

Tax Reform and the Political Economy of the Tax Base*

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Abstract

This paper studies the political prospects for reform in a model where the tax base and statutory rate are separate instruments of tax policy. The model suggests that large changes in the tax code may be easier to enact than marginal reforms. The tax base faces a tipping point where even the beneficiaries from tax exemptions support reform. At this tipping point, tax reform is Pareto improving. Politically feasible tax reform occurs when fiscal needs are large, but may nonetheless involve reductions in marginal tax rates. There is strategic complementarity in lobbying for tax exemptions, resulting in multiple equilibria. The model's main predictions are consistent with recent tax reforms in OECD countries. JEL Codes: D72, D78, H26

1 Introduction

The politics of tax reform are taking center stage once again, just as public debts are mounting worldwide. Congress passed a substantial change to the U.S. tax code in December 2017; calls for tax reform have also emerged in Spain, Portugal, Italy, and Greece

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following the debt crisis in Southern Europe. Tax reform was a centerpiece of the legislative agenda of the current Indian parliament. Frequently, tax reform involves changes not only in tax rates, but also in the tax base. Proposals eliminating exemptions or closing loopholes involve a change in the tax base. Indeed, expanding the tax base was central to the most successful reforms in recent history. For example, the landmark 1986 U.S. tax reform eliminated exemptions to both corporate and personal taxes.

Reviewing the history of any major tax reform, one sees immediately that broadening the tax base, while often economically desirable, is also politically contentious. (See Birnbaum and Murray, 1987 on the politics of the U.S. Tax Reform Act of 1986.) An interest group that was powerful enough to secure a tax exemption is sure to resist attempts to eliminate this exemption when reform is on the table. This paper explores the political determinants of the tax base. To this end, I propose a model where a government meets its revenue needs through a choice of not only the tax rate, but also the tax base. These two policy dimensions appear important in actual reforms and are central to the discussion in this paper. This framework allows us to evaluate individuals' preferences for tax exemptions and the tradeoff between the two policy dimensions. In the model, all agents and goods are identical ex-ante and there is no economic rationale for tax exemptions. A broader tax base is more efficient, as it removes a wedge between the prices of taxed- and tax-exempt goods. However, 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. Therefore, a special interest may attempt to secure a tax break despite the inefficiency it creates. This phenomenon is familiar from our understanding of special interest politics. (See Grossman and Helpman, 2002.)

The novelty here is the study of the budgetary and general equilibrium implications of the inefficient policies that result and their political repercussions. 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 beneficiaries of tax exemptions. When inefficiencies in the tax code reach a critical point, special interests themselves are willing to forgo their tax breaks in favor of tax reform: the elimination of *all* tax exemptions. Importantly, no (small) spe-

cial interest would forgo its tax break in isolation. The rents from a single exemption are large, but the budgetary and 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. I derive 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 fiscal needs. Hence, the scope for tax reform is greater when the government wishes to raise more revenues.

The economic framework outlined in Section 3 yields a number of results that inform the political analysis that follows. First, there always exists a tax base breadth, below which a coalition of all special interests would collectively forgo their tax exemptions in favor of full reform—the elimination of all tax breaks. As the tax base narrows, the private benefits of tax exemptions grow roughly linearly, while deadweight losses grow exponentially. Hence, there is always a tipping point where the private cost of an unreformed tax system outweighs its benefits, even to the very beneficiaries of tax exemptions. Second, the minimal size of this reform coalition is decreasing in public good needs. As fiscal strain increases, a smaller number of special interests needs to be persuaded to forgo their tax breaks and prospects for tax reform are greater. Third, tax exemptions are strategic complements: the private benefits of a tax exemption are increasing in the total number of allocated exemptions.

Turning to politics, I study normative (Section 4) and positive (Section 5) implications of this economic framework. The main normative result is that a reform-minded policymaker, constrained by the need to compensate losers from reform, should opt for large, “big bang”, reforms rather than gradual changes in the tax base. This follows from the complementarity of private benefits from tax exemptions. Eliminating an individual, or small set, of exemptions is very costly when the tax base is narrow, but less so when the tax base is broadened in one fell swoop. At the extreme, the general equilibrium gains from a big bang reform are sufficient to fully compensate losers and a large reform is Pareto improving. This is of course a limiting case: real world reforms typically have losers alongside winners. But this result emphasizes that both the benefits to winners are larger and the cost to each individual loser is smaller when a more ambitious reform is

envisaged.

The positive analysis considers equilibrium policy in a standard lobbying model (following Grossman and Helpman, 2002, chapter 7). Results 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. The main positive prediction is that tax reform is more likely when fiscal pressures are greater. Further, I extend the lobbying model to allow endogenous entry into lobbying. Given the strategic complementarity in tax exemptions, endogenous entry leads to multiple equilibria. If many citizens join the special interest group (SIG), the SIG vies for many tax exemptions. This increases the private value of each individual exemption, validating citizens' choice to join the SIG. On the other hand, if few citizens join the SIG, the value of tax exemptions is small and citizens have a smaller incentive to organize.

A large literature studies the political forces shaping tax policy.¹ Homing in on the tax base is motivated by the prominence of the tax base in major tax reforms in recent decades. Broadening the tax base was one of the main objectives of the Tax Reform Act of 1986 in United States. Value-Added-Tax reforms in Canada and Sweden, both enacted in 1991, involved significant expansions of the tax base. Corporate tax reforms in the United Kingdom in 1984 and in Germany in 2000 similarly involved substantial broadening of the base. Existing theories of the political economy of taxation typically take the tax base as exogenous and usually as comprehensive. The large normative literature building on Mirrlees (1971) has individuals each taxed at a distinct rate and it is difficult to distinguish the tax base from the continuum of statutory rates. Given the prominence of the tax base in reform proposals, a model that makes this distinction explicit leads to new insights on the politics of taxation.²

The economic framework builds on models of tax enforcement, following Yitzhaki (1979), Wilson (1989), and Slemrod and Kopczuk (2002). I abstract from enforcement and focus on the political, rather than administrative, constraints to expanding the tax base. I

¹See Alt et al (2009) and Persson and Tabellini (2002) for comprehensive literature reviews.

²There 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 Dixit (1975), Feldstein (1976), and more recently Golosov, Tsyvinski, and Werquin (2014). Here, I allow for reforms of any magnitude.

augment existing models with endogenous production and explicit attention to the distributional implications of a narrow tax base. The latter extension creates special interests seeking preferential tax treatment. The former creates general equilibrium costs of a narrow tax base. Importantly, the focus of this article is on the politics rather than merely the economics of the tax base.

The paper also relates to the literature on the politics of economic reform³ and more generally to the large literature on the role of special interest politics, the nexus between political and economic power, and public choice mechanisms. A common thread in this literature is the tension between particularistic interests and overall economic efficiency. A similar tension is present in this paper as well, but it differs in its general equilibrium setting. General equilibrium allows us to compare the individual losses with the general equilibrium gains from base-broadening tax reforms. This provides new insights, such as complementarity in special interests' lobbying incentives. Base-broadening tax reforms are 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 dead-weight 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 exemptions are 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 similar in magnitude to all discretionary spending in the U.S.⁴ Given the sums involved, it is of independent interest to understand the politics of tax exemptions.⁵

The remainder of the paper is organized as follows. In the following section, I describe a number of tax reforms in recent history. This narrative highlights the importance of the tax base in tax reforms and relates these reforms to the theory that follows. Appendix A.2 formalizes this analysis using data on corporate tax legislation in OECD countries. Section

³See Acemoglu and Robinson (2000); Alesina and Drazen (1991); Fernandez and Rodrick (1991); and Jain and Mukhand (2003). For a recent contribution in the context of tax policy, see Scheuer and Wolitzky (2016).

⁴GAO estimates: http://www.gao.gov/key_issues/tax_expenditures/issue_summary

⁵Tax expenditures are not uniquely a 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).

3 describes the model's economic environment and derives citizens' policy preferences. Section 4 describes normative political implications and section 5 turns to positive political analysis. Section 6 concludes. Proofs, robustness checks, and extensions are in the online appendix.

2 Base Broadening Reforms in Recent History

A few of the most prominent reforms in modern history involved expansions of the tax base, motivating the theory that follows. These tax reforms were often triggered by fiscal strain. In addition, tax reforms were ambitious and involved reduction in marginal tax rates alongside base-broadening policies. Analysis in Appendix A.2. shows that these anecdotes generalize to the tax-reform experiences of a panel of OECD countries in reforming the tax base.

United States The landmark U.S. tax reform of the past several decades was the Tax Reform Act (TRA) of 1986. Its main objectives were to simplify the tax code, broaden the tax base and increase fairness, primarily considering horizontal equity. 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*).

Ultimately, reform was nonetheless 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 tax rate cuts and broadening the tax base were necessary for the enactment of the TRA. 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 minor, with top marginal personal income 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.*

Finally, some special interests were unsurprisingly opposed to tax reform, protective of their own tax exemptions, such as

“...the chairman of Texaco, who was concerned about oil-and-gas tax breaks; the chairman of the Ford Motor Company, who worried about the end of investment incentives; the president of the National Federation of Independent Business, who was disturbed by the elimination of lower tax rates for small businesses... ” *Kindle Loc. 2022.*

However, there were also some that supported tax reform for the very general equilibrium arguments advanced in this paper:

“A small group of others—like Roger Smith of GM—thought tax reform would be good for their customers and encourage sales. ” *Kindle Loc. 2034.*

Canada In Canada, tax reform also passed amidst fiscal consolidation, yet involved reduction in marginal tax rates. The “1985 Plan” to reform the tax code came amidst a significant effort to consolidate the Federal budget. (See Sancak et al, 2011.) This 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 sales tax reform. The reform replaced the 13.5% Manufacturers’ Sales Tax with a 5% Goods and Services Tax and 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 et al, 2011.) These aims would appear inconsistent, but can be reconciled in the theory provided here. 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 broadening 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.

