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Taxation and Representation in recent history

Abstract

This paper disaggregates government accounts to examine whether and how representation affects the level and distribution of taxation. Using panel data for over 100 countries from 1970-1999 and cross-sectional data for approximately 75 democracies from 1990-98, we find that both democratization and voter turnout induced a modest but highly systematic increase in revenue from regressive taxes on consumption. While one-third of the increase due to democratization reflects a shift from more inefficient and similarly regressive taxes on trade, most of it was new revenue. Less convincingly, democratization and voter turnout also increased total tax revenue. Neither democracy, nor voter turnout systematically increased revenue from progressive taxes on income and capital. With reasonable assumptions about tax incidence and participation patterns, these findings shed light on competing conceptions of taxation and representation.

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Introduction

Social scientists have expended considerable energy trying to answer who gets what, when and how. Far fewer papers have addressed the flipside of the question—who pays what, when and how—even though the latter also has considerable implications for economic growth and inequality. While there are a host of unanswered questions about the size and composition of government revenue that deserve attention, this paper hones in on just one: the consequences of representation for taxation. The motivation is fourfold: First, while the level and composition of tax revenue varies considerably between countries and modestly within countries, much of that variation has yet to be explained. Second, even though the relationship between taxation and representation has been of practical and scholarly interest for well over two centuries, we are still not entirely sure whether representation systematically affects how much people remit to the state and, more importantly, who pays to the state.[1] Third, there are several competing theories that bear on the question of taxation and representation. Put succinctly: the neoclassical theory of the state posits that representation of $citizen_i$ allows for more taxation of $citizen_i$; the median-voter model of the state, by contrast, loosely posits that representation of $citizen_i$ allows for more taxation of $citizen_{j..}$ Finally, to the extent that there is work on this subject, most papers rely primarily on cross-sectional tests and/or use random-effects models, and virtually all ignore dynamic processes.[2]

This paper explores the relationship between representation and taxation using panel data for 106 democracies and non-democracies from 1970-1999, as well as cross-sectional data for

[1] The current wisdom is that representation does not lead to a change in the level of taxation (Cheibub 1998; Ross 2004). With few exceptions, notably Lindert (1994), the question of how representation affects the distribution of the tax burden has been largely ignored.

[2] Easterly and Rebelo´s (1993) pioneering work on the composition of revenue, for example, largely employs cross-sections, while Cheibub (1998) and Ross´s (2004) comparisons of democracies and non-democracies (using total revenue) do not include fixed-effects for units and years.

approximately 75 democracies. We find that two plausible measures of representation (democratization and voter turnout) systematically affect the level and composition of revenue in ways that are consistent with the neoclassical perspective. Specifically, previous increases in a country´s democracy score on the Polity index (or a switch from non-democracy to democracy using categorical variables), and higher levels of voter turnout (within democracies) generate modest but highly systematic increases in revenue from broad-based but regressive taxes on consumption. Moreover, the effects of democracy and voter turnout appear to be additive, with a one-standard deviation increase in democracy and voter turnout each generating not less than a 1 percent increase in consumption taxes as a percentage of GDP. Roughly one-third of the revenue from consumption taxes attributable to democratization reflects a switch from relatively inefficient taxes on trade. Less convincingly, previous increases in democracy and voter turnout also generated long-run increases in total tax revenue. Finally, though some developed democracies clearly raise more revenue from progressive income and capital taxes, there was no general tendency for either democratization or voter turnout to increase revenue from progressive taxes.

There are several reasons we should care about these findings. First, while 2 percent of GDP is modest, it is not trivial—roughly the annual equivalent of total US spending in Iraq between 2001 and 2006.[3] Where that 2 percent comes from matters. A progressive tax on income and capital, like that in place in the United States from 1980 to 2000, would draw roughly $3 for each $10 earned by a representative household in the top quintile, compared to $1 for each $10 earned by a representative household in the bottom quintile.[4] A flat tax on consumption, by contrast, would

[3] US spending in Iraq totaled $292B between 2001 and 2006 (Congressional Budget Office 2007); US GDP stood at US$12.45 trillion at the end of 2005.

[4] In the 1980s-1990s, the average federal tax rate for families in the bottom quintile was roughly 5-10 percent; for families in the top quintile, it was 25-30 percent (Slemrod and Bajika 2001, p.76).

