax exemptions. The larger is the existing number of tax exemptions, the narrower is the tax base. A narrower tax base increases citizens’ willingness to pay for exemptions. The more active are others in vying for tax breaks, the larger is the incentive of each citizen to seek one. In the following section, we will see how these strategic complementarities lead to multiple equilibria in the extent of lobbying activity for tax breaks.

The Reform Tipping Point \( f^R \). Citizens prefer the broadest possible tax base on one hand, but prefer to retain their own exemptions, on the other. Obviously, these two objectives are at odds with each other. We now ask when the desire for a broader tax base outweigh the parochial interest for an individual tax break. A tax exemption provides a discrete gain for its beneficiary, while the gains from its elimination are infinitesimal. There is no point at which a citizen would unilaterally forgo a tax exemption. However, when inefficiencies in the tax code reach a critical point, beneficiaries from tax breaks are willing to forgo their exemptions in favor of tax reform: the elimination of all tax exemptions. This is illustrated in Figure 2 with

\(^{19}\) The broader tax base also reduces the effective tax rate \( \tilde{\tau} \), which further amplifies this effect under the tax-aversion assumption.
the marker labeled $f^R$. $f^R$ is the tipping point for reform. At a tax base narrower than $f^R$ ($f < f^R$), exempt exempt citizens are strictly better off by reforming the tax system: eliminating all tax exemptions. Thus a tax base narrower than $f^R$ provides an opportunity to reform the tax system in a Pareto-improving way. All exempt citizens are made better off by following the path along the right-pointing arrow and all taxed citizens are naturally better off as well.

The value of tax exemptions increase roughly linearly as tax rates increase, while the resulting deadweight losses are convex in the rate. This provides the intuition for the existence of a critical tax base $f^R$, below which special interests are willing to reform the system. This can be seen in figure 11, where utility is concave in the tax base, while the value of a tax exemption—the gap between the two curves—changes little with $f$, in comparison.

The following proposition states that existence of a critical tax base $f^R$ is a more general result: it exists for any parameter values.

**Proposition 4** For any feasible revenue need $g > 0$, there is a cutoff tax base $f^R \in (0, 1)$ so that exempt citizens prefer tax reform of $f = 1$ to another tax base $f$, if and only if $f < f^R$.

**Proof.** Appendix A. ■

There are two separate factors that might determine the reform-triggering tax base $f^R$: feasibility and preferences. Which of the two is binding depends on parameter values. First, the revenue need $g$ might exhaust the government’s fiscal capacity at the tax base of $f = f^R$. That is, revenues of $g$ require taxing at the revenue-maximizing tax rate at the this tax base. As revenues at this point are increasing in $f$, no policy $f < f^R$ is feasible. Exempt citizens are therefore forced to choose a tax base that is broader than $f^R$.

Second, and more interestingly, there is a critical tax base at which exempt citizens are exactly indifferent between tax reform and their own tax exemptions, as in Figure 2. The exempt strictly prefer tax reform if $f < f^R$ and strictly prefer a tax base of $f$ for all $f > f^R$.

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Note that tax reform at $f = 1$ is Pareto-improving relative to a policy $f < f^R$, but not Pareto optimal. At $f = 1$, any citizen can be made better off with a tax exemption. No Pareto-optimal policy exists.
Revenues and Tax Reform  The tipping point for reform $f^R$, plays an important role in the politics of tax reform. It is therefore interesting to explore what determines its value. Exempt households are more willing to forgo their tax exemptions when the resulting deadweight losses are large. We might therefore expect factors that increase the cost of taxing with a narrow base to increase the value of $f^R$. A higher value of $f^R$, in turn, means that reform is more likely as special interests can be persuaded to forgo their exemptions at a larger range of tax bases.

Two critical elasticities are naturally $\eta$ and $\varepsilon$: the Frisch elasticity of labor supply and the elasticity of substitution across varieties, respectively. Higher elasticities make it easier to evade taxation by substituting consumption from taxed to exempt goods or by substituting consumption with leisure. This requires higher statutory tax rates at any given narrow tax base, increasing the inefficiency of taxing at a narrow base. All together this reduces the number of tax exemptions that are sustainable before their value exceeds their efficiency costs.

But structural elasticities are assumed to be time-invariant so that they cannot be catalysts for reform in and of themselves. The value of $g$—desired public spending—fluctuates significantly over time, so that $g$ is a more realistic driver of tax reform. It seems plausible that support for tax reform increases with the revenue needs of the government. Raising higher revenues on a narrow base may be more difficult and might require more distortionary taxation.

This is precisely what we see in figure 3, which shows the utility of taxed and exempt citizens—as in figure 2—but now for a number of values of $g$. As before, the tax base is on the horizontal axis and solid lines give the utility of taxed citizens and dashed lines give the utility of exempt. The gap between the two curves is the value of a tax exemption. Each pair of curves corresponds to specific value of $g$, with higher values of $g$ lower in the figure. Public goods serve no purpose in this model, so that more public goods simply imply higher taxation. As before, the value of $f^R$ is represented with an X: this is the tax base at which the utility of the exempt is equal to the utility of the taxed under a reform of $f = 1$. As can be seen in the figure, $f^R$ is increasing in $g$.

The intuition for this result is as follows. Higher public goods require higher taxation and therefore higher statutory tax rates. On one hand, this increases the value of a tax exemption, as stated in proposition 3 and can be seen in figure 3 by the increasing gap between the dashed and solid lines.
Figure 3: Utility and $f^R$ for a number of $g$ values

as $g$ increases. All else equal, this reduces the value of $f^R$ as it increases the private value of a tax exemption. On the other hand, a higher value of public good needs increases the statutory rate required at narrow bases even further, thus amplifying the inefficiency of taxing with a narrow tax base. This can be seen by the steeper slope of the utility curves as $g$ increase. All else equal, this would give $f^R$ a higher value. $g$ is increasing in $f^R$ because the latter force outweighs the former. This is because the value of a tax exemption increases roughly linearly in $g$ while the deadweight losses from taxation at narrow bases increase in a convex manner.

The following proposition states formalizes these intuition. It states that $f^R$ is increasing in $g$ for a sufficiently high value of $g$.

**Proposition 5** If public good needs $g$ are sufficiently high, the cutoff tax base for reform $f^R$ is increasing in $g$.

**Proof.** Appendix A. ■

The proposition gives a result for high values of $g$, meaning that we can say with confidence that high (enough) values of $g$ will lead to to higher
values of $f^R$. As we will see in the following section, this implies that high levels of $g$ lead to a higher probability that tax reform is enacted.

The result that $f^R$ is increasing in $g$ appears to be more general than stated in proposition 5. Computational analysis shows that $f^R$ is increasing in $g$ for the entire range of feasible values of the public good and for a broad range of parameter values. In fact, I was unable to find parameters for which $f^R$ was not increasing in public goods. This is illustrated in figure 4 that shows the cutoff tax base $f^R$ as a function of public goods $g$ for a number of parameter values. The horizontal axis gives values of $g$, while the vertical axis gives the corresponding cutoff tax base $f^R$ that makes Pareto-improving reform feasible. The solid line gives parameter values that correspond to the previous figures ($\varepsilon = 2$ and $\eta = 0.5$). The line marked with circles shows a lower value of the elasticity of substitution across varieties ($\varepsilon = 1$: the Cobb Douglass case). As suggested earlier, $f^R$ is increasing in elasticities, so that this lower elasticity of substitution shifts the curve downwards. The line marked with $x$ gives a higher Frisch elasticity of labor supply ($\eta = 1$), leading to higher values of $f^R$, as mentioned above. Finally, the line marked with squares decreases the markup (to $\mu = 1.05$ from the benchmark value of $\mu = 1.1$). Citizens benefit from tax exemptions through higher profits, which are leveraged by the size of markups. A lower markup decreases the private value of a tax break relative to the efficiency losses caused by exemptions. We’d therefore expect $f^R$ to be decreasing in the markup $\mu$, as is indeed the case. In all parameter configurations–and a large range of other parameter values–$f^R$ is increasing in $g$.