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 stimulate 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 also 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 was financed by broadening the VAT tax base. 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.

United Kingdom In the United Kingdom, tax reform was also stimulated by debt consolidation attempts. (See Ahnert et al, 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 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 reducing the corporation tax rate from 52% to 35%, financed by base-broadening measures.

In summary, several of the largest tax reforms involved broadening the tax base and have a number of common features. They occur when fiscal needs are perceived to be large. They typically finance reductions in marginal tax rates. And reforms were often comprehensive, eliminating many tax breaks in one fell swoop, rather than gradualist.⁶

3 The Economy

This section outlines the economic framework, how the economy responds to tax policy, and citizens' resulting policy preferences. The economic model builds on a normative literature of the optimal tax base in public finance: Yitzhaki (1979), Wilson (1989), and Slemrod and Kopczuk (2002). Citizens have CES preferences over the consumption of a measure-one continuum of goods varieties. Income is taxed at a statutory tax rate τ , but some goods are deductible from taxation. The measure of exempt goods is given by $1 - f$, so that f is a measure of the tax base. This gives two clear dimensions to tax policy: statutory rates and the tax base.⁷

The model that follows differs from the aforementioned papers by adding three general equilibrium components, each of which is essential to the discussion. First, competi-

⁶As this paper was being finalized (in December 2017), Congress passed a substantial change to the personal and corporate income tax code. It is too early to assess its economic impact or the politics that led to its passage. I nevertheless discuss some of its base-broadening provisions in the context of the theory in the following section. This reform too was substantial, rather than marginal. However, analysis of the politics of this reform in the context of base-broadening measures is complicated by the fact that tax cuts were primarily deficit funded, with the CBO estimating a \$1.5 trillion increase in public debt, with only a small share of revenues coming from tax base increases (see <https://www.cbo.gov/publication/53415>). As such, the politics of this reform relate more to the traditional literature on the political economy of public debt (See Alesina and Passalacqua, 2016 for a review).

⁷The model is isomorphic to one where a statutory consumption tax is applied to a measure f of goods and $1 - f$ goods are exempt.

tion in the goods market is monopolistic. This gives producers profits that are increasing in the demand for their product. Producers therefore have a vested interest in securing a tax break for their variety. Second, production is endogenous, with an elastically-supplied labor input. This contrasts with the endowment economy in the aforementioned public finance literature. With endogenous output, tax policy affects aggregate demand and hence firms' profits. The tension between the rents from 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 focus here is on the political factors affecting tax policy. In this section, we take policy as given; the political determinants of policy are then studied in the following sections.

3.1 Model Setup

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

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

Citizens' Income The citizen receives a wage of w units of the consumption good for each hour worked. Citizen j also earns profits π^j from a *single* firm she owns; it is one of a unit measure of firms indexed by $i \in [0, 1]$. Firms' indexes match 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 3.2, this framework can easily accommodate any other ownership structure.

Consumption and Intermediate Goods Each firm produces a single intermediate good variety, sold at a price $p(i)$. Let $x^j(i)$ denote consumer j 's demand for variety i . Households bundle individual varieties through a CES aggregator to give consumption

x^j of

$$x^j = \left[\int_{i=0}^1 \left(x^j(i) \right)^{\frac{\varepsilon-1}{\varepsilon}} di \right]^{\frac{\varepsilon}{\varepsilon-1}},$$

with $\varepsilon \geq 1$ giving the elasticity of substitution across varieties.

Tax Policy The government must raise sufficient tax revenues to finance an exogenously given amount of public goods g .⁸ I show in Appendix A.3 that the model's results are unchanged if public good demand is endogenous. Tax policy consists of two instruments: the tax rate τ and the tax base f . Personal income $wh^j + \pi^j$ is taxed at a uniform rate τ . However, varieties of intermediate goods in $i \in [f, 1]$ are fully deductible from income taxation.⁹

There is no economic rationale to provide a tax exemption to any specific variety, given that intermediate goods are identical (e.g. in their price elasticity of demand). The theory of uniform commodity taxation, harking back to Ramsey (1927), suggests that a social welfare maximizer would set $f = 1$. Moreover, unlike the literature on the optimal tax base, I assume no administrative costs to tax enforcement.¹⁰ Any deviation from a complete tax base is therefore due political, rather than economic, forces.

This tax structure captures 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. Allowing for a continuum of tax breaks would muddle the distinction between the tax base and the tax rate, but in Appendix A.4, I allow for partial deductions and in Appendix A.5 allow for the tax system to be determined endogenously, with a policymaker who can set the size and of exemptions freely. I show there that the main insights do not rely on 100% exemp-

⁸I assume that the public good is of a specific variety, $i = 1$, and that this good is always exempt from taxation. 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.

⁹Identifying tax exempt goods as those with higher i indexes is for notational convenience and without loss of generality.

¹⁰Allowing for administrative costs would not alter the model's results and would unnecessarily obfuscate the political motivations for a narrow tax base.

tions. In any case, 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. The largest tax exemptions include mortgage interest deduction (\$59 billion in fiscal year 2014) and exclusion of employer provided health insurance (\$202 billion in fiscal year 2015).¹¹ Income used for the purchase of these goods is (partially) deductible from income taxation.¹²

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

$$\underbrace{\int_{i=0}^1 p(i) x^j(i) di}_{\text{Consumption Expenditure}} \leq \underbrace{(1 - \tau) (wh^j + \pi^j)}_{\text{After-tax income}} + \underbrace{\tau \int_{i=f}^1 p(i) x^j(i) di}_{\text{Tax deduction}} \quad (2)$$

Consumer choice is then to maximize (1) through a choice of varieties $\{x^j(i)\}_{i=0}^1$ and labor supply h^j , subject to (2).

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

$$x^j(i) = \left((1 - \tau(i)) \frac{p^c}{p(i)} \right)^\varepsilon x^j,$$

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

$$p^c \equiv \left(\int_{i=0}^1 \left(\frac{p(i)}{1 - \tau(i)} \right)^{1-\varepsilon} di \right)^{\frac{1}{1-\varepsilon}}. \quad (3)$$

Firms Each firm i has a technology that transforms $h(i)$ units of labor into $zh(i)$ units of good i . Firms are identical in their productivity (firms with heterogeneous productivities are studied in Appendix A.6). Each firm faces a fully competitive labor market, but

¹¹GAO estimates. See http://www.gao.gov/key_issues/tax_expenditures/issue_summary

¹²There are also exemptions in the corporate tax code. The theory as outlined here doesn’t include a corporate tax and thus no corporate tax exemptions. Similar forces impeding or driving reform could be modeled in that setting as well.

a monopolistically competitive (Dixit and Stiglitz, 1977) goods market. 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 $\mu \equiv \frac{\varepsilon}{\varepsilon-1}$ over marginal costs: $p(i) = \mu \frac{w}{z}$.

Normalizing the producer price (identical for all firms) to one, the consumer price index (3) can be written as $p^c = \frac{1}{1-\hat{\tau}}$, where $\hat{\tau}$ is the effective tax rate defined as

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

The labor wedge is equal to the effective tax rate. It is useful to anticipate at this point that raising one unit of revenues via an increase in the statutory tax rate τ 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 less efficient than broadening the tax base.

Finally, firms' profits are directly proportional to demand for their varieties: $\pi(i) = \frac{\mu-1}{\mu} x(i)$.

Government The government collects tax revenues

$$\rho = \tau \left(wh + \pi - \int_{i=f}^1 p(i) x(i) di \right), \quad (4)$$

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

Labor Supply and Consumption Workers' first order condition for labor supply gives

$$h = h^j = \left(\frac{z(1 - \hat{\tau})}{\mu} \right)^\eta. \quad (5)$$

Consumer j 's consumption can now be written as

$$x^j = (1 - \hat{\tau})(wh + \pi(j)). \quad (6)$$

Indirect Utility The utility of citizen j is given by (1). h^j is determined by (5) and x^j is given by (6), so that the indirect utility of a citizen $j < 1$ can be written as

$$u^j = \left(\frac{z(1-\hat{\tau})}{\mu} \right)^{\eta+1} \left(\frac{1}{1+\eta} + (\mu-1) \frac{(1-\tau(j))^\varepsilon}{(1-\hat{\tau})^{\varepsilon-1}} \right).^{13} \quad (7)$$

This indirect utility function can be separated into two easily-interpretable terms. The first reflects the utility derived from labor effort; the second, utility derived from profits. Given that these two terms are additively separable, it is easy to adapt the model to other assumptions about the distribution of ownership, monopoly rents, and income in society. The assumption that every citizen owns a single firm can also be easily altered.