(nearly) reverse those figures, with the bottom quintile paying 2-3 times more per dollar earned than the top quintile.[5]

Second, the data shed light on the perennial question of how representation affects taxation. The median-voter model is the benchmark in the fiscal policy literature, in part because of its elegant simplicity and pristine predictions, but it is only mildly supported by the contemporary tax data.[6] We believe, instead, that the evidence is more consistent with the idea that representation of $citizen_i$ disproportionately leads to taxation of $citizen_i$, rather than of $citizen_j$: being or becoming more representative allows governments to generate more revenue from taxes that disproportionately affect lower income groups. But the important thing to remember is that if proponents of the neoclassical theory of the state are correct, participation also brings with it increased control over spending, meaning that the net effect for $citizen_i$ may well be positive. A variety of studies using OECD countries suggest that electoral participation is associated with larger transfers and more public spending (e.g., Franseze 2002). Furthermore, Kato (2003), Lindert (2004)

The Bush tax cuts reduced the progressivity of federal taxes, especially at the very top, but federal taxes still retain the 3-1 ratio mentioned above (see Piketty and Saez 2007, Table 2).

[5] Brashares, Speyrer and Carlson (1988) calculated that a broad-based 10 percent value-added tax (VAT) in the United States would cost families earning US$10,000 annually at least 12 percent of their income, compared to 4 percent for families earning US$100,000. Their figures are consistent with Dynan, Skinner and Zeldes (2004, Table 3), who found the marginal propensity to consume 2.2 times higher among the bottom quintile than the top quintile.

[6] In academic and popular discourse, median-voter logic is often connected to progressive taxation. Boix (1998) and Acemoglu and Robinson (2000), for example, highlight instances of progressive taxation as evidence for the median voter model. But because of the difficulty of modeling non-linear tax schemes, which usually lead to cycling and/or multiple equilibria, median voter models typically postulate that taxes are proportional to income, rather than progressive.

and others have shown that regressive taxes fund the bulk of the welfare state spending, while Timmons (2005) has shown that consumption tax revenue is strongly correlated with public health outcomes (e.g., lower infant mortality, longer life expectancies, higher immunization rates and more public health spending). In other words, representation may bind regressive taxes and progressive spending.

This paper is organized as follows. Section 1 sketches out recent tax trends, giving a sense of the variation to be explained. Section 2 summarizes the theoretical and empirical literature that relates to the question of taxation and representation. Section 3 outlines the research design. Section 4 presents the results. Section 5 concludes.

Section 1: Recent trends in taxation

Ben Franklin wrote that "nothing in this world is certain but death and taxes," but the truth is that the level and composition of taxes vary considerably across time and space. In the early 1970s, non-OECD (central) governments raised approximately 14-15 percent of GDP in taxes, according to the World Bank (2004/2006); by the late 1990s, that number had jumped to 18-19 percent. Not only did the level of taxation change, but so did the composition of tax revenue. Trade taxes in developing countries declined from an average of 4-5 percent of GDP in the early 1970s to 3.5 percent in the late 1990s. General consumption taxes, in contrast, rose from approximately 3.5 to 7 percent of GDP, while social security taxes increased from less than 1 percent to just over 3 percent. Taxes on income and capital, meanwhile, held even at around 4-5 percent of GDP. As always, the general trends in taxation mask considerable variation between countries. While the average developing country roughly doubled its revenue from consumption taxes, some countries tripled their revenue yields and others lost ground: in Nicaragua, for example, revenue from consumption taxes went from roughly 4 percent of GDP in the early 1970s to 17 percent in the late 1990s; in Myanmar, by contrast, consumption taxes fell from 6-7 percent of GDP to roughly 2 percent. Put in distributional

terms: The dramatic increase in consumption taxes in Nicaragua substantially increased taxes paid by the poor, while the dramatic decrease in Myanmar almost certainly decreased it.[7]

Section 2: Representation and Taxation in theory and history

The history of representation and taxation is well covered in Hoffman and Norberg (1994), Gould and Baker (2002), Ross (2004), Herb (2005) and Mahon (2006). Rather than recapitulating that literature, we focus on two especially cherished notions about the consequences of representation for taxation. The first notion is that taxation is the handmaiden of representation.[8] According to the neoclassical theory of the state, associated with the fiscal sociologists, notably Schumpeter (1918), as well as a number of contemporary theorists, including North (1981) and Levi (1988), states trade