**Big Bang vs. Piecemeal Reform** The political economy of reform was an active research agenda in the 1990s, largely in the context of economies transitioning from central planning to market-based systems. Should economies eliminate the rents to entrenched interests in one fell swoop, or is a more gradual approach desirable? Dewatripont and Roland (1992) ask what a reform-minded leader ought to do when faced with special interests–workers–that must be compensated to be induced to exit an industry requiring restructuring. This is obviously a very different context from the one studied here and they conclude that gradualism is preferable due to adverse selection concerns. Gradual reform allows the government to screen workers for the value they place on remaining in the existing industry and thus may reduce the total compensation required.
A different conclusion arises from this general equilibrium model of tax reform. Looking again at figure 2, imagine that current policy is with a tax base of $f = f^R$ (or any value of $f < f^R$). A reform-minded leader wishing to maximize general welfare wants to eliminate all special provisions in the tax code and set $f = 1$. Now consider the merits of gradualism or more ambitious reform in this context. At the “big bang” extreme, the reformer removes all tax exemptions at once. This is represented by the rightward-pointing arrow in figure 2. By the definition of $f^R$, special interests are no worse off under reform than under the status quo; reform is in fact Pareto improving. Special interests are compensated directly by the general equilibrium benefits from reform and there are no losers from reform in need of compensation.

At the gradualist extreme, the reformer could eliminate one tax exemption at a time. The reformer selects one special interest and removes its provision. Compensating this special interest is costly, with the cost represented by the downward-pointing arrow in figure 2. This is the utility loss to the special interest when its tax exemption is eliminated. If the policy maker proceeds to remove all tax exemptions one at a time while compensating losers sequentially, the total cost of reform would be the area between the
two curves in figure 2 to the right of $f = f^R$. This is obviously larger than the zero cost incurred under a big bang reform. Of course, by the definition of the reform tipping point $f^R$, all special interests come out of this reform no worse than they were in the status quo ante regardless of the degree of gradualism. But if the policy maker cannot commit to follow through with this gradual reform, special interests may nevertheless demand compensation along a gradual reform path.

Central to this result is the general equilibrium nature of this framework and its implications for Pareto-improving reform outlined in proposition 4. One typically thinks of reform as being welfare increasing. It is the distributional consequences that stands in the way of reform, with losers utilizing some form of political power to block its enactment. In this section we’ve studied the distributional consequences of tax exemptions and found conditions where tax reform is Pareto improving. Under these conditions, there are no longer losers from reform. By setting the agenda appropriately as a choice between a large “big bang” change and the status quo, a reform-minded politician may be able to obtain broad support for reform without needing to compensate losers.

Naturally, the exact details of the policy process will be crucial in determining how the agenda is set and whether reform is feasible. A study of the politics is the subject of the following section.

3 Politics

We now turn to policy determination and consider political forces preventing or driving tax reform. The economic setting of the previous section and its resulting payoffs call attention to the conflict between general and special interests. In addition, lobbying appears to have played an important role the political history of tax reform; Birnbaum and Murray (1987) give a blow-by-blow history of the role of lobbies in resisting and then accepting the 1986 TRA. A model of lobbying is therefore a natural setting to explore the politics of this conflict. A lobbying model also highlights the power of special interests to secure tax exemptions and as such pits the odds against reform. It underscores the tipping point where even the special interests show restraint in vying for exemptions. The lobbying model is admittedly and intentionally simple, but one that captures political insights that would emerge in more involved settings. I discuss the importance of each simplifying assumption in
detail and show results from a number of other political frameworks (median voter, probabilistic voting, legislative politics) in the online appendix.

The most general result emerging from this analysis is that high values of $f^R$ lead to tax reform. As suggested in proposition 5, this high value of $f^R$ could be triggered by high public good needs. There is however a discontinuity, with less political prospects for tax reform when $f^R$ is below some critical value, and far greater prospects once this critical value is crossed. This result holds in a simple Downsian median voting model, with reform occurring when $f^R$ exceeds $\frac{1}{2}$, i.e. the median voter can be persuaded to reform. It also holds in a legislative model, where tax reform occurs when $f^R$ exceeds one minus the measure of the minimum winning coalition. (These results are available in the online appendix.) In what follows, reform occurs when $f^R$ exceeds one minus the measure of entering lobbyists, in a model with endogenous entry into lobbying.

**Setup** The lobbying game proceeds in three stages. In the first stage, the value $g$ of public goods is still unknown. At a later stage, $g$ will be drawn randomly from a probability distribution function $\gamma(g)$. The support of $\gamma(g)$ obviously includes only feasible values of $g$, i.e. public good levels that can be financed if the tax base is $f = 1$. With this information in mind, all citizens decide simultaneously whether to lobby. If citizen $j$ chooses to lobby, she faces a fixed cost of $\phi_j$, measured in units of consumption. For the sake of exposition, it will be assumed that this cost is the same for all citizens $\phi_j = \phi \forall j$, but results are robust to any distribution of fixed costs across citizens. One can think of this cost as a monetary “pay to play” fee, a minimal lobbying effort required to gain access to politicians, or a fixed cost to special-interest-group organization. For the time being, imagine that the fixed cost is pure waste rather than a transfer to politicians. I later consider results when the fixed cost is a price set by a politician. Let $L$ denote the measure of citizens who have chosen to lobby.

In the second stage, public good needs $g$ are revealed. A policy maker chooses a feasible policy $\{\tau, f\}$ and allocates tax exemptions to a measure $1 - f$ of goods. Policy must satisfy the government’s budget constraint $\rho = g$ and is set to maximize the aggregate utility of the $L$ citizens who have chosen to lobby. The policy maker puts equal weight on the utility each lobbying citizen and zero weight on the preferences of non-lobbyists. That is, the policy maker chooses a feasible policy that maximizes the joint utility of all
lobbyists. The government must set the same policy for all lobbyists and cannot discriminate among them. Citizens who have borne the fixed cost of lobbying are “at the table” of the policy discussion, while others’ voices are not heard. If no citizens lobby, the policy maker chooses a policy that maximizes social welfare (leading to a default policy of $f = 1$).

In the third stage, policy is implemented and citizens choose consumption baskets and labor supply; firms choose production levels and hire workers to maximize profits. Citizens realize their payoffs at this stage.

**Policy Determination Given Lobby Size** The model is solved via backward induction. In the third stage, citizens face policy $\{f, \tau\}$. A measure $f$ of goods is taxed and $1-f$ are exempt. The payoffs of taxed and exempt citizens are given through (11) and were discussed extensively in the previous section.

Entering the second stage, public good demand $g$ is observed. The policy maker maximizes the joint utility of the measure $L$ of lobbyists subject to the government’s budget constraint. Given that the policy maker may not discriminate among lobbyists, the government can either exempt the entire lobbying coalition and set $f = 1 - L$ or exempt no one and set $f = 1$.