The first term,

$$u^W \equiv \frac{1}{1+\eta} \left(\frac{z(1-\hat{\tau})}{\mu} \right)^{\eta+1}$$

gives the utility of consumption from labor income net of the dis-utility of supplying this labor: $(1-\hat{\tau})wh - \frac{h^{1+\frac{1}{\eta}}}{1+\frac{1}{\eta}}$. It is immediately apparent that the labor component of utility is the same for all citizens. In addition, the effects of tax policy on this component of utility is entirely captured by the effective tax rate $\hat{\tau}$. Raising a unit of revenues by increasing the statutory tax rate τ increases the effective tax rate $\hat{\tau}$ by more than raising revenues through a broadening of the tax base f . Hence, if households obtained no profit income, they'd always prefer the broadest possible tax base.¹⁴

The second term

$$u^\pi(j) = (\mu-1) \underbrace{\left(\frac{z(1-\hat{\tau})}{\mu} \right)^{\eta+1}}_{\text{Aggregate Demand}} \underbrace{\frac{(1-\tau(j))^\varepsilon}{(1-\hat{\tau})^{\varepsilon-1}}}_{\text{Relative Demand}} \quad (8)$$

gives the citizens utility due to profits: $(1-\hat{\tau})\pi(j)$. Profits from the total sales of vari-

¹³Although μ is a function of ε , I treat the two as separate parameters in what follows. This is without loss of generality as it 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 substitution between closely-substitutable varieties within industries. De-linking the two parameters allows separate comparative statics for the two.

¹⁴This stark result is due to the fact that the "worker" component of the household as defined here doesn't include any monopoly rents. In a world where workers share in their employer's monopoly rents, workers would have a vested interest in their employer's profits and would then benefit if their employer receives a tax exemption.

ety j are affected by both aggregate and relative demand. The term labeled as aggregate demand is familiar from the labor component of utility, as it is proportional to total consumption. Aggregate demand is decreasing in the effective tax rate.

The term $\frac{1-\hat{\tau}}{1-\tau(j)}$ is the relative price of good j . Thus $\left(\frac{1-\tau(j)}{1-\hat{\tau}}\right)^{\varepsilon-1}$ 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 τ 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.¹⁵ The tax base f determines whether a specific product is sheltered from taxation.

These two terms highlight how firms benefit from tax exemptions, but also bear a cost, through the general equilibrium. Comparing the profits of a firm with, to one without, a tax exemption, one can see the value of securing an individual tax exemption. Relative demand for the product of the “exempt” firm is higher by a discrete margin. Accordingly, this firm's profits are higher by a discrete amount. Thus entrepreneurs have a strong incentive to secure a tax exemption for their own product.

For a given revenue need, the effective tax rate $\hat{\tau}$ 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 (8) demonstrates that citizens internalize the cost of their tax exemptions, even through their profits alone. However, the aggregate demand cost of any single tax exemption is infinitesimal, while the benefits to its recipient are not. No citizen would unilaterally forgo her own tax benefit. The aggregate demand channel does leave scope, however, for a group of citizens to benefit from collectively forgoing their tax exemptions.

Revenues The logarithm of tax revenues $\rho(\tau, f)$ in (4) is given by

$$\log(\rho(\tau, f)) = \log \tau + \log f + \eta \log(1 - \hat{\tau}) + (\varepsilon - 1) \log\left(\frac{1 - \tau}{1 - \hat{\tau}}\right) + \zeta(z, \eta, \varepsilon), \quad (9)$$

¹⁵Profits of all firms are taxed at a flat rate of τ , as can be seen in equation (2). I use the term “taxed citizens” as shorthand for citizens owning firms producing goods that are not tax deductible.

where $\zeta(z, \eta, \varepsilon)$ is a term that doesn't contain the tax instruments f and τ . 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 (9). The remaining terms reflect changes in taxable income due to household responses. First, an increase in the effective tax rate decreases revenues due to the standard substitution from consumption to leisure. In this case, it is the effective rather than the statutory tax rate that determines the labor wedge. This effect is proportional to the Frisch elasticity of labor supply η .

Tax revenues are further affected by revenue efficiency, captured by the term $\frac{1-\tau}{1-\tau}$: the ratio of the statutory and the effective net-of-tax rates. This ratio gives the wedge between the prices of taxed goods and the CPI. The larger is the wedge, the greater is the substitution from taxed to exempt goods, losing revenues due to tax exemptions. This second effect is increasing in the elasticity of substitution across varieties: ε .

Figure 1 plots the government's budget constraint for a number of values of g .¹⁶ Each curve plots in $\{f, \tau\}$ space a set of tax base and rate combinations that lead to the same revenues. The curves are downward sloping as broadening the base allows the government to decrease statutory rates. Moving from left to right, these equi-revenue curves are increasing in the revenues they generate.

3.2 Policy Preferences

Policy Preferences of Citizen j We can now solve for citizens' policy preferences. It follows directly from (7) that each citizen prefers the good she produces to be tax exempt. We now ask how the citizen wishes to raise tax revenues taking her own tax status as given. The preferred policy of citizen j is given by

¹⁶In 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 Broda and Weinstein (2006). The relevant elasticity is that between taxable and tax exempt goods, which are typically in broad product classifications such as health care, housing, or basic foodstuffs. The markup is set to $\mu = 1.1$, as is common in the macroeconomics literature. I state explicitly when results depend on parameter values. The chosen values—while empirically relevant—are primarily for graphical convenience.

$$\begin{aligned} & \max_{\tau, f} u^j \\ & \text{s.t. } \rho(\tau, f) \geq g. \end{aligned}$$

An interior policy choice satisfies the optimality condition:

$$MCPF^\tau(j) = MCPF^f(j),$$

where

$$MCPF^\tau(j) \equiv -\frac{\partial u^j}{\partial \tau} / \frac{\partial \rho}{\partial \tau} \quad \text{and} \quad MCPF^f(j) \equiv -\frac{\partial u^j}{\partial f} / \frac{\partial \rho}{\partial f},$$

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 to use both policy instruments until the marginal costs of raising an additional unit of revenues using either instrument is equalized.

However, as the following proposition states, the solution to the maximization problem is a corner solution at $f = 1$ if the effective tax rate is sufficiently small, specifically if

$$(1 - \hat{\tau})^{\varepsilon-1} > (\mu - 1)(\varepsilon - \eta - 2). \quad (10)$$

As 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 1 *When taxes are in the range given by (10), all citizens prefer raising taxes by broadening the base rather than increasing rates, keeping their own tax status constant. That is $MCPF^\tau(j) > MCPF^f(j)$ for any $j \in \{E, T\}$ and any $\{f, \tau\}$. $f = 1$ is therefore the preferred policy of all citizens, keeping their own tax status constant.*

It follows directly that a social welfare planner—putting an equal weight on the preferences of each citizen—would always set $f = 1$. The intuition for this proposition is illustrated in Figure 2, which plots utility of exempt (dashed curve) and taxed (solid line)

citizens along equi-revenue curves. The horizontal axis shows values of the tax base f , but keep in mind that a broader tax base gives a lower statutory tax rate, as in Figure 1. The gap between the two curves represents the discrete value of a tax exemption.

Broadening the tax base lowers the statutory tax rate, as we shift down and to the right along an equi-revenue curve in Figure 1. All citizens benefit through a decrease in the effective tax rate $\hat{\tau}$. The lower effective tax rate follows from the standard uniform commodity taxation result: Lower statutory rates reduce the wedge between taxed and exempt goods. In addition, citizens benefit directly from lower statutory tax rates afforded by the increased revenue that broadening the base generates. Accordingly, the two curves in Figure 2 are upward sloping: citizens prefer the broadest possible base. It follows that the ideal policy for any citizen is at the right-most X marker: Set the broadest possible tax base, while retaining her own tax exemption. This tension between a desire for a broad tax base, on one hand, and for individual exemptions, on the other, is central to the politics of tax reform.

Discussion of Condition (10) Proposition 1 requires that taxes be in the range represented by the inequality (10). This range is a sufficient condition for the remaining propositions in this article as well. The restriction imposed by (10) isn't particularly constraining for two reasons: one theoretical and one empirical.

First, theoretically, if distortions are so high that (10) is violated, it can be shown that tax-exempt citizens become "tax loving". That is, they prefer tax rates to be high regardless of the revenue needs of the government. These perverse preferences arise because when taxed and exempt goods are highly substitutable, higher tax rates strongly divert demand from taxed goods to the exempt. When the effective tax rate is high (close to the peak of the Laffer curve), this substitution effect is so strong that exempt citizens would like to increase taxes even if the revenues are unused. The possibility that tax-sheltered firms may prefer wasteful taxation may have some interesting implications, but these go beyond the scope of this paper and needlessly complicates analysis.

Second, empirically, (10) holds for realistic parameterizations. The parameter ε 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 is between broader categories, such as food items vs. housing vs. automobiles. If we accordingly set $\varepsilon = 2$, following Broda and Weinstein (2006), then condition (10) holds for any value of the Frisch elasticity η and any tax rate.

The Value of a Tax Exemption We now turn to a result that will be central in the politics of tax reform, studied in Sections 4 and 5. 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 is the distance between the utility of the exempt (dashed 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 is a general feature of the model, as described in the following proposition.

Proposition 2 *The individual value of a tax exemption is*

- 1) *Decreasing in the tax base f*
- 2) *Increasing in revenue needs g*
- 3) *Increasing in ε*

The proposition also states that a citizen's willingness to pay for a tax break is increasing in public goods g and in the elasticity of substitution ε . The former can be seen in Figure 3, which shows a 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 is increasing in g .

The intuition for these results is as follows. For a given revenue need, a broader tax base allows a decrease in statutory tax rates τ . The value of a tax exemption is proportional to the statutory tax rate, as can be seen in (7). The value of a tax exemption is therefore decreasing in the tax base.¹⁷ Similarly, for a given tax base, an increase in g necessitates

¹⁷The broader tax base also reduces the effective tax rate $\hat{\tau}$, which further amplifies this effect.

an increase in the statutory tax rate τ . This increases the relative cost of being in the tax base and thus increases the value of a tax exemption. A higher elasticity of substitution ε makes consumers more reactive to tax exemptions and makes it more attractive for a firm to obtain one.