[7] In passing, we note that Nicaragua aptly illustrates the argument and statistical findings. Given its history of class tensions, one might have expected the (left-wing) Sandinista revolution to generate progressive taxes. Instead, it generated massive increases in consumption taxes, which doubled from 4 percent of GDP during the Somoza period to 8 percent in the first two years of Sandinista rule. Consumption tax revenue peaked at 18.5 percent of GDP in 1985, the period of most intense conflict, and then fell, hitting 11 percent of GDP in 1990, the year Nicaragua "democratized." Rather than continuing to ease the tax burden on the poor and/or taxing the rich more intensely, subsequent democratic administrations increased their reliance on regressive taxes (see Tanzi 2000). Within Latin America, similar, albeit perhaps not as compelling, stories can be told about Argentina (Bird 1992), Brazil (Weyland 1996), Bolivia (Bird 1992), and even Chile (Boylan 1996).

[8] The causal sequencing between taxation and representation is ambiguous. By some accounts, taxation should precede representation (see Ross 2004). Assuming that states maximize revenue for any given level of representation, our interpretation is that, in equilibrium, taxation and representation should move hand-in-hand, albeit with some stickiness. We believe this interpretation squares with the empirical literature, which generally shows that governments did not significantly increase revenue until they conceded representation (e.g., North and Weingast 1989).

revenue for services. Because collecting taxes is costly, states have to bargain with asset holders to raise revenue. As a result of this bargaining process, rulers extend policy-making privileges to taxpayers, giving them a say over policy in return for revenue.[9]

Bates and Lien (1985), arguably, provide the best theoretical explanation for why taxation should go hand in hand with services (and, by extension, representation). Using a simple formal model, they show that if taxable items are privately held and mobile, revenue-maximizing governments face a trade-off between revenue collection and policy concessions. The key comparative static of Bates and Lien's model is that more mobile tax bases should acquire greater control over policy for each unit of taxes paid. But the logic is generalizable. As long as collecting taxes from any tax base is costly, states have incentives to trade policy for revenue. States that make concessions to asset holders will raise more revenue, but lose control over policy. Bates and Lien's model suggests that representation allows for more taxation because it increases the credibility that government will provide services to potential taxpayers, increasing their willingness to pay (see also North and Weingast 1989). Similarly, even though individuals are not the units in the model, the logic suggests that representation of citizen$_i$ allows for more taxation of the citizen$_i$.[10]

[9] The factors that determine the bargain are not particularly well-specified. By most accounts (e.g., Hintze 1975; Tilly 1985), interstate war is the key causal variable pushing the exchange of representation for taxation—without revenue today, there is no kingdom tomorrow—while abundant natural resources are the key variable hindering such a bargain (Ross 1999).

[10] Unfortunately, Bates and Lien´s model waves away collective action problems. To overcome the free-rider problem, there must be some behavioral, reputational or social mechanism that induces what Levi calls quasi-voluntary compliance, whereby individuals accept taxes as long as the state and other citizens do their part. While theoretical explanations for quasi-voluntary compliance are not entirely convincing (Bordignon 1993 provides the most compelling model), the empirical

While anecdotal support for the neoclassical perspective abounds, especially in Western history, establishing a systematic connection between taxation and representation has proved devilishly difficult.[11] Cross-national tests with large Ns by Cheibub (1998) and Ross (2004), for example, find no robust statistical relationship between democracy and taxation. Whereas the former showed that democracies and non-democracies are indistinguishable from each other in terms of revenue collected, the latter showed that increased taxation neither leads to, nor follows, increased democratization.[12] Works that take a more nuanced view of representation within democracies, however, point towards a different conclusion. Lott and Kenny (1999), for example, show that the extension of female suffrage clearly increased taxation in the United States.[13] Likewise, Persson and Tabellini (2004) use cross-sectional data for 80 democracies to show that countries with proportional representation (PR) and parliamentarism have higher tax/GDP ratios than countries with single-member districts (SMD) and presidentalism. Assuming that PR and

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evidence in favor of such behavior is extensive (see Pommerehne and Weck-Hannemann 1996; Alm, McClelland and Schulze 1992; and Becker, Buchner and Sleeking 1987).

[11] The most famous case of such bargaining is perhaps England (North and Weingast 1989), where disputes over taxes and spending triggered a series of showdowns between Parliament and the Crown, which culminated in the Glorious Revolution of 1688. The English story is by no means unique. In France (Gruder 1982), Austria (Schumpeter 1918), and the Netherlands (Hoffman and Norberg 1994), cash-strapped rulers extended some form of representation in return for revenue.