It follows directly from proposition 4 that the policy maker chooses to exempt the coalition if and only if $L \leq 1 - f^R$. A larger lobbying coalition necessitates a tax base narrower than $f^R$ and lobbyists themselves are better off under tax reform $f = 1$. This is as demonstrated in figure 2.21

**The Costs and Benefits to Lobbying** In the first stage, each citizen decides whether to lobby. Citizen $j$’s lobbying strategy consists of a probability of lobbying as a function of the measure of citizens who enter, $L$. Denote the probability that citizen $j$ lobbies if a measure $L$ of citizens lobbies as $\pi^j(L)$. A Nash equilibrium is a set of lobbying probability functions $\{\pi^j(L)\}_{j=0}^1$ such that the resultant measure of lobbyists is consistent with the entry probability of individual lobbyists. The equilibrium value of $L$ is therefore the solution to the fixed point $L = \int_{j=0}^1 \pi^j(L) \, dj$.

To understand citizens’ incentives to lobby, consider the expected cost and benefit of lobbying. The cost is straightforward and is captured by the

\[ \text{Cost} = \text{Expected Cost} \times \text{Probability of Lobbies} \]

\[ \text{Benefit} = \text{Expected Benefit} \times \text{Probability of No Lobbies} \]

\[ \text{Net Benefit} = \text{Benefit} - \text{Cost} \]

---

21If $L = 1 - f^R$, the policymaker and lobbyists are indifferent between setting $f = 1 - L$ and $f = 1$. Given that payoffs are the same in both cases, the tie breaking rule does not affect citizens’ choices in the first stage of the game.
fixed cost $\phi$. In studying expected benefits, consider first the benefit citizen $j$ obtains from being in the lobbying coalition if a value $g$ is realized in the second stage. We’ll use $B(L, g)$ to denote the benefit to lobbying as a function of lobby size at a public good level of $g$. This is shown in figure 5 for two different values of $g$. The figure gives the benefit to lobbying (before deducting the fixed cost to entry) as a function of $L$. The benefit is given by the difference between lobbyists’ and other citizens’ utilities. If $L \leq 1 - f^R$ in the second stage, lobbyists will be tax exempt and the tax base will be $f = 1 - L$. Accordingly, for all $L \leq 1 - f^R$, the curve gives the difference between the utility of the exempt and of the taxed at the corresponding tax base: $u^E - u^T$. As can be seen from the figure, this benefit is increasing in $L$. This result follows from proposition 3 and is precisely a mirror image of the net benefits to a tax exemption in figure 2. It is a mirror image because a larger lobbying coalition $L$ translates one to one into a narrower tax base $f$.

If $L > 1 - f^R$, the policy maker will implement tax reform ($f = 1$). If reform is passed, lobbyists have no tax exemptions and there is no benefit to lobbying. This is represented by the discrete downward jump to zero in the benefit to lobbying.

The benefit to lobbying changes with public goods as could be expected
from our analysis in the previous section. A high value of $g$ shifts the positive portion of the curve upwards. This follows directly from proposition 3 and was shown in figure 3: The value of a tax break is increasing in $g$. However, $f^R$ is also increasing in $g$, as shown in figures 3 and 4 and discussed in proposition 5. As $g$ increases, the cutoff $1 - f^R$—where the benefit of lobbying goes to zero—therefore shifts to the left in figure 5. With greater public good needs, there is a greater incentive to secure a tax exemption. On the other hand, with greater public good needs, a large number exemptions cannot be sustained. Higher values of $g$ make reform more desirable and therefore decrease the maximal sustainable size of a lobbying coalition.

Figure 6 shows the expected costs and benefits of lobbying for an individual citizen, if $L$ other citizens lobby. The fixed cost of lobbying $\phi$ is also shown in horizontal lines. The two horizontal lines correspond to two values different values of $\phi$. Expected benefits are represented by the inverted-U-shape curve and are simply an integral over the curves for specific values of $g$: $E_g \{B(L, g)\} = \int_g B(L, g) \gamma(g) \, dg$.

The figure shows the expected benefits of lobbying for a specific PDF function (normally distributed around a mean value of $g$) and the curve may differ depending on the nature of the distribution. Specifically, other distributions might give multiple peaks rather than the single peak shown in the figure. But two features of this curve hold for any distribution and are central to the description of equilibrium.

First, this curve is initially increasing (increasing at $L = 0$). For any feasible value of $g$ (such that $f^R < 1$), expected benefits in the neighborhood of $L = 0$ are simply a weighted integral of the benefits of a tax exemption $u^E - u^T$ over values of $g$. The benefits of a tax exemption are decreasing in $f$ for any $g$ (proposition 3). As $f = 1 - L$ in the second stage of the political game, expected benefits are increasing in $L$ for any $g$ at $L = 0$.

Second, for $L$ sufficiently high, the expected benefit of lobbying is zero. If $L$ is sufficiently high, then $L > 1 - f^R$ for any value of $g$. In this case, the benefit of lobbying is zero for any value of $g$ and therefore the expected benefit of lobbying is zero.

The general shape of expected benefits of lobbying as a function of the size of the lobbying coalition is therefore as represented in figure 6. The function is increasing for low values of $L$ and ultimately decreasing to zero. The function has at least one peak (but may have multiple peaks and therefore is not generally inverted-U-shaped).

The value of $L = 1 - med(f^R)$ is indicated with a cross in the figure,
where $\text{med} \left( f^R \right)$ is evaluated at the median value of $f^R$. A lobby of this size leads to reform with 50% probability in the second stage of the game. Higher values of $g$ occur with probability $\frac{1}{2}$ and lead to higher values of $f^R$. In these scenarios, $L > 1 - f^R$ and the policy maker opts for tax reform in the second stage. Lower values of $g$ occur with probability $\frac{1}{2}$, give $L < 1 - f^R$, and lead to $f = 1 - L$ in the second stage.

**Equilibrium Number of Lobbyists** Figure 6 illustrates how equilibrium is determined. Considering first the low lobbying cost, the unique equilibrium number of lobbyists is indicated with a circle, where the costs and expected benefits of lobbying are equal. Given that all citizens are identical, we cannot pin down the identity of citizens who lobby in equilibrium, but their equilibrium number is unique. If $L$ were smaller, the expected value of lobbying would exceed its costs. This could not constitute an equilibrium, as some citizens could profitably deviate by increasing their lobbying probability $\pi^j \left( L \right)$ at that value of $L$. If $L$ were larger, the cost of lobbying would exceed its expected value. This could not constitute an equilibrium, as some citizens could profitably deviate by decreasing their lobbying probability.

There is a large set of lobbying probability functions that support an
equilibrium, but all of them would have a fixed point at the unique value of $L$ represented with a circle in the figure. For example, one equilibrium is symmetrical with all citizens choosing $\pi(L) = L^*$, where $L^*$ is the equilibrium measure of lobbyists. Another equilibrium has a measure $L^*$ of citizens lobbying with probability one and the remainder lobbying with probability zero.

For the low lobbying cost, equilibrium unfolds as follows. A measure $L^*$ of citizens lobbies in the first stage. In the second stage, the value of $g$ is drawn, with a corresponding value of $f^R$. If $f^R < 1 - L^*$, the equilibrium tax base is $f = 1 - L^*$ with tax breaks going to all lobbyists. If $f^R > 1 - L^*$, the equilibrium tax base is $f = 1$: tax reform. With the low lobbying cost shown in the figure, $L^*$ exceeds $1 - \text{med}(f^R)$. The probability that tax reform is chosen is greater than 50%. A large number of citizens nevertheless lobbies because the cost of lobbying is low. They are willing to incur the lobbying cost to secure a tax break tax if breaks are allocated.