A corollary of Proposition 2 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. In section 5, we will see how these strategic complementarities lead to multiple equilibria in lobbying 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. Collectively, these two objectives are at odds with each other. When does 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. Hence, a citizen would never unilaterally forgo a tax exemption. However, when the tax base is narrow enough, beneficiaries from tax breaks are willing to collectively forgo their exemptions in favor of tax reform: the elimination of *all* tax exemptions. This is illustrated in Figure 2 with the marker labeled f^R : the tipping point for reform. At a tax base narrower than f^R ($f < f^R$), exempt citizens are strictly better off 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. Citizens, including the exempt, are made better off by following the path along the right-pointing arrow in Figure 2. The value of tax exemptions increases roughly linearly in tax rates, while the resulting dead-weight losses are convex. Hence, a critical tax base f^R exists, below which the latter force dominates the former.

The following proposition states that the existence of a critical tax base f^R is a general result.

Proposition 3 *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 any tax base $f < f^R$.*

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 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 $f > f^R$.

Discussion of Proposition 3 Proposition 3 describes the central mechanism that drives or impedes reform in the political economy analysis that follows. Might special interests truly be willing to forgo exemptions for the resulting general equilibrium gains? A few points are worth noting in this regard.

First, the general equilibrium gains from tax reforms are sizable. Auerbach (1983) estimated the cost of distortions in the corporate tax code alone in the early 1980s at nearly 4% of the US capital stock, coming to more than 10% of GDP, giving large potential gains from reform. Kopczuk (2005) estimates gains from the reduction in the elasticity of taxable income due to broadening the personal income tax base in the 1986 TRA at around \$30 billion a year.¹⁸ Gravelle (1989) estimates an additional \$15 billion a year from changes in the relative treatment of corporate and non-corporate capital. Jorgenson and Yun (1990) simulate a number of the bill's provisions and estimate total total gains as high as \$1.5 trillion in net present value—nearly a third of GDP at the time. This is on top of the \$80 billion of direct increases in disposable income due to rate reductions, increases in standard deductions, and increases in the Earned Income Tax Credit (Auerbach and Slemrod, 1997, Table 1), afforded by the base-broadening measures. Barro and Fuhrman (2018) estimate gains of 3% of GDP from the the December 2017 reform, if rules governing capital expensing are made permanent. Mertens (2018) estimates these gains at 1.3% of GDP.

Second, the term “exempt citizens” may lead the reader to over-estimate the value of

¹⁸He estimates a 3pp reduction in the social cost of collecting a dollar of revenue, giving this figure using 1986 revenues.

a tax exemption in this model. In the model corporate income (profits) are taxed at a flat rate τ , with no exemptions. Instead, the product of an “exempt firm” is deductible from ordinary income, as in (2). Thus firms benefit only indirectly due to the increase in relative demand for their goods due to the lower consumer prices that the tax deduction affords. It is this private benefit that firms need to weigh against the benefit of a lower tax rate and stronger aggregate demand.

An example from the December 2017 tax bill is illustrative. The law broadened the tax base by limiting mortgage interest deductions to apply only to the first \$750,000 of the value of the mortgage (down from \$1.1 million previously). The bill was opposed by the National Association of Realtors, a major proponent of the mortgage interest deduction and one of the strongest special interests in Washington.¹⁹ Why were lawmakers willing to take on this immense special interest? This was perhaps somewhat aided by the fact that this base-broadening measure helped finance the reduction in corporate income tax rates from 35% to 21%. It is entirely plausible that the increase in after-tax profits to realtors will turn out to be greater than the lost profits due to lower housing demand funded with mortgages in the \$750K – \$1,100K range.²⁰

Third, shareholders are workers and taxpayers too. Citizens evaluate the net benefits of reform based on both parts of their utility function in (7). The tipping point for reform applies to *utility* not *profits*. In fact, at the tipping point f^R , firms’ profits are harmed by reform. This can be seen by the fact that reform increases citizens’ utility as workers—the term u^W in (7). Indifference to reform at f^R therefore requires that the remaining term u^π —profits—decrease from reform. There exists an even lower tax base at which even profits alone would increase from reform, but this tax base is unlikely to ever be reached, as Pareto-improving reform is available at higher tax bases.

This form of “cross-subsidization” is important in the politics of tax reform in practice. The 1986 TRA is estimated to have increased the tax burden on the corporate sector as a

¹⁹It is the second largest in lobbying spending in Washington: <https://www.opensecrets.org/lobby/top.php?showYear=a>. The NAR also opposed the increase in the standard deduction and changes in the treatment of capital income from house sales.

²⁰Indeed, in a November 20 letter to the Senate, the NAR expressed “strong opposition to ‘The Tax Cuts and Jobs Act,’” but acknowledged that the “NAR supports tax reform’s goal to spur greater economic growth”, corresponding to the competing forces described in the theory.

whole (Auerbach and Slemrod, 1997, Table 1). But the reform also dramatically reduced the top marginal personal income tax rate—relevant for many corporate shareholders—from 50% to 28%. This certainly will have sweetened the bitter pill for affected shareholders.

Finally, Proposition 3 is a stronger result than necessary for the political economy of reform. In reality, there certainly are losers alongside beneficiaries of most reforms. But the cost of reform to losers decreases, and its benefits to beneficiaries increases, as the tax base narrows, as seen in Figure 2. Proposition 3 gives a limiting result that there exists a tax base so narrow that even exempt citizens are willing to reform the system so that reform is Pareto improving. In reality, the system may be reformed well before this point is reached, when political resistance to reform erodes sufficiently. Indeed, Section 5 presents a lobbying model, in which reform passes against the (waning) resistance of special interests when the tax base is sufficiently narrow.

Revenues and Tax Reform The tipping point for reform f^R plays an important role in the politics of tax reform. It is the critical tax base, below which special interests can be persuaded to forgo tax exemptions. Conversely, $1 - f^R$ is the largest number of exemptions that can be allocated to special interests before these interests are collectively harmed by the porous tax system. What then determines the value of f^R ? 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 for a number of values of g . Each pair of curves corresponds to a specific value of g , with higher values of g lower in the figure. 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 following proposition formalizes this result. It states that f^R is increasing in g for sufficiently high values of g or ϵ .

Proposition 4 *If public good needs g are sufficiently high, the cutoff tax base for reform f^R is increasing in g . In addition, f^R is increasing in g for values of ϵ that are sufficiently high.*

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 higher values of f^R . The second part of the proposition states that for values of ε sufficiently high, f^R is increasing in g over the entire range. Note that both these conditions are *sufficient* but neither of them is *necessary*. In fact, I was unable to find a counterexample where f^R wasn't strictly increasing in g .

Computational analysis further affirms 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. This is illustrated in Figure 4 that shows the cutoff tax base f^R as a function of public goods g . The solid line plots results with parameter values as in the previous figures ($\varepsilon = 2$ and $\eta = 0.5$). Other lines show alternative values of the elasticities ε and η , and the markup μ . In all cases the critical tax base f^R is increasing in public good needs g . This result will be central in the prediction that tax reform is more likely when public good needs are greater.

3.3 Active Ingredients

The results in this section are based on a model with standard, but specific, preferences. This allows for analytical proofs and graphical analysis. But to what extent do the results presented here generalize further? To answer this, it is useful to consider the active ingredients leading to the main results. The general equilibrium gains from reform come from two forces that are quite general. First, differential tax treatment of goods leads to deadweight losses. This is a general result and follows from the theory of uniform commodity taxation harking back to Ramsey (1927) and outlined in many public finance textbooks (e.g. Atkinson and Stiglitz, 2015). The theory recommends taxing goods differentially based on their demand elasticity, but this is unlikely the main reason for most tax exemptions in practice. Second, differential taxation, beyond distorting consumption bundles, also leads to a larger labor wedge. This too is quite general. Differential taxation leads to a higher price level with constant elasticity of substitution preferences over commodities, as seen in (3). But this generalizes to other preferences as long as deadweight losses from taxation of individual commodities are convex. A higher price level then increases the price of leisure relative to consumption, distorting work incentives.

A narrower tax base leads to a higher statutory tax rate, creating a larger diversion of

consumption from taxed to deductible goods. When the two aforementioned assumptions hold, this leads to a more distorted consumption bundle and lower utility. This force might trigger reform at narrow tax bases, but will not be sufficient alone to reduce profits for producers of tax-exempt goods. The increasing labor wedge delivers this result: A more distorted consumption bundle makes consumption less attractive relative to leisure (higher price level), reduces hours worked, demand, and corporate profits.

The notion that there exists a critical tax base below which exempt citizens may support reform does depend on parametric assumptions. As noted earlier, if condition (10) is violated (e.g. the elasticity of substitution across products is sufficiently large), the diversion of relative demand towards tax exempt goods is so great that tax exemptions may become irresistible. Of course, in any model, the tax base may be so narrow that ultimately revenue needs cannot be satisfied, but this reflects a far more mechanical budgetary reason for tax reform.

The strategic complementarity in vying for tax exemptions should also generalize to other settings. The result follows from the fact that a narrower tax base requires higher tax rates: a simple fiscal reality. When tax rates are higher, the value of being exempt from taxation is greater: again, a general result.

The assumption that firms are of zero measure is for analytical convenience, but not central to the model's results. One can think of any measure of firms in the model as being a large multi-product conglomerate. If anything, this larger firm would be more likely to internalize general equilibrium effects and wouldn't face the collective action problem that a larger number of firms faces.

Results reported in this section go through if deductible goods obtain a deduction of less than 100%. This more general case is analyzed in Appendix A.4. Partial deductions have two competing effects on the pivotal tax base f^R . On one hand, partial exemptions are less distortionary, reducing their general equilibrium cost. On the other hand, partial deductions are less valuable to exempt citizens, thus lowering their private value. As shown in the appendix, for a reasonable parameterization of the model, these two forces roughly cancel out.²¹

²¹Note, however, that the parameter f no longer represents the tax base, when exemptions are partial.