[12] Ross´s results are not necessarily inconsistent with the neoclassical theory of the state. As long as taxes and spending move in tandem states need not grant formal representation. Only when taxation increases without a corresponding increase in spending do countries democratize.

[13] Lott and Kenny do not explore the composition of taxes so the distributional consequences of the changes are unknown.

parliamentarism are more generally representative (see Huber and Powell 1994; Lijphart 1999), their results suggest that representation and taxation are correlated.

None of the aforementioned works—except Lott and Kenny—include time and unit fixed-effects (or specify a dynamic model), and none take the next step, disaggregating the tax burden. Disaggregating taxes would provide us with more leverage over the question of how, specifically, representation affects the structure of taxation, not just the level. In particular, it behooves us to know whether the people acquiring representation are the ones paying the taxes, consistent with (our extension of) the neoclassical theory of the state.

The second cherished notion is that redistribution is handmaiden of representation. The most important theoretical statement is the median voter model, popularized by Meltzer and Richard (1981), and extended by Boix (1998), and Acemoglu and Robinson (2000), among others. While there are numerous complexities that could be introduced, the essential features of the median voter model are as follows.[14] The state has a single tax instrument, which is proportional to income. Revenue from this tax is then distributed on a per capita basis. Assuming majority vote, the tax rate will be determined by the initial distribution of income and the position of the median voter (as determined by participation levels and the extent of the franchise). The greater the distance between the median voter´s income and the mean income, the higher the tax rate and, hence, the level of redistribution. Changes in the franchise or different participation rates along the income continuum shift the median voter to the left or right, causing a corresponding increase/decrease in the tax rate. Given the fact that real world taxes need not be (and generally are not) proportional, a number of people have tried to model non-linear taxes. With some restrictions, the median voter´s

[14] Second generation median-voter models have incorporated a number of real-world features of political systems into the model, such as differences in electoral systems and lobbying by groups, but they still hinge on several questionable assumptions: (1) elections can be reduced to a single dimension (money); and (2) following the election, everyone complies.

optimal tax is progressive (Cukierman and Meltzer 1991; de Donder and Hendriks 2003).[15] In other words, the median voter model, especially in popular discourse, typically posits that representation of one group of citizens allows for increased taxation of another group of citizens. Acemoglu and Robinson (2000) put it even more starkly, arguing that democracy emerges and survives precisely because it transfers income from rich to poor.[16]

As with the neoclassical model of taxation and representation, there is modest, but not compelling, evidence that the median voter model applies loosely in Western history. Acemoglu and Robinson (2000) highlight the United Kingdom as evidence for the median-voter model because expansions of the franchise were accompanied by an increase in the progressivity of the tax system, but Lindert´s comprehensive analyses of pre-World War II data (1880-1930) finds mixed results. On the one hand, democracies did not have greater revenue yields from income or inheritance taxes as a percentage of GDP (nor did they have higher levels of social spending). With only a few exceptions, increases in suffrage were generally associated with lower (albeit statistically insignificant) income and inheritance tax rates and transfers. On the other hand, countries that increased male participation rates from 40 to 70 percent (but not from 70 to 85 percent) were associated with higher social spending and greater income tax yields, while countries with female suffrage were associated with more social spending, more revenue from income taxes and more revenue from inheritance taxes. Within and between country tests using contemporary data have also turned up mixed results (see Milanovic 2000 and Rodriguez 1999).

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[15] De Donder and Hendrik´s model, for example, hinges on a closed feasibility set, corner preferences, and exogenously determined incomes.

[16] Acemoglu and Robinson (2005) back away from their stark prediction. While still conceiving of democracy as a distributional game, they argue that "de facto" power trumps formal institutions. One could argue that many results—including the ones we present—could be consistent with the re-formulated conjecture.

To sum up: Not only do we have an abundance of data that is worth analyzing, but we have a handful of theories that link representation to taxation. With some extensions, these theories make different predictions about the level and distributional composition of tax regimes.

Section 3: Research Design

Our analysis builds on the following premises:

1: We can make reliable inferences about the composition of voters and the position of the median voter from aggregate participation levels. We start with the naïve assumption that democracy shifts the median voter to the left, thereby incorporating $citizen_i$ into the political process. Likewise, we posit that within democracies higher levels of electoral participation favor $citizen_i$ since virtually every study of voter turnout shows that higher income groups participate more than lower income groups (Lijphart 1997). Hence, a democracy will draw a higher percentage of lower income people into the political process than a non-democracy, while a country with higher turnout will draw a higher percentage of lower income people into the political process than a country with low turnout.