This points to a more general result. Lower fixed lobbying costs generally lead to more lobbying but to a higher probability of tax reform. It is hardly surprising that lower fixed costs encourage entry. The latter result may be counterintuitive at first glance as one might think that more lobbying would necessarily lead to a more a porous tax base. But lower lobbying costs democratize the lobbying process and more citizens are represented at the table when tax breaks are allocated. When budgetary conditions allow ($g$ is sufficiently low), tax exemptions are distributed liberally and the tax base is narrow. However, the large number of organized citizens puts high demands on the tax system. Even moderate public good needs may make tax reform a necessity.

Note that as lobbying costs approach zero, $L$ approaches 1, and tax reform always passes. If all citizens lobby, they all receive equal weight, and policy is as a social planner would choose.

There are two equilibria in the higher lobbying cost scenario, indicated with squares in figure 6. The right-most of the two parallels the equilibrium in the low lobbying cost case. The cost of lobbying equals its expected

\footnote{The caveat “generally” is because the expected benefit function need not be monotonically decreasing. For some probability distributions $\gamma(g)$, the expected benefit function will have additional upward sloping segments, and lower lobbying costs will lead to the opposite result. The general shape of the expected benefit function implies that a sufficient (non-marginal) reduction in lobbying costs will lead to increased lobbying and thus a higher probability of tax reform.}
benefits at this point. Additional entry is not individually rational as it decreases expected benefits below their costs. Exit from lobbying increases the benefits to lobbying and is also not optimal.

In the high lobbying cost scenario, an additional equilibrium exists at \( L = 0 \). If no other citizens lobby, the cost of lobbying exceeds its expected benefits and no individual citizen wishes to lobby.\(^{23}\) Multiple equilibria are not a curiosity of this specific lobbying model, but a more general feature of the economic setting. As noted in proposition 3 and shown in figure 2, the payoff from a tax exemption is decreasing in the tax base. This leads to strategic complementarity in lobbying for tax breaks. The larger the number of lobbyists, the larger are the returns to lobbying for other citizens. This strategic complementarity is the source of multiple equilibria in this setting.

Put simply, the logic of multiple equilibria is as follows. We are studying a scenario where the cost of lobbying is high. Specifically, this cost exceeds the value of an individual tax break as a departure from a reformed and efficient tax system (\( f = 1 \)). It is therefore not worthwhile for an individual citizen to secure a tax break and a no lobbying-equilibrium is sustained. However, the benefits of a tax break are decreasing in the tax base. This means that if other citizens lobby for tax breaks, lobbying becomes more profitable. If a critical mass of lobbyists entered, the value of a tax break would exceed its costs. More citizens would therefore choose to enter. This leads to the other equilibrium.\(^{24}\)

Note that even in the lobbying equilibrium tax reform is nevertheless a possibility. In the second stage, a large realization of revenue needs \( g \) could lead to tax reform, as described in the case of low lobbying costs. As discussed earlier, the relatively high lobbying costs in this scenario decreases the equilibrium lobby size but also decreases the probability of tax reform.

\(^{23}\)The remaining intersection between the cost and expected benefit curves is not an equilibrium. With this measure of lobbyists, a citizen could deviate by increasing her lobbying probability, thus increasing the size of the lobbying coalition. The expected benefits of lobbying would then exceed its cost and this deviation would be profitable.

\(^{24}\)This result is somewhat dependent on the assumption that the default policy is \( f = 1 \) if no one lobbies. Other default policies would (discontinuously) change the expected benefit of lobbying at \( L = 0 \). This expected benefit would moreover be heterogeneous as it would differ for citizens who expect to be taxed and those who expect to be exempt under the default policy. If the default policy is sufficiently bad (has a narrow base) the benefits of lobbying (at \( L = 0 \)) to avoid the default policy could exceed its costs. In these conditions, the \( L = 0 \) equilibrium is eliminated and the equilibrium with a at the rightmost square in figure 6 would be unique.
The high lobbying costs shown in the figure suggest that in this equilibrium the probability of tax reform is less than 50%. This can be seen by the fact that the equilibrium lobby size is to the left of the cross in the figure.

Finally, note that if the cost of lobbying were so high so as to exceed its expected benefit everywhere, the unique equilibrium would be $L = 0$ and therefore $f = 1$. If lobbying costs are so high that no citizen wishes to incur them, lobbying no longer determines policy and the government sets the policy to $f = 1$ by default.

**Modeling Assumptions** I make a number of simplifying assumptions in the discussion above, but the model is robust to more general specifications. I introduced uncertainty in public good needs to smooth citizen’s preferences. Discrete jumps in preferences pose problems for equilibrium existence and introducing uncertainty is one way to avoid them.

The fixed cost to lobbying is a reasonable, but critical, assumption. As mentioned earlier, with no fixed costs all citizens will lobby and $f = 1$ is always the unique equilibrium. With all citizens lobbying and weighted equally, equilibrium policy is the solution to the social welfare planner’s problem. Our main political concern is the conflict between special and general interests and the fixed cost allows us to make this distinction.

The model can be easily adapted to allow variable lobbying costs in addition to fixed costs. For example, the model would have similar results if lobbyists faced an additional cost proportional to the policy benefits they receive in addition to the fixed cost to entry. An extension of this sort would merely shift rents from lobbyists to the policy maker and induce less citizens to lobby, but would not change results qualitatively.

I presented results assuming that all citizens face the same lobbying cost $\phi_i = \phi$. A model with heterogeneous lobbying costs could help pin down the equilibrium identity of lobbying citizens, but would not change the qualitative nature of aggregate outcomes. Not surprisingly, citizens with lower lobbying costs would be more likely to lobby.

A version of the model with heterogeneous fixed costs nests as a special case the possibility that a some groups are organized for political action, while others are not. This is a common assumption in special interest models such as in Grossman and Helpman (2002) and Persson and Tabellini (2002). This is easily accommodated in our setting by giving a zero fixed entry cost to the organized group and an infinite cost to everyone else. Allowing for equal
costs—or less extreme versions of cost heterogeneity—to the lobbying game has the advantage of pinning down the equilibrium size of the lobbying coalition, rather than determining its size by modeling assumptions. The interested reader is referred to the online appendix for a model with heterogeneity in political organization.

Equal weights for all lobbyists is a reasonable benchmark given that all citizens are identical ex ante. If weights were unequal, the benefits of lobbying would depend on these weights and differ across citizens. Citizens would then vary in their willingness to lobby and we might be able to pin down the identity of citizens in the lobbying coalition. Aggregate results would remain qualitatively similar.

The assumption that the policy maker cares only about lobbyists and puts zero weights on other citizens is stark, but not crucial, as long as the policy maker puts a greater weight on the preferences of lobbyists. A policy maker more concerned with general welfare will obviously be more likely to pass reform, reducing the incentive to lobby somewhat. Otherwise, results are qualitatively the same.

The default that the policy maker maximizes social welfare if no one lobbies arises endogenously if the policy maker puts some weight on social welfare. As presented above, the model can be viewed as a limiting case as the weight on non-lobbyists goes to zero. An additional appeal of this assumption is that it avoids discontinuities in the value of lobbying. If the default policy were different, e.g. the status quo inherited from an earlier period, most results nevertheless go through. The no-lobbying equilibrium is eliminated under certain default policies (see footnote 24).