Relaxing the assumption that consumers have homogeneous preferences over commodities may affect results and certainly has real-world political economy implications. In practice, consumers differ in their consumption bundles and benefit differentially from tax deductions. The mortgage interest deduction benefits mortgagors, not only realtors, for example. The result that “workers” are identical in preferences, and always support reform, is an artifact of this stark assumption. Introducing ex-ante differences in consumer preferences on top of the ex-post difference in firms’ tax status would complicate analysis substantially. While the rich political interaction between consumer advocacy groups and corporate interests is certainly intriguing, it goes beyond the scope of this paper and I leave it to future research.

4 Normative Analysis: Big Bang or Piecemeal Reform?

Using the economic model we have derived, we now turn to the politics of tax reform. In this section, we begin with normative analysis and ask whether economies should eliminate the rents to entrenched interests in one fell swoop, or is a more gradual approach desirable? In Section 2, I discussed a number of recent cases and we saw that large reforms were common in tax policy. Are such big-bang reforms desirable?

Consider the case of a “reformist” policymaker (PM) who aims to maximize social welfare and therefore wants to maximize the tax base. However, she is restricted to reforms that obtain unanimous support. This may represent an extreme case of multiple veto points, but illustrates the case for big bang reform clearly. Looking at Figure 2, imagine that current policy has a tax base of $f = f^R$ (or any value $f < f^R$). The reform-minded leader 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 and reform is Pareto improving.

Instead, the tax base—defined as the share of total expenditure that is taxed—is roughly $1 - (1 - f)\chi$, where χ is the share of expenditure on exempt goods that is tax deductible.

Special interests are compensated directly by the general equilibrium benefits from reform and there are no losers in need of compensation.

At the gradualist extreme, the reformer could eliminate one tax exemption at a time. Compensating the first special interest is costly, with the cost represented by the downward-pointing arrow in Figure 2. The total cost of reform, when removing tax exemptions one at a time and compensating losers sequentially, is 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.²² This result is generalized and summarized in the following proposition.

Proposition 5 *If the status quo tax base satisfies $f^q \leq f^R$, a welfare-maximizing reformist who is required to raise revenues to fully compensate all losers from reform will prefer a reform of $f = 1$ to any $f^q < f < 1$.*

Central to this result is the general equilibrium nature of this framework and its implications for Pareto-improving reform outlined in Proposition 3. One typically thinks of reform as being welfare increasing. It is the distributional consequences that stand in the way of reform, with losers leveraging their political power to block its enactment. 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 with limited need to compensate losers.

The debate on gradualism vs. big-bang reforms has a long history. A large literature in the early 1990s debated whether large reforms were preferable to piecemeal ones with particular reference to the transition economies of the former Soviet bloc. Dewatripont and Roland (1992) argued for gradualism, due to informational asymmetries. They ask what a reform-minded leader ought to do when faced with special interests: workers that must be compensated when exiting a restructured industry. They conclude that gradualism is preferable, because it allows the government to screen workers for the value they place on remaining in the existing industry and thus reduce the total compensation required. The context of tax reform is different. The losers from tax reform are relatively

²²The ultimate payoffs from reform are not path dependent. 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.

easy to identify: it is those groups that currently have tax exemptions. Our mechanism is entirely different and relies on the complementarity between individual tax exemptions, which make the cost of “buying out” special interests smaller, the larger the number of exemptions that is eliminated.

In contrast, Murphy et al (1992) argue in favor of big-bang reform. They study liberalization of product markets in a transition economy and argue that a partial reform may introduce new price distortions. It is therefore desirable to transition in one step. In contrast, in the model presented here, partial reform does reduce inefficiency. As Figure 2 illustrates, any broadening of the tax base is a step in the right direction. Instead, I argue that a big bang reform is desirable due to the complementarities in tax exemptions studied in Proposition 2. Special interests benefit more from tax exemptions when other groups also have exemptions. Partial reform eliminates some exemptions but leaves others in place. A special interest losing its exemptions will therefore require larger compensation in a partial reform.

5 Positive Analysis: Tax Reform and Public Good Needs

I have suggested that base-broadening tax reform often occurs when there is a perceived need for fiscal consolidation. In this section, I use positive political economy theory to analyze how public good needs affect the tax base. Many of the results will follow from Proposition 4 and Figure 3. f^R is increasing in g , which means that the size of a coalition that collectively prefers tax reform to tax exemptions ($1 - f^R$) is decreasing in public good needs. In many political settings (e.g. median voter model) this directly implies that tax reform is more likely when public good needs are greater.

The economic setting of Section 3 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 account of the role of lobbies in resisting and then resigning themselves to the 1986 TRA. A lobbying model is therefore a natural setting to explore the politics of this conflict. Substantial lobbying effort is devoted to protecting the types of tax deductions

studied here. The National Association of Realtors is the second largest organization in lobbying expenditure in the U.S. and protecting the mortgage interest deduction is one of its main objectives. Blue Cross/Blue Shield provides more lobbying contributions than any other individual firm and it certainly benefits from the deductibility of employer-provided health insurance.²³

I begin with the canonical Grossman and Helpman (2002, chapter 7) lobbying model. The model predicts that tax reform occurs when public goods g are high. I then extend the model to allow endogenous citizen participation in the lobby. In this case, strategic complementarities in the value of tax exemptions, summarized in Proposition 2, come into play. Strategic complementarity creates two equilibria, one with substantial lobbying and a narrow tax base and another with limited lobbying and a broader base. Finally, I summarize a number of extensions and alternative political models. The prediction that base-broadening reforms are more likely when public good needs are higher is robust to a variety of specifications.

5.1 Lobbying

The lobbying model follows Grossman and Helpman (2002, chapter 7) closely. A measure L of citizens is organized in a single lobby. The lobby is headed by a representative member and consists of a group of citizens that indistinguishable in terms of the tax code. That is, it is administratively impossible to exempt a subset of lobby members without exempting the entire lobby from tax. In Section 5.3, I discuss an extension that allows more flexibility in the tax code. Lobby size is exogenous to begin with, but is endogenized in Section 5.2. The model will have nothing to say about how the collective action problem within the lobby is resolved, as is the case with most existing lobbying models. There also exists a policymaker (PM) who determines the tax code $\{f, \tau\}$, including which $1 - f$ citizens obtain tax exemptions. The PM herself is not a citizen in this economy.

The lobby can make binding commitments to transfer consumption goods to the policymaker (PM), conditional on policy. Having observed public good needs g , it offers a contribution schedule $C(f, \tau)$, giving the size of the transfer if the PM sets policy to

²³<https://www.opensecrets.org/lobby/top.php?showYear=2017&indexType=s>

$\{f, \tau\}$. The lobby may also condition the transfer on the identity of the $1 - f$ varieties that are tax exempt. However, given that the PM will never give tax exemptions to lobby non-members in equilibrium, we anticipate that the $1 - f$ agents who receive the exemption are always lobby members. Hence $\{f, \tau\}$ fully summarizes payoffs to the PM and the lobby.

The PM values both public policy and contributions, with weights Λ and $1 - \Lambda$ on these two objectives, respectively. In terms of public policy, the PM values social welfare, with equal weights for all citizens. Accordingly, the PM's objective is

$$u^{PM}(f, \tau) = \Lambda u^{SWP}(f, \tau) + (1 - \Lambda) C(f, \tau).$$

As Grossman and Helpman (2002, chapter 7) show, policy in this environment is Pareto efficient for the PM and the lobby, and policy maximizes a weighted average of social welfare and the utility of the lobby:

$$\tilde{u}^{PM}(f, \tau) = \Lambda u^{SWP}(f, \tau) + (1 - \Lambda) Lu^L(f, \tau)$$

where $u^L(f, \tau)$ is the utility of the average lobby member. On observing g , the PM chooses policy to maximize $\tilde{u}^{PM}(f, \tau)$ subject to the budget constraint $\rho(f, \tau) \geq g$. The equilibrium outcome is $f = 1 - L$ (lobby exempt) for lower levels of g and $f = 1$ (tax reform) for higher levels.

Proposition 6 *In the lobbying model, tax reform occurs if public good needs g are sufficiently high.*

This result is a direct corollary of Propositions 1 to 4. Proposition 1 implies that the PM will never give tax exemptions to lobby non-members, so that $f \geq 1 - L$. Given that policy cannot discriminate between lobby members, the PM has two options: $f = 1 - L$ or $f = 1$. These two options correspond to an unreformed system, where the lobby receives tax breaks or a reformed tax system, respectively. Taking the extreme case of $\Lambda \rightarrow 0$ (PM cares only about contributions) as an example, it is easy to see that tax reform occurs at high public good levels. With $\Lambda = 0$, the PM maximizes lobby welfare and Proposition

3 implies that $1 - f^R$ is the largest measure of tax exemptions that is sustainable before the beneficiaries themselves prefer to reform the tax system. Hence tax reform occurs if and only if $L \geq 1 - f^R$. Notice that this is a limiting case: if the PM puts any weight on the welfare of non-lobbyists, reform occurs at tax bases broader than f_R and potentially against lobby resistance.

Further, Proposition 4 and Figure 3 show that f^R is increasing in g . It follows that tax reform will be triggered for sufficiently large public good needs. If the PM is policy motivated ($\Lambda > 0$), this continues to be the case because the taxed lobby non-members always prefer tax reform and value tax reform more the higher are public goods. In conclusion, a simple lobbying model predicts that tax reform occurs when public good needs are high.