2: Based on incidence assumptions that are fairly common in the economics literature (see Fullerton and Metcalf 2002), we can assign taxes to $citizen_i$ and $citizen_j$, based on their relative impact. Taxes on trade and taxes on consumption (also referred to as taxes on goods and services) are assigned to $citizen_i$ because empirical studies show that they are usually regressive (Ebrill, Keen, Bodin, and Summers 2001).[17] Taxes on individual income, profits and property, in contrast, are assigned to $citizen_j$ because they are typically progressive. [18] While empirical studies suggest that social security

[17] Consumption taxes tend to be highly regressive in terms of current income; they are less so in lifetime perspective, especially in countries with high social mobility. Most empirical studies find import taxes to be regressive; there is more debate about export taxes (Ebrill et. al. 2001).

[18] Not only do most countries have progressive rate structures for income taxes, but many have thresholds well above the poverty line, especially in developing countries. Rich countries tend to have broader tax income tax bases, but most are still considerably progressive vis-à-vis alternative

taxes are generally regressive, they are not assigned because is more difficult to generalize about their (net) incidence across time and space.[19]

These propositions give rise to several testable, albeit informally-derived, conjectures.

Neoclassical Hypothesis: More representation should be associated with more revenue from relatively regressive taxes.

MV hypotheses: More representation should be associated with more total tax revenue (standard version) and/or more revenue from progressive taxes (popular version).[20]

Dependent variables

Using World Bank data (2004/2006) we disaggregate (central) government revenue into the following categories:

Taxes on citizen$_i$:

Consumption taxes, which includes general sales and turnover or value added taxes, selected excises on goods, selective taxes on services, taxes on the use of goods or property, and profits of fiscal monopolies.

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revenue schemes. Corporate and property taxes are generally considered to be progressive, though some would debate this point (see Auerbach 2005 and Fullerton and Metcalf 2002).

[19] Social security taxes are typically regressive, but since they are also explicitly tied to progressive benefits, the net effect is often progressive (see Orszag and Stiglitz 1999).There are also some not easily resolved data issues. Autonomous institutes sometimes receive the monies (rather than central government) and the proliferation of mandatory, yet private, pension schemes makes for awkward and potentially misleading breaks in the time-series (e.g., Chile).

[20] Most papers that use the tax/GDP ratio assume that the incidence of taxes across countries is the same. We think that taxes/GDP is not a good indicator of average rates because it ignores the composition of taxes; the same tax/GDP ratio means different things in different places.

Trade taxes, which includes import and export taxes.

Taxes on citizen$_j$:

Income and Capital taxes, which include taxes on income, profits and capital gains, inheritance taxes, and nonrecurrent levies on capital.

Taxes not assigned to citizen$_i$ or citizen$_j$:

Social security taxes.

Unclassified taxes, a residual category that includes employer payroll and other labor taxes, property taxes, and taxes not allocable to other categories.

While we include all tax categories in our analysis, we focus primarily on taxes on goods and services and taxes on income and profits since they were the largest sources of tax revenue for most governments during the period under study, accounting for approximately two-thirds of total tax revenue.[21] All revenue is measured as a percentage of GDP, which captures the ability of states to extract revenue from different social groups, controls for the size of the economy and is available for a large set of countries and years. Since sub-national data are not yet available for a large set of countries, the revenue data are only for central governments only. The absence of sub-national data should not be a major concern since sub-national taxes are relatively modest in most countries (World Bank 2007). Moreover, the sample is large enough that we can exclude federalisms and/or include country fixed effects. Finally, we think the exclusion of sub-national data will, if anything, bias the analysis against finding a (positive) relationship between consumption taxes and representation, given that sub-national taxes are frequently regressive and democracy overlaps with sub-national taxes.

Independent Variables

[21] The correlation between revenue from goods and services and revenue from capital is approximately 0.3, suggesting that there is no trade-off between taxing the citizens i and j.