The fixed cost to lobbying is assumed to be pure waste rather than a transfer to a politician. I have moreover assumed that this cost is an exogenous parameter. One could alternatively think about the cost $\phi$ as being a price to lobbying that is set and received by a politician. The high value of $\phi$ in figure 6 was chosen such that it maximizes contributions. A politician would choose this price and attempt to coordinate lobbyists on the lobbying equilibrium. At this point the marginal loss in revenues from existing lobbyists due to increasing the lobbying price exactly equals the lobbying contribution ($\phi$) provided by the last lobbyist to enter. Note that despite the politician’s desire to maintain the lobbying equilibrium, a high enough value of $g$ could still tip the scales towards reform.\textsuperscript{25}

\textsuperscript{25}This is also the outcome if the politician holds an all-pay auction and chooses the
Finally, to simplify analysis I will assume that the policy maker cannot discriminate (randomly or deterministically) between members of the lobbying coalition and must offer a policy that provides them with identical outcomes. This is a natural assumption if the lobbying coalition is a cohesively organized group that promises equal treatment to its members. Results are no different if the policy maker can discriminate between lobbyists.

4 Evidence from Corporate Tax Reforms

The theory has a number of testable implications. In this section, I provide evidence from tax base changes in OECD countries that is broadly consistent with these predictions.

A main prediction is that tax reform occurs when the government faces high revenue needs (proposition 5). Second, a tax reform is a “big bang” move from a narrow tax base of $f^R$ to a broader base. The size of a reform is in the eye of the beholder making this a tricky proposition to test. I provide qualitative evidence that tax reforms did involve significant changes in the tax system in appendix B. But one testable implication of a big bang reform is that it frees up sufficient revenues to allow a reduction in statutory tax rates.

I provide supportive evidence for these two predictions using data on the corporate tax base take from Kawano and Slemrod (KS, 2012). This data set documents legislative changes to the corporate tax base in 30 OECD countries from 1980 to 2004. The data includes both high-income and emerging economies and episodes of increasing and decreasing corporate tax rates.

Corporate taxation was not the main tax revenue source for any of the countries in the sample. Data on the breadth of the income tax base or VAT base for a large sample of countries is not readily available. It is nevertheless interesting to explore whether the model’s predictions are supported in the corporate tax data. KS document changes to the tax base including changes in the generosity of investment credits, loss carry-forward rules, depreciation allowances, among others. I define a dummy variable broad that takes on a value of one if the tax rate was broadened by any of the KS measures. In the reported regressions, I focus only on the tax base for domestic corporations as questions of international taxation go beyond the scope of this paper. The number of allocated lobbying slots to maximize revenues. I thank Roger Lagunoff for this insight.
results are nevertheless robust to including international tax legislation as well.

Table 1: Regression Results: Correlates with Base-Broadening Reforms

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<td>.036*</td>
<td>.162**</td>
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<td>.011***</td>
<td>.041***</td>
<td>.007***</td>
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<td>Δ Tax Rate</td>
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<td>-</td>
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<td>-.045**</td>
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<td>-.014***</td>
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***, **, * represent statistical significance at the 1%, 5% and 10% confidence levels, respectively.

The model summarizes the demands on the fisc with a single variable \( g \). In a dynamic context, government can de-link current revenue needs from public good provision by borrowing. However, eventually accumulated debt burdens must be repaid or serviced and public debt may be viewed a summary of the stock of the government’s accumulated financing needs. Accordingly, I use (the natural logarithm of) central government debt as a fraction of GDP as one measure of governments’ fiscal needs.\(^{26}\) The narrow focus on corporate taxation gives the government other (and larger) bases from which to service public debt. It is therefore useful to have a measure that homes in on the fiscal strain in the corporate sector. I use the statutory tax rate

\(^{26}\)Debt to GDP ratios are taken from Reinhart and Rogoff (2009) with the exception of the Czech and Slovak Republics, for which longer time series were available from the World Bank Debt tables.
at the time of the tax base change as another measure of the fiscal needs of
the government (or the degree to which the government relies on corporate
taxation for its fiscal needs.)

Results are shown in table 1. The first column of the gives the result
from an OLS regression of the broad dummy on the debt-to-GDP ratio and
shows that base broadening reforms do generally occur when debt is higher.
Column 2 adds the corporate tax rate the year of the reform and shows that
governments broaden the corporate tax base when existing tax rates are high.
The third column adds the change in the statutory corporate tax rate in the
year of the reform. The negative coefficient suggests that the corporate tax
rate is cut simultaneously with the increase in the tax base. Interestingly
this relationship disappears when looking at the lead or lag of the change in
the corporate tax rate, suggesting that the rate changes in the reform year
are not incidental and may have been part of the same legislative package
that broadened the tax base.

The fact that the tax base and statutory tax rates move in opposite di-
rections is not an obvious accounting identity. If fiscal pressures are large,
the government may be forced to increase both dimensions of tax policy si-
multaneously. This is in fact what the normative theories of the tax base,
such as Yitzhaki (1979), Wilson (1989), and Slemrod and Kopczuk (2002)
would suggest. There, the tax base is narrow because of the administrative
cost of enforcing a broader base. The optimal tax base equalizes the mar-
ginal cost of enforcing taxes with the marginal deadweight losses due to the
narrow tax base. In this normative literature, a government facing increased
financing needs would bear both these costs on the margin and increase both
the statutory rate and enforce a broader tax base. The fact that statutory
tax rates are cut when the government legislates a broader tax base suggests
that a different force is at play here. This result is consistent with the theory
here where the government needs the lower statutory tax rates to compensate
losers from the base-broadening reform.

The next three columns show that the results are broadly robust to a
probit specification (column 4), inclusion of year (column 5) and country
(column 6) fixed effects (although the coefficient on the debt-to-GDP ratio
loses its statistical significance in the last case).

Certainly, one should be wary of simple correlations of this sort; I make no
causal claims; and there certainly be bias due to omitted variables. The cor-
porate tax base is only a part of the tax code, and many of the landmark tax
reforms described in the appendix focused on income or sales taxes. These
correlations are nevertheless suggestive that the theory presented in this paper is broadly consistent with the history of a set of carefully-documented reforms.

5 Concluding Remarks

The enactment of tax reform is a highly political process. Reformers’ desire to bring about a simpler, more efficient, and “fairer” tax system is often stonewalled because of the distributional consequences of such change. This paper proposes a tractable model of the political economy of tax reform. When revenue needs are low, these can be met more easily with narrow tax bases. Voters focus on securing parochial tax benefits, each of which has a only minor implications for overall efficiency, but combined may bring significant deadweight losses. Greater revenue needs are more difficult and more costly to fund with a narrow tax base. Voters become increasingly willing to forgo their own tax breaks in favor of efficiency as revenues increase. A tipping point arrives where tax reform is feasible.

Politically feasible reform, however, may not be etching at the margin of the tax code, but a significant overhaul of the tax system. This contrasts with the common view that small changes entail smaller political costs than big ones do. When direct compensation for lost benefits is impossible, a special interest blocking reform can only be compensated via the general equilibrium benefits it brings. These benefits are small if only one special interest is confronted. But forging a grand bargain where a number of special interests is targeted simultaneously may improve efficiency sufficiently to compensate all losers. This points to the potentially broader applicability of the insights of this paper. Gradualism in reform suggests politicians should take on special interests one at a time. The analysis in this paper shows why it might be less costly for politicians to take on a large number of special interests at the same time.

I hope this study will stimulate further interest in formal analysis of the political economy of tax reform. Social choice in this model is through a simple voting model. Some extensions including special interests and more general political preferences are explored in the online appendix. But this is admittedly not the final word on the rich legislative processes involved in the passage of tax reform. I have no doubt that more could be said on the role of special interests in determining the tax code. Of particular interest
is the collective action problem involved in “big bang” reforms studied here. Much has been written about the collective action problem within special interest groups (see Olsen, 1971, for example), but a large reform may require coordination across special interests as well. This paper illustrates why all special interests might agree to forgo their tax benefits collectively, but not individually. This obviously creates a free-rider problem that may be worthy of further inquiry. Agenda setting and framing of policy choices may give politicians a central role in coordinating special interests towards the common good.