Comment on Big Bang Reforms The lobbying model predicts that tax reform occurs at high levels of g . This result is robust to a number of extensions and alternative political models discussed in Section 5.3 and is consistent with base-broadening tax reforms in OECD countries, as discussed in Section 2 and shown in Appendix A.2. In the previous section, we saw that big bang reforms may be easier for a reform-minded policymaker to implement. It is less clear from the positive analysis put forth in this section whether big bang reforms are more likely than marginal ones. In the baseline lobbying model I have presented, reforms also have a big bang nature in that a discrete increase in public goods triggers a substantial increase in the tax base. In some of the extensions discussed below, we will see that this result is due to two assumptions in the baseline model. Specifically, there are two discrete components of the model that together drive the big bang result.

The first assumption is that the tax code cannot distinguish between lobby members. If this assumption is relaxed, the lobby and PM could agree to remove the tax exemption of a single lobby member rather than the exemptions of all its members. Hence, there may be no critical level of public goods where a marginal increase in g leads to a discrete reform. The tax base broadens when g increases, but not in a discrete jump. Non-discrimination among lobby members may hold in practice if lobby members are relatively homogeneous and belong to a certain class (income bracket, industry, age group) that tends to be treated similarly in the tax code for administrative or political reasons. The assumption may

also hold if non-discrimination among lobby members is important for internal lobby cohesion.

The second assumption is that tax exemptions involve a deduction that can only take a discrete set of values. In the model presented here, I restricted attention to two values—full deductability or none—but discrete reform occurs for any finite number of brackets. If a continuum of brackets is allowed, the lobby and PM may agree to decrease the exemption on the margin rather than eliminate it entirely. Hence, there may be no discrete reform due to a marginal increase in g , but the tax base does broaden, in the sense that the wedge between taxed and exempt goods is narrowed.

5.2 Endogenous Lobby Membership

I now extend the model to allow endogenous lobby membership. Prior to the lobbying stage of Section 5.1 and before the value of g is known, citizens choose whether to participate in the lobby or not. It is known that g will be drawn from a probability distribution function $\gamma(g)$. A citizen j may join the lobby at a fixed cost of ϕ_j units of the consumption good. For expositional ease, assume 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. The fixed cost is in addition to the per-capita contributions $\frac{C(f,\tau)}{L}$ to the PM in the lobbying stage. One can think of the fixed cost as a membership fee that covers the administrative cost of special interest group organization or time and effort devoted to lobbying.

Citizen j 's lobbying strategy consists of a probability of lobbying as a function of the equilibrium lobby size L . Let $q^j(L)$ denote the probability that citizen j joins a lobby of size L . A Nash equilibrium is a lobby size L and a set of lobbying probability functions $\{q^j(L)\}_{j=0}^1$ such that (i) each citizen's lobbying probability maximizes her expected payoff and (ii) the resultant measure of lobbyists is consistent with the entry probability of individual lobbyists. That is, L is a solution to the fixed point $L = \int_{j=0}^1 q^j(L) dj$.

Cost and Benefit of Lobby Membership To understand citizens' lobby membership choice, consider the expected cost and benefit of membership. The cost is straightforward and is captured by the fixed cost ϕ . In studying expected benefits, consider first the benefit

citizen j obtains from being in the lobby 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 lobby size at a public good level of g . The benefit is equal to the lobby members' policy rents net of per-member lobby contributions to the PM. If the lobby receives a tax exemption, $B(L, g) = u^E(f, \tau) - u^T(f, \tau) - \frac{C(f, \tau)}{L}$, where the policy $\{f, \tau\}$ is the equilibrium outcome of the lobbying stage. Under tax reform, $B(L, g) = 0$, as lobby members receive no policy rents but also make no contributions to the PM.

The costs and benefits of membership are shown in Figure 5 for two different values of g and taking the limit $\Lambda \rightarrow 0$ (the PM cares only about contributions) for simplicity. At this limit, the PM sets policy to maximize the lobby's utility and the lobby captures all policy rents $C(f, \tau) \rightarrow 0$. The figure gives the benefit of lobbying as a function of L . As previously discussed, tax reform will occur if and only if $L \geq 1 - f^R$. Absent reform, lobbyists obtain tax exemptions and the tax base is $f = 1 - L$. Accordingly, for all $L \leq 1 - f^R$, the curve shows $u^E(1 - L, \tau(1 - L)) - u^T(1 - L, \tau(1 - L))$, where $\tau(1 - L)$ is the tax rate that gives g units of revenues when the tax base is $1 - L$. The figure shows that this benefit is increasing in L . This follows from Proposition 2 and is precisely a mirror image of the net benefits to a tax exemption from Figure 2. It is a mirror image because a larger lobby L translates one to one into a narrower tax base f . If $L > 1 - f^R$, the resulting policy is tax reform ($f = 1$) and the gross benefit to lobby membership is zero. This is represented by the discrete downward jump to zero in the benefit of lobbying in Figure 5.

The benefit of lobbying changes with public goods as could be expected from our analysis in section 3. A high value of g shifts the curve upwards. This follows from Proposition 2 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 Figure 3 and Proposition 4. 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 smaller number exemptions can be sustained.

Figure 6 shows the cost and *expected* benefit of membership for an individual citizen in a lobby of size L . The two horizontal lines correspond to two values of the entry

cost ϕ . Expected benefits are represented by the inverted-U-shape curve and are simply a weighted integral over the benefit function of Figure 5 over all possible 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 distribution. Specifically, other distributions might have 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 increasing at $L = 0$. Expected benefits in the neighborhood of $L = 0$ are simply a weighted average (over values of g) of the benefits of a tax exemption $u^E - u^T$. The benefits of a tax exemption are decreasing in the tax base for any value of g (Proposition 2). Equivalently, the expected benefit of lobby membership is increasing in L at $L = 0$.

Second, for L sufficiently high, the expected benefit of lobbying is zero. If L is sufficiently high, then L must necessarily exceed $1 - f^R$ for all g . Tax reform occurs with probability one and the expected benefit of lobbying is zero. The general shape of the expected benefits of lobbying as a function of number of lobbyists is therefore as shown 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).

Equilibrium Number of Lobbyists Figure 6 illustrates how equilibrium is determined. An equilibrium is a lobby size L and a set of probabilities $q^j(L)$ such that (i) for each j , the expected benefit of membership equals the expected cost and (ii) lobbying probabilities lead to a lobby of size L .

Considering first the low lobbying cost, the unique equilibrium lobby size is indicated with a circle. There is a large set of lobbying probability functions $q^j(L)$ that support equilibrium, but all have a fixed point at the unique value of L represented with a circle. For example, one equilibrium is symmetrical with all citizens choosing $q(L) = L^*$, 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. First, a measure L^* of citizens joins the lobby in the first stage. Second, the value of g is drawn, with a corresponding value of f^R . If $L^* < 1 - f^R$, the equilibrium tax base is $f = 1 - L^*$ with tax breaks going to all lobbyists. If $L^* > 1 - f^R$, the equilibrium tax base is $f = 1$: tax reform.

The value of $L = 1 - \text{med}(f^R)$, indicated with a cross in the figure gives the number of entering lobbyists that leads to reform with a 50% probability. With the low lobbying cost shown in the figure, L^* exceeds $1 - \text{med}(f^R)$: The probability of tax reform 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 if exemptions are allocated. This points to a more general insight. Lower fixed lobbying costs lead to greater lobby membership but to a *higher* probability of tax reform. It is hardly surprising that lower fixed costs encourage entry. But lower lobbying costs also 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 induce tax reform. At the extreme, 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.

In the higher lobbying cost scenario there are two equilibria, indicated with squares in Figure 6. The right-most equilibrium parallels the low lobbying cost case. The cost of lobbying equals its expected benefits at this point. In the high lobbying cost scenario, an additional equilibrium exists at $L = 0$. If no one enters the lobby, the cost of lobbying exceeds its expected benefits and no individual citizen wishes to lobby.²⁴ Multiple equilibria are not a curiosity of this specific lobbying framework, but a more general feature of the economic setting. As noted in Proposition 2 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

²⁴The 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 and the expected benefits of lobbying would exceed its cost.

lobbying for other citizens. In one equilibrium, there is little lobbying so that the tax base is broad. With a broad tax base, the benefits of a tax break are small and exceed the cost of lobbying. In the other equilibrium, the lobby is large and the tax base is likely narrow. With a narrow tax base, the benefit of a tax break is large and justify the cost of lobbying.²⁵

5.3 Extensions, Robustness, and Other Political Settings

I make a number of simplifying assumptions in the discussion above. As mentioned earlier, the result that reform occurs when g is high is robust. I now summarize a number of the assumptions and their implications.

I introduced uncertainty in public good needs to smooth citizens' preferences. Discrete jumps in preferences pose problems for equilibrium existence and introducing uncertainty is one way to pin down equilibrium.

The fixed cost to lobbying in Section 5.2 is a reasonable, but critical, assumption. With no fixed costs all citizens would lobby and $f = 1$ is always the unique equilibrium. Our main political concern is the conflict between special and general interests and the fixed cost allows us to make this distinction.

The analysis of endogenous lobby membership assumed that the lobby obtained all policy rents. A more general specification where the PM obtains a share of the rents leads to qualitatively similar results.

Graphical results showed the case where all citizens had the same lobby membership 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 are more likely to lobby.