We start from the premise that comparing democracies and non-democracies is a meaningful exercise, even though both categories are clearly heterogeneous (Lijphart 1999). Our main measure of representation is the 0-20 Polity scale (Marshall, Jaggers, and Gurr 2004), arguably the most common measure in the literature. It is highly correlated with alternative measures, notably Vananhen (2000), and has faired reasonably well in several head-to-head comparisons (e.g., Hadenius and Teorell 2004), but is clearly imperfect. Not only does it tap into constraints on the executive more than representation per se, but linear interpretations are problematic, as small (ans substantively meaningless) movements at the very top and very bottom can be highly influential. To mitigate the problem of linearity and prevent small movements at the extremes from being overly influential, we also create 0-1 categorical variables using 11 and 14 on the Polity scale for the threshold for democracy.[22] Because our interest is in the effect of representation over time, these measures were backtracked to 1960, which allows us to fully exploit the available revenue data without losing many observations. Starting the Polity data in 1960 also means that some countries do not just transition to democracy, but also from democracy to non-democracy.

For the comparison within democracies, we assume that voter participation is a reasonable measure of representation. While there are a variety of ways that people can express themselves politically—and hence a variety of ways that people can be obtain representation—we assume that voting is a meaningful activity. Whether people vote because they are satisfied or dissatisfied, voting allows them to express their preferences over policy, as well as to select/sanction politicians

[22] We recognize that measures of democracy are not exchangeable and that our particular measure taps more into constraints on the executive than representation *per se*. The presumption is that the Polity measure is sufficiently well correlated with representation to compare democracies with non-democracies. We would add an alternative if we knew the appropriate one. Vananhen's measures of competition and participation make little sense individually, while any combination of them (e.g., multiplicative, additive, weighted) seems totally arbitrary.

(Powell 1982). Equating voting with representation implies a process-based interpretation of representation, rather than an outcome-based interpretation. That is, $citizen_i$ feels represented if she votes, regardless of whether her preferred policy or outcome is adopted. Voting merely increases the probability that her preferred policy will be adopted. Electoral participation is measured as the percentage of the voting age population that voted in the last parliamentary election, taken from IDEA (2006). (Because taking participation as exogenous may be problematic, most of the institutional and socio-economic variables thought effect turnout are included in the models).[23]

Samples

To compare democracies and non-democracies we use a panel of 106 countries from 1970-99, using all countries with both tax and democracy data.[24] To prevent changes in the country sample from driving the results, our preferred specifications use a balanced panel (in width) containing 106 countries—the number of countries with at least 2 consecutive observations for all tax categories and (nearly) complete data for the right hand side variables.[25] We also restricted the sample to countries with at least 10 and at least 20 observations for the tax variables ($n\approx100$ and $n\approx70$ respectively), and expanded the sample to include all available tax observations ($n\approx106$-118,

[23] While few (if any) variables systematically affect voter turnout, according to recent surveys (e.g., Blais 2006), we include district magnitude, compulsory voting laws and several other covariates.

[24] Country lists available.

[25] While it was not feasible to balance the panel in length, we also ran the models with the same set of country-year observations (N=1694), which produced similar results, especially with relatively long lag structures. The main differences between the two samples (N=1750 and N=1694) is that with the latter we lose observations for 1970 and 1971 and we lose additional observations for Singapore and Kuwait since they do not have a complete time series for Polity. Because most of our missing data is for the tax variables, we have used listwise deletion for missing values, rather than multiple imputation.

depending on the specific tax variable and specification). Our robustness tests included jackknifed re-sampling techniques in which we dropped individual countries and standard country groupings (e.g. the OECD), allowing us to detect influential cases, notably Spain, Venezuela, and Argentina. Furthermore, since some non-democracies in the sample were clearly over-sized coalitions (e.g., communist countries), in which lower income groups had representation, even if not formalized via electoral institutions, we ran models without the most prominent long-standing, left-wing dictatorships—the former Soviet Block. Finally, because copious natural resources can distort the tax system and generate misleading inferences about who is bearing the tax burden, we also ran models with and without rentier observations, defined as country-years in which natural resource exports exceeded 30 percent of exports, taken from Herb (2005). When the rentier distinction made a substantial difference, we present models with the restricted sample.