I have assumed that changes in the tax base come about only through policy. In addition, in this setting, a tax reform induced by a shock (to revenues, for example) is reversed once the shock subsides. Casual observation suggests that erosion of the tax base occurs through a qualitatively different process than its expansion. The private sector devotes much energy to minimize payments under a given tax code, and much of the depreciation of the tax base occurs due to individual, rather than collective decisions. It may be interesting to consider private responses to tax reform, and how they feed back into the political process that determines tax policy.

A narrow tax base causes labor misallocation, with excessive production of tax-exempt goods. The model highlights that this affects the labor wedge, but has no effect on aggregate productivity, as firms are homogeneous in their productivity. The impacts of misallocation on total factor productivity is a growing field of macroeconomic inquiry.\(^{27}\) The framework studied here may help shed light on the political determinants of misallocation and thus indirectly on questions of economic development. The online appendix introduces firms with heterogeneous productivities as a step in that direction. Introducing capital as a factor of production may also be of interest.

In a world increasingly open to trade and capital flows, there may be international implications as well. The importance of the aggregate demand channel favoring tax reform might be diminished in a small open economy. The demand for an open economy’s goods is determined partly by tax policy elsewhere. In addition “tax competitiveness” may be a separate pressure for tax reform in such a setting, particularly with respect to corporate taxation.

Finally, I have ignored considerations of vertical equity in this analysis. This omission was intentional, to emphasize political forces, rather than equity considerations, driving redistribution. A study of the interaction be-

\(^{27}\)See Restuccia and Rogerson (2013) for a literature review.
tween vertical and horizontal equity may also prove fruitful.

References


A Appendix: Proofs

Throughout, let

\[ T(j) \equiv 1 - \tau(j); \quad \hat{T} \equiv 1 - \hat{\tau}; \quad \theta \equiv \frac{1 - \tau}{1 - \hat{\tau}}. \]
We use the superscript $T$ to denote a citizen who produces a taxed good and $E$ to denote a citizen with a tax exemption. Throughout, recall that indirect utility is given by

$$u^j = \eta^n \left( \frac{z^T}{\mu} \right)^{\eta+1} \left( \frac{1}{1+\eta} + (\mu-1) \frac{T(j)^\varepsilon}{T^{\varepsilon-1}} \right)$$

and

$$\log (\rho) = \log \tau + \log f + \eta \log \hat{T} + (\varepsilon - 1) \log \theta + \zeta (z, \eta, \varepsilon),$$

**A.1 Proposition 1**

For an owner of a taxed firm $j = T$, we have

$$\frac{d \log u^T}{d \tau} = -\frac{\eta + 1}{T} f^{\theta^{\varepsilon-2}} - (\mu - 1) \frac{\varepsilon - (\varepsilon - 1) f^{\theta^{\varepsilon-1}}}{1+\eta} + (\mu - 1) \frac{T}{T^{\varepsilon-1}} < 0,$$

which holds because $\theta \leq 1$. We can make a stronger statement than in the proposition: taxed citizens always prefer a lower tax rate. In addition:

$$\frac{d \log u^T}{df} = \frac{1 + (\mu - 1) (\eta + 2 - \varepsilon)}{\frac{T}{1+\eta} + (\mu - 1) \frac{T}{T^{\varepsilon-2}}} \frac{\partial \hat{T}}{\partial f}.$$

Given that

$$\frac{\partial \hat{T}}{\partial f} = -\frac{1}{\varepsilon - 1} \frac{1 - T^{\varepsilon-1}}{T^{\varepsilon-2}} \leq 0,$$

$$\frac{d \log u^T}{df} < 0 \text{ iff } \hat{T}^{\varepsilon-1} > (\mu - 1) (\varepsilon - \eta - 2) T^{\varepsilon},$$

which must hold under assumption (13).

Owners of exempt firms have

$$\frac{\partial \log u^E}{\partial y} = \frac{1 + (\eta + 2 - \varepsilon) (\mu - 1)}{\frac{T}{1+\eta} + \frac{\mu - 1}{T^{\varepsilon-2}}} \frac{\partial \hat{T}}{\partial y} \tag{17}$$

for $y \in \{f, \tau\}$. Noting that $\frac{\partial \hat{T}}{\partial f} < 0$ and $\frac{\partial \hat{T}}{\partial \tau} = -f^{\theta^{\varepsilon-1}} < 0$, then $\frac{\partial u^E}{\partial \tau} < 0$ and
\[ \frac{\partial u^E}{\partial f} < 0 \] both hold under assumption (13). In the case of exempt citizens, we have a stronger result than stated in the proposition: (13) is both a sufficient and necessary condition for these citizens dislike tax increases, either by broadening the base or increasing statutory rates.

### A.2 Proposition 2

Using (14), we have

\[
\frac{\partial \log \rho}{\partial \tau} = \frac{1}{\tau} - \frac{\varepsilon - 1}{T} + \frac{\eta - \varepsilon + 1}{T} \frac{\partial \tilde{T}}{\partial \tau} \quad \text{and} \quad \frac{\partial \log \rho}{\partial f} = \frac{1}{f} + \frac{\eta - \varepsilon + 1}{T} \frac{\partial \tilde{T}}{\partial f}.
\]

We also have marginal utilities from (17) Then it can be shown that for sheltered firms,

\[ MCPF^r (E) > MCPF^f (E) \quad (18) \]

is equivalent to

\[ 1 - \tau - (\varepsilon - 1) \tau - (1 - \tau)^\varepsilon < 0. \]

This latter inequality holds for all \( \tau > 0 \) (and with equality for \( \tau = 0 \)), so that exempt firms always prefer tax base increases to tax rate increases, as long as this does not change their tax status.

Turning to taxed citizens, it is easy to show that

\[
\frac{\partial u^T}{\partial \tau} / \frac{\partial u^T}{\partial f} > \frac{\partial u^E}{\partial \tau} / \frac{\partial u^E}{\partial f},
\]

i.e., citizens whose firms bear the brunt of taxation find increases in statutory taxes even more costly relative to base-broadening measures than do citizens with tax exemptions. This is natural, as the incidence of statutory rates falls more on “taxed” citizens than on the exempt. It then follows directly that \( MCPF^r (T) > MCPF^f (T) \), i.e. taxed citizens also prefer broadening the base to increasing statutory rates.

If \( MCPF^r (j) > MCPF^f (j) \) for both the taxed and the exempt, it must be the case that the optimal tax base for every citizen is \( f = 1 \), keeping the tax status of the citizen in question unchanged.
A.3 Proposition 3

The individual value of a tax exemption is equal to

\[ \Delta U(f,g) \equiv U^E(f,g) - U^T(f,g) : \]

the difference between the utility of the exempt and the taxed. I’ll now show that \( MVBB^T > MVBB^E \) always; in words: the marginal value of broadening the base is greater for taxed citizens than for the exempt. Broadening the base then narrows the gap between the utility of the taxed and of the exempt, so that the value of a tax exemption is decreasing in the tax base:

\[ \frac{\partial \Delta U(f,g)}{\partial f} < 0. \]

To see that \( MVBB^T > MVBB^E \), note that this holds if and only if

\[ MCPF^T(T) - MCPF^T(E) > MCPF^E(T) - MCPF^E(E), \]

meaning that it is more costly for the taxed than for the exempt, on the margin, to raise revenues with statutory tax rate increases relative to broadening the base. This inequality can be shown to be equivalent to

\[ \frac{\partial u^T / \partial \tau}{\partial T / \partial \tau} > 0. \]

Both the numerator and the denominator of the left hand side of the inequality are negative, and this inequality always holds.