As noted earlier, whether reform is big bang depends on the assumption that the PM cannot discriminate between lobby members. A more general specification where the lobby and PM are allowed to agree on tax breaks for (a randomly selected) subset of lobby members is otherwise similar in its qualitative predictions. High g will lead to reform in

²⁵If the cost of lobbying is so high so as to exceed its expected benefit everywhere, the unique equilibrium is $L = 0$ and therefore $f = 1$.

the sense that the tax base will be increasing in g , but the tax base increases smoothly in g . The results from Section 5.2 follow through as well.

In Appendix A.5, I analyze an extended model that allows the PM to choose the tax base on both the extensive and intensive margins. That is, the PM may decide on both the number and the size of exemptions. As g increases, the tax base increases on both margins: fewer exemptions are allocated and the size of the exemption declines.

The appendix also shows that extensions where government spending is endogenous (A.3) and where firms have heterogeneous productivities (A.6) lead to similar results. The appendix also contains an analysis of a Downsian voting model (A.7), a legislative bargaining model (A.8), and a model where policy is set by a planner with arbitrary weights on the welfare of each citizen (A.9). All predict that tax reform is more likely as g increases.

In summary, the prediction that tax reform occurs at high levels of the public good is robust to modeling assumptions. It is also robust to other political models, including a simple median voter model.

6 Concluding Remarks

Determining the tax base 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 the tax base. When revenue needs are low, they can be met more easily with narrow tax bases. Special interests focus on securing parochial tax benefits, each of which has a only minor implications for overall efficiency, but combined may bring significant dead-weight losses. But greater revenue needs are more costly to fund with a narrow tax base. Special interests become increasingly willing to forgo their own tax breaks in favor of efficiency as revenues increase. Eventually, tax reform is feasible.

At a first glance, it may appear that it would be easier to broaden the tax base through a divide-and-conquer strategy that takes on one special interest at a time. The model proposed here shows that tax exemptions to multiple groups are strategic complements. Special interests will invest greater resources in fighting reform when the tax base is nar-

row. Base-broadening tax reforms may therefore not be etching at the margin of the tax code, but a significant overhaul of the tax system. The general equilibrium 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.

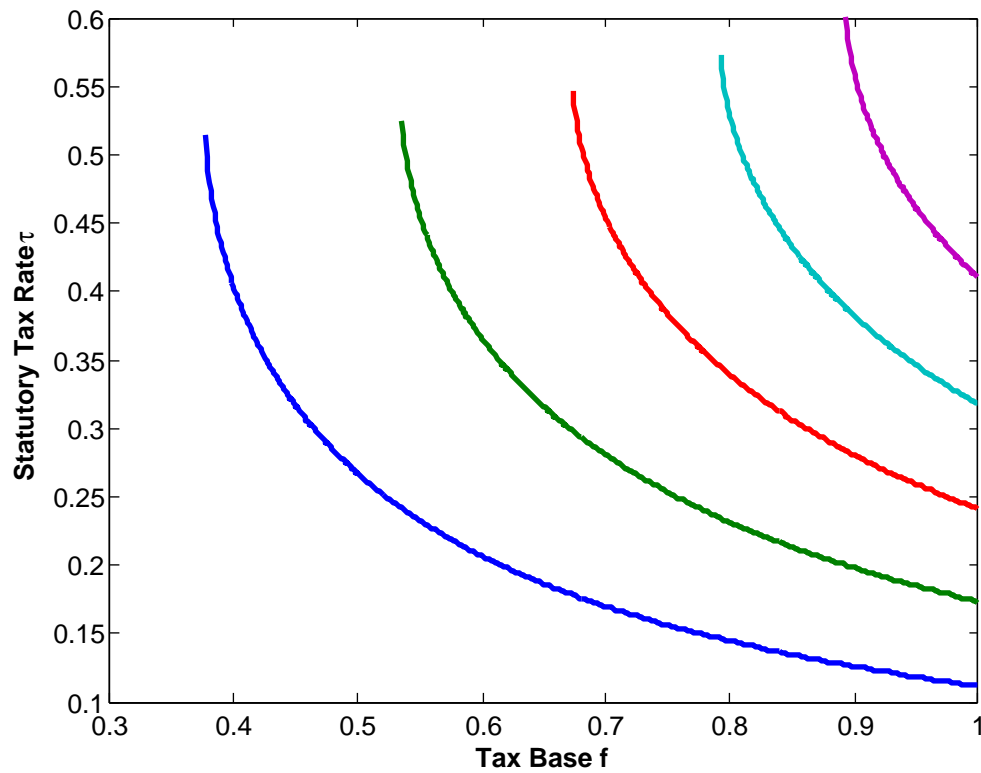
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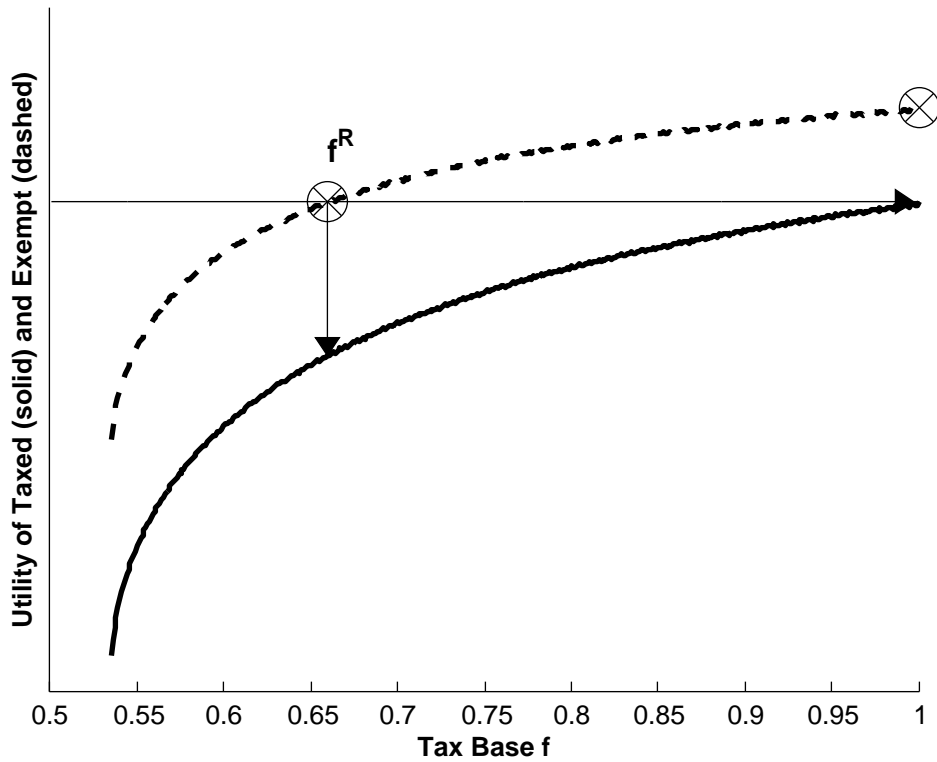
Figure 1: Budget Curves



This figure shows budget curves. Points along each curve are combinations of a tax base f and a statutory tax rate τ that raise the same revenues. The curves further to the right raise higher revenues. Parameter values here and in later figures: $\eta = 0.5, \varepsilon = 2, \mu = 1.1$.

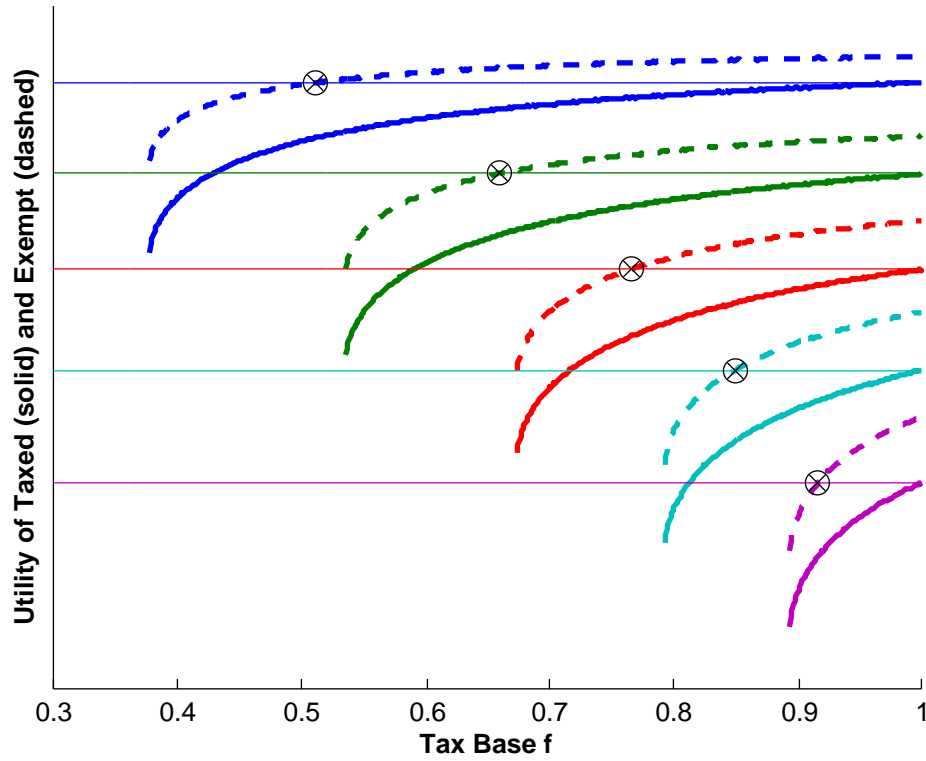
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Figure 2: Utility of Taxed and Exempt Along A Budget Curve