Turning to the second result, we ask whether the value of a tax break, \( \Delta U(f,g) \), is increasing in \( g \). Now,

\[ \frac{\partial U^j(f,g)}{\partial g} = -MCPF^T(j) : \]

Keeping the tax base constant, the burden of increasing revenues by one unit falls squarely on statutory rates, so that the marginal cost to any individual of higher public spending is the marginal cost of public funds for statutory rates. Using this result

\[ \frac{\partial \Delta U(f,g)}{\partial g} = MCPF^T(T) - MCPF^T(E). \]
Given that the marginal cost of taxation is always higher for the taxed than for the exempt, this must always be positive, and the value of a tax exemption is indeed increasing in the amount of public goods to be financed.

A.4 Proposition 4

An exempt citizen \( j \) prefers reform to a tax base \( f \) if one of two conditions hold. First, if public goods \( g \) cannot be financed at the base \( f \). Second, if her utility is higher at \( f = 1 \) is than it is at \( f \).

If \( g \) cannot be financed at the tax base \( f \), it can also not be provided at any \( \tilde{f} < f \). To see this, note that revenues are maximized at a tax rate \( \bar{\tau} \) satisfying

\[
\frac{1 - \bar{\tau}}{\bar{\tau}} = (\eta - \varepsilon) f \bar{\theta} + \varepsilon, \text{ where } \bar{\theta} = \frac{1 - \bar{\tau}}{f (1 - \bar{\tau}) + 1 - f}.
\]

The following Lemma states that the revenue-maximizing tax base \( \bar{\tau} \), revenues are increasing in the tax base, a fact that can be easily from (19) with a few steps of algebra.

**Lemma 6** At the revenue maximizing statutory tax rate, tax revenues are strictly increasing in the tax base for all \( f \in (0, 1) \)

Given that at the tax base \( f = 0 \) no revenues can be raised, there must be a critical tax base, below which revenues of \( g \) are infeasible.

Turning now to the utility comparison between the tax bases \( f \) and 1, let \( T(f, g) \) denote the net-of-tax statutory rate that provides revenues of \( g \) if the tax base is \( f \) and \( \hat{T}(f, g) \) denote the corresponding effective net-of-tax rate. Proposition 2 states that \( MCPF^r(E) > MCPF^f(E) \). This means that the utility of exempt citizens is increasing in the tax base, subject to the need to raise \( g \) in revenues, as illustrated in Figure 2. In addition, I will now show that the marginal cost of having a narrow base, defined as

\[
MCNB(E) = MCPF^r(E) - MCPF^f(E),
\]

becomes infinite as \( f \) goes to zero. Then the utility curves shown in Figure 2 are upward-sloping and span the entire range of values from zero to the
value for the exempt at a tax base of $f = 1$. Given that the value of tax reform—the utility of the taxed at the tax base of $f = 1$—is within that range, there must be a critical breadth of the tax base such that the utility of the exempt at that critical value is equal to the utility of the taxed under reform. Moreover, at any tax base below this critical value, the exempt are strictly better off under tax reform, while they are strictly worse off at any broader tax base.

The critical value $f^R$ is the smaller of the two values discussed above. It may be defined by the feasibility constraint or by desirability. In the online appendix, I explore the parameter space in which feasibility and desirability are the binding constraints.

### A.5 Proposition 5

If public goods are $g$, $f^R$ is defined by

$$u^E (f^R, \tau^R) = u^T (1, \tau^1),$$

where $\tau^R$ and $\tau^1$ are the tax rates required to raise $g$ in revenues, if the tax base is $f^R$ and $1$, respectively:

$$\rho (f^R, \tau^R) = \rho (1, \tau^1) = g$$

This last equation simply maps $\tau^1$ onto $g$ with $\tau^1$ naturally increasing in $g$. We can therefore eliminate this last equality and conduct comparative statics with respect to $\tau^1$, with results for $g$ following. In other words, $f^R$ is increasing in $g$ if and only if $f^R$ is increasing in $\tau^1$, with $\tau^1$ taken parametrically. \{ $f^R, \tau^R$ \} are defined implicitly with the first equation and the first equality in the second equation. Conducting comparative statics using these two equations, we obtain that

$$\frac{\partial f^R}{\partial \tau^1} = \frac{MCPF^E_f (f^R, \tau^R) - MCPF^E_T (1, \tau^1)}{MCPF^E_f (f^R, \tau^R) - MCPF^E_T (1, \tau^1)} \frac{\partial \rho (1, \tau^1)}{\partial \tau}.$$

As long as we are on the correct side of the Laffer curve, the marginal revenue terms are positive. Also, proposition 2 states that the difference in marginal costs of public funds in the denominator is positive. Therefore $\frac{\partial f^R}{\partial g} > 0$ if
and only if

\[ MCPF_T^{fR} (f^R, \tau^R) > MCPF_T^{fT} (1, \tau^1). \]  \hspace{1cm} (20)

I now argue that this condition must hold for \( g \) sufficiently high. Let’s begin from the highest feasible value of \( g \), that which sets \( \tau^1 \) to the peak of the Laffer curve, i.e. to the maximal revenues that can be raised even at the peak of the Laffer curve. At this extreme, if we narrowed the base even marginally, \( g \) would no longer be feasible (see lemma 6). \( f^R = 1 \), then as no smaller base is feasible.

Now, let’s consider lower values of \( g \) where \( f^R \) is determined by the preferences of the exempt rather than feasibility. With \( g \) sufficiently high, we can make \( \{ f^R, \tau^R \} \) be arbitrarily close to the peak of the Laffer curve, but with \( \tau^1 \) still away from the Laffer curve peak at \( f = 1 \). At the Peak of the Laffer curve, marginal revenues are zero and \( MCPF_T^{fR} (f^R, \tau^R) \) goes to infinity. It must therefore be larger than the finite value of \( MCPF_T^{fT} (1, \tau^1) \). The inequality 20 holds and \( f^R \) is increasing in \( g \).

\section*{B Tax Reform in Recent History}

In this appendix I contextualize the model in light of some historical experiences of tax reform in a number of countries.

\textbf{United States}  \hspace{0.5cm} The landmark tax reform of the past several decades in the United States was the Tax Reform Act of 1986. Its main objectives were to simplify the tax code, broaden the tax base and increase fairness, primarily considering horizontal equity—all features of tax reform as described in the theory. Revenue needs were perceived to be great at the time, with a federal budget deficit in excess of 5% of GDP that year. Some prominent Republican leaders, including Senate Majority Leader Robert Dole initially opposed revenue-neutral tax reform because they believed that deficit reduction should take priority (Birnbaum and Murray 1987, Kindle Loc. 301). This is consistent with the model, where high revenue needs trigger tax reform.

Nevertheless, reform was ultimately designed to be revenue-neutral, with significant reductions in marginal tax rates combined with base-broadening measures. Accounts of the political process suggest that a combination of re-
ductions in tax rates and broadening the tax base were necessary for the enactment of the Tax Reform Act.

Support for the Tax Reform Act was bipartisan, passing the Senate 74 to 23 and the House of Representatives by 292-136. The political process lead to compromise between uncommon political bedfellows. As Birnbaum and Murray (1987) state:

“Merging the lower rates of the supply-siders with the base-broadening of the liberal tax reformers was the glue that held the 1986 tax bill together… The ability of this unholy alliance to stick together throughout an arduous process… was the key to success.” Kindle Loc. 162.