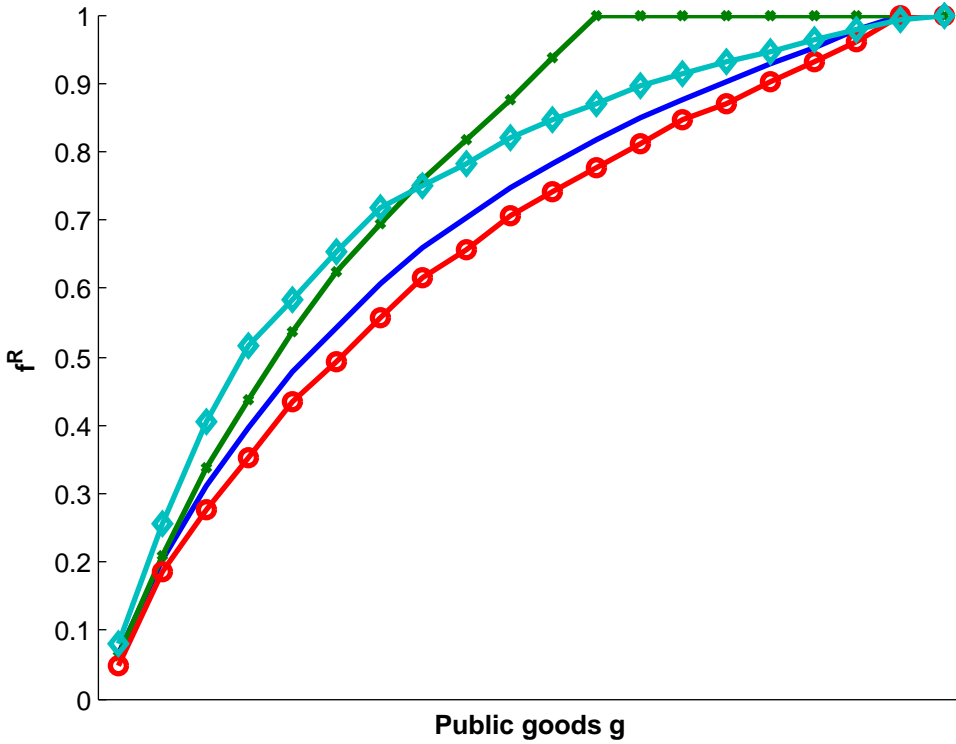
The curves show the utility of citizens whose firm has a tax exemption (dashed line) and those who are not exempt (solid line) as a function of the tax base f . The curves are along a balanced-budget path, i.e. all points on the curves raise the same amount of revenues. The leftmost marker (X) is the utility maximizing policy for a citizen: the broadest possible tax base, while retaining her own tax exemption. The point f^R is the tax base that is the tipping point for reform. At this tax base, exempt citizens are indifferent between retaining their exemption and a tax reform that eliminates all exemptions. The two arrows represent utility losses to losers from reform. The downward arrow is the loss of utility as part of a gradual reform that eliminates one tax exemption at a time. The rightward arrow represents the loss of utility (equaling zero) as part of a “big bang” reform that eliminates all exemptions simultaneously.

Figure 3: Utility of the Taxed and Exempt for Several Values of g



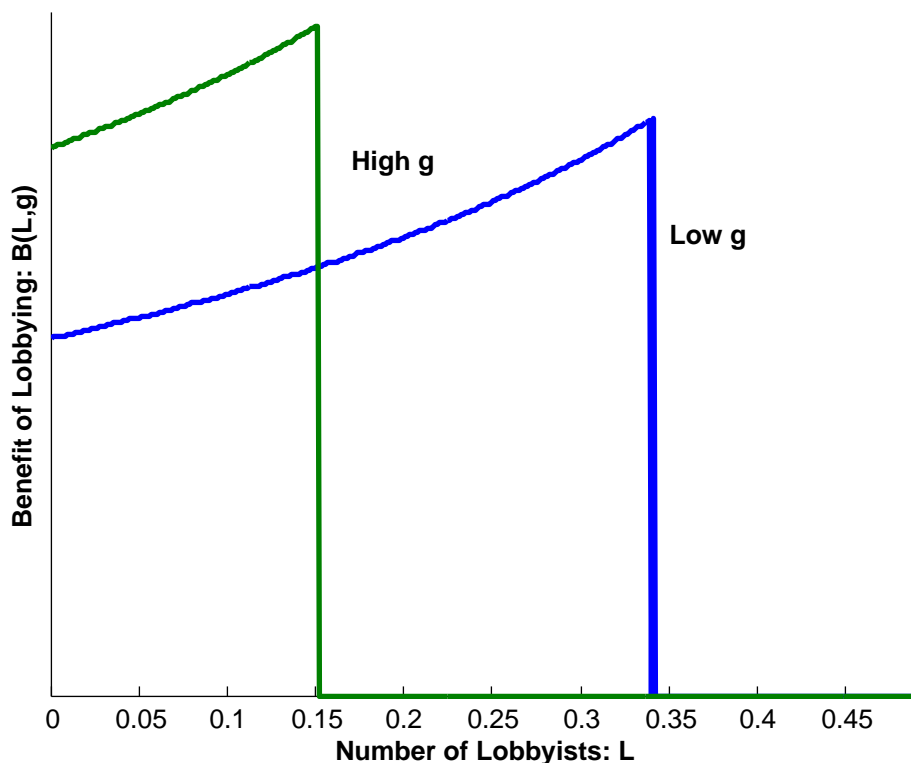
This figure shows the utility of citizens with tax exemptions (dashed lines) and those who are taxed (solid lines). Each pair of curves represents a specific value of the public good g . Curves further to the bottom reflect higher levels of g . The Xs indicate the tax base that triggers reform for that level of public goods: f^R . This is the tax base that leaves the exempt indifferent between a reform that eliminates all exemptions and a tax exemption at that tax base. The figure illustrates that f^R is increasing in g . It also shows that the value of a tax exemption—the gap between the dashed and solid lines—is increasing in g .

Figure 4: The Reform-Triggering Tax Base f^R vs. Public Goods g



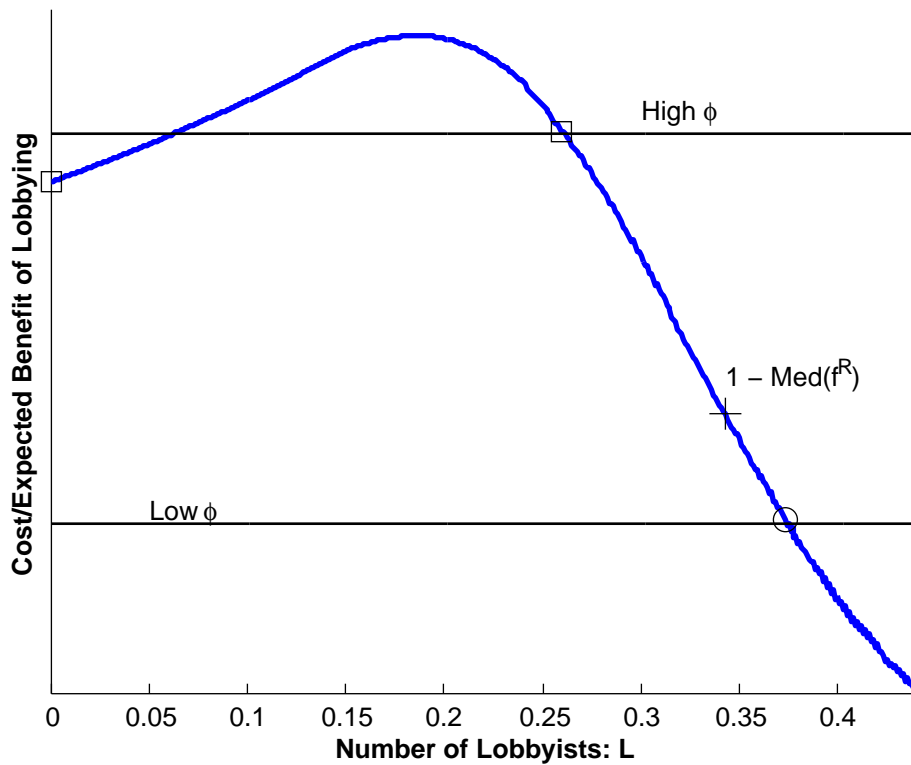
This figure shows the reform-triggering tax base f^R as a function of g , for several parameterizations. In all cases, f^R is increasing in g . The solid line uses the benchmark parametrization of $\eta = 0.5, \epsilon = 2, \mu = 1.1$. The circle markers use $\epsilon = 1$. The square markers use $\eta = 1$. The cross markers use $\mu = 1.05$.

Figure 5: The Benefit of Lobbying vs. the Number of Lobbyists



The benefit of lobbying is plotted against the number of lobbyists entering the lobbying game, for two values of g . The benefit of lobbying is the value of a tax exemption, if tax exemptions are distributed in equilibrium. This benefit is decreasing in the tax base and therefore increasing in the number of lobbyists, as long as exemptions are allocated. There is a discrete downward jump in the value of lobbying where tax reform is enacted. Higher values of g increase the value of tax exemptions when they are distributed, but also reduces the number of lobbyists that can be sustained in equilibrium before reform is passed.

Figure 6: The Cost and Expected Benefit of Lobbying



The expected benefit of lobbying is plotted against the number of lobbyists, before the value of public goods g is realized. In this figure, g is drawn from a normal distribution, but the general shape of the curve would be similar for any distribution. Two values of ϕ , the entry cost, are plotted. For the low lobbying cost, equilibrium is at the circle where costs and expected benefits are equal. The two equilibria for the high cost are shown in squares. The cross indicates one minus the tax base that leads to tax reform with probability $\frac{1}{2}$.