The change in the tax code was significant, rather than marginal, with top marginal tax rates dropping from 50% to 28%. Again, Birnbaum and Murray (1987) write:

“Congress was a slow and cumbersome institution that usually made only piecemeal, incremental changes. Tax reform proposed something very different: a radical revamping of the entire tax structure.” Kindle Loc. 504.

It is interesting to contrast the 1986 experience with the 1981 Economic Recovery Act and the 1984 Deficit Reduction Act. These were two of a series of tax changes enacted during President Reagan’s first term in office. Although the 1981 act was larger in its overall revenue implications than the 1986 reform—the latter was intended to be roughly revenue neutral—its main objective was to lower the overall tax burden rather than a wholesale reform of the tax system. The 1984 law was passed due to concerns over the government deficit (Romer and Romer, 2010). These smaller changes in the tax code correspond more closely to the predictions of Yitzhaki (1979) and Wilson (1989), as the tax rate and the tax base moved in the same direction. Alongside cuts in marginal income tax rates included in the 1981 bill, new depreciation guidelines decreased the tax base as well. The 1984 bill, designed to increase revenues, reduced tax benefits for tax-exempt entity leasing and other

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28The initial Senate vote prior to the Conference Committee was close to unanimous at 97 to 3, demonstrating the breadth of support for tax reform in general.
base-broadening measures. In contrast, the large, tax reform grand bargain of 1986 saw the tax base and tax rate moving in opposite directions. This is inconsistent with the predictions of models where administrative costs are the main barrier to base broadening policies, but coherent with the theory presented in this paper.

**Canada** In other countries, tax reform has followed similar patterns. The main objective of Canada’s “1985 Plan” was the reduction of the Federal deficit: It came amidst a significant effort to consolidate the Federal budget. The plan was, however, accompanied by proposals to reform the Canadian tax code. (See Sancak, Liu and Nakata, 2011.) These led to legislation in 1987 that broadened the personal and corporate tax base and eliminated deductions, while lowering corporate tax rates.

The second phase of tax reform was introduced in 1991, with a reform of the sales tax. The reform replaced the 13.5% Manufacturers’ Sales Tax with a 5% Goods and Services Tax, introduced a more transparent tax that provided a more equal treatment of business, thus broadening the sales-tax base alongside the lower tax rates.

**Germany** The German tax reform of 2000—passed after a decade of debates—was discussed in the context of fiscal consolidation. Chancellor Gerhard Shroeder’s initial proposals were for fiscal consolidation and tax cuts. (See IMF, 1999; IMF, 2000; and Breuer, Gottschalk, and Anna Ivanova, 2011.) The theory in this paper provides a rationalization for these seemingly contradictory aims. Prior to the reform, the corporate tax base was so narrow that the 45% statutory rate on retained earnings raised only 2% of GDP in revenues (IMF, 2000). Corporate tax reform involved a broadening of the tax base, limitations to depreciation allowances, and lowering top marginal tax rates. Personal income tax rates were also decreased, although without substantial changes in the tax base.

The German experience may also highlight the broader applicability of the political economy of reform presented in this paper. Not only was corporate tax reform comprehensive, rather than a marginal elimination of individual tax benefits, but was also bundled together in a broader reform agenda. Tax reform was one element of the Agenda 2010 reform plan of the Schroeder administration. Rather than taking a piecemeal approach to reform, as would be advocated by a gradualism, Schroeder proposed reforming several aspects
of economic policy simultaneously.\textsuperscript{29} The reform package included labor market reforms, social benefit reform, and tax reform. A gradualist view to reform would suggest that such an ambitious agenda is foolhardy or doomed to failure. Our theory provides some insights on the political viability of such a grand policy of reform. While each individual reform proposal had winners and losers, the general equilibrium benefits of wide-sweeping reform may have been sufficient to compensate losers. The bundling of reforms may have been a recipe for success rather than a formula for failure.

**Latin America**  Mahon (2004) and Focanti et al (2013) conduct panel regressions of determinants of tax reform in Latin America and both find that high inflation was the main domestic driver of tax reform. Given that high inflation in the region has often been due to fiscal pressures, this too is consistent with the theory that revenue needs are a stimulant for tax reform. Sanchez (2006) reviews the history of and political forces motivating tax reform in Latin America. He describes tax reforms undertaken in Latin America over the past three decades “to create simpler, more efficient tax systems with a greater emphasis on indirect taxes of broader bases, and more moderate marginal tax rates.” (pp. 772) He too cites the debt crises of the 1980s as the leading domestic forces towards reform.

**Sweden**  The Swedish tax reform of 1991 was dubbed by some the “tax reform of the century” (Agell et al, 1996). The reform involved a significant reduction in personal income tax rates, estimated to lose as much as six percent of GDP in tax revenues. A large part of these reductions in marginal tax rates were financed by a broadening of the VAT tax base to include goods and services that were previously exempt, as well as the elimination of tax loopholes. Consistent with the model, tax reform passed in the aftermath of a fiscal crisis, with the debt to GDP ratio increasing from 40% of GDP in 1980 to over 60% by the middle of the decade and a currency crisis following at the end of the decade. The reform was passed by a left-wing government, in what was viewed as a shift in policy, consistent with consensus for tax reform at a reform moment, predicted by the theory.

\textsuperscript{29}The Agenda 2010 reform program was first announced in March 2003. See http://germanhistorydocs.ghi-dc.org/sub_document.cfm?document_id=3973
United Kingdom  In the United Kingdom, the 1980s and early 1990s were also periods of tax reform, partially stimulated by debt consolidation attempts. (See Ahnert, Hughes and Takahashi, 2011.) In 1980, the Thatcher government faced a fiscal deficit of 4.8%. After failed attempts by his predecessor to rein in the deficit, Chancellor Nigel Lawson presented a plan in 1984 that envisaged a deficit reduction of nearly four percentage points. The lion’s share of the consolidation came on the expenditure side, while tax reform measures were planned to be roughly revenue neutral. The reform package included a reduction in the corporation tax rate from 52% to 35%, financed by base-broadening measures.

Recent Events  Recent discussions of tax reform in the U.S. have arisen again in a time of budget consolidation. Alongside debates about the relative merits of expenditure cuts and tax increases, a debate has also emerged as to whether new revenues should come through increases in marginal tax rates or broadening the tax base. Again, as in the Tax Reform Act of 1986, there have been strong political pressures to compensate for base-broadening measures with decreases in marginal rates. (See for example the House of Representative’s Committee on the Budget Budget proposal in 2014: http://budget.house.gov/.)

The European sovereign debt crisis has also brought tax reform to the forefront. This is consistent with the theory presented here, where large revenue needs trigger tax reform. While it is still early to predict whether any significant reform will be enacted, nor what form it will take, there are some early indicators of reforms along the lines suggested here. The Financial Times predicts that

“At the heart of the overhaul [of the Spanish tax code] will be an election-friendly move to lower marginal rates on income and corporate tax. The headline reductions will be balanced by steps to broaden the tax base, mostly by eliminating some of the exemptions and deductions that litter the system.” Financial Times, February 10, 2014.

The notion that base-broadening measures will have to “bought” with lower tax rates seems to be on the minds of reform-oriented politicians.

In summary, several of the largest successful efforts to reform the tax code in the U.S. and other industrialized countries in the past few decades seem to con-
form with the general features of the model. Tax reform successfully passes through the political process as alongside efforts to reign in deficits—in times of high revenue needs. They often involve broadening the tax base, used to finance reductions in marginal tax rates. Reforms were often comprehensive, eliminating many tax breaks in one fell swoop, rather than gradualist. In some instances these gained broad and bipartisan support that was unexpected to political observers at the time.