Our second dataset is designed to look only at variation within democracies. We use a modified version Persson and Tabellini's (2004) fiscal institutions dataset, which covers 85 democratic countries from 1990-1998 (note: that the N drops to around 75 with the revenue data).[26]

Methods

Our goal is to estimate the partial effects of representation on the level and composition of taxation. The main assumption we make is that the affects of representation on taxation could be instantaneous or deferred, given that regime transitions can be messy affairs. While we estimated with a number of models, including a simple moving average model (described in the footnote), our preferred model is a generic autoregressive distributed lag (ADL) model, which produces unbiased

[26]Using data for the 1980s, with far fewer cases (only 62 democracies with tax data, fewer with controls) and a smaller set of control variables (e.g., no measures graft and government efficiency) yields similar results (available). Note too that using central government tax shares (direct vs. indirect) for some European and North American countries (N=11-16), we find that more representation equaled a larger share from indirect revenue before 1900 (available).

and asymptotically consistent estimators under fairly general conditions (Davidson and MacKinnon 1993).[27] Specifically, the ADL model requires that the data be stationary (i.e., the coefficient on lagged dependent variables (β_1) must be less than 1);[28] that the parameters of interests be weakly exogenous (i.e, uncorrelated with contemporaneous and future errors);[29] and that the countries have a common lag structure. The ADL is more appropriate than individual lags, contemporaneous correlations or first-differences as long as we expect democratization and taxation to be sticky and have no strong priors about how quickly representation should affect taxation (De Boef and Keele 2005). The ADL captures the immediate and cumulative affects of changes in representation on taxation, teasing out the affects of democratization as it feeds it way through the system over time. Lags of the dependent variable eliminate serial correlation, with the length of the lag determined by Lagrange Multiplier Tests.[30]

Our basic model is

$Taxes_{it}=\alpha + \beta_1(Taxes\sum_{it-1\rightarrow t-p}) + \beta_2(Representation\sum_{it0\rightarrow t-q}) + \beta_3(Controls_{it}) + \beta_4$(fixed effects for i and t) $+ \varepsilon_{it}$, where

[27] As with any model with a lagged dependent variable on the right-hand side, the ADL is only consistent asymptotically in T. To mitigate this problem, we also restricted the sample to countries with at least 20 observations, at which point any bias should be small (Hendry 1995). The simple moving average model took the same form as the ADL, except that we substituted a 10-yr moving average of democracy for the individual terms.

[28]The dependent variables are highly persistent, but Levin-Lin-Chu (2002) tests of non-stationarity (using a smaller sample, N=30 1972-1998) allow us to reject the null of non-stationarity at the 99 percent confidence level for all of the tax variables except trade (see Table 4D).

[29] We assume weak exogeneity. Using a dead start specification, which excludes the contemporaneous values of β_2, yields similar results.

[30] One lag of the DV suffices to eliminate virtually all serial correlation. LM tests available.

i and t index countries and years respectively;

p refers to the number of lags of the dependent variable;

q refers to the number of lags of the parameters of interest;

ε is white noise with a mean of zero and constant variance;

taxes are divided into their component parts (consumption, trade, social security, income and capital, other taxes);

representation is measured as the Polity 0-20 index and as a 0-1 indicator variable;

and B_3 is a vector of economic, demographic, social and political characteristics.

To guard against the possibility that taxes today are less a function of previous levels of democracy than a function of immediate factors, such as dramatic decline in the level of democracy (i.e. a coup), we also separated the sample into "permanent" from "temporary" liberalizations: Observations were coded as permanent if their Polity score at time T_0 was equal or greater than the Polity score for the longest lag in the specification (e.g. $Polity_{t-n}$). Observations were coded as temporary if their Polity score in T_0 was at least 5 points lower than it was at the time of the longest lag; the results remain consistent with higher thresholds (say negative 5-9), up to the point that the N becomes too small for analysis, but not lower ones (i.e., countries with small declines appear to be no different than countries that stay the same or increase).

We employed single equation models for each DV and seemingly unrelated regressions for all of them together (SUR, Zellner 1962). The latter allows the independent variables to vary across equations, but uses the information about the covariances to produce estimators that are just as efficient, if not more so, than single-equation ordinary least squares.[31] The cross-sections follow the

[31] With the single equation models we used clustered standard errors and (separately) panel corrected standard errors (PCSE, Beck and Katz 1995). Those models are available.

same basic set-up, except that the models do not include lagged dependent variables or fixed effects for units and years.[32] Instead, we control for unit heterogeneity with a broad array of controls.

Control variables

Unfortunately, we do not have a theory that explains the size and composition of government revenues. Based on previous empirical endeavors, we employed the following controls, not all of which were included in the final model since most were generally not statistically significant:[33]

War (0-1, Sarkees 2000). The causal relationship between war, taxation and representation is unresolved, but the extant literature suggests that there may be a systematic relationship.

GDP per capita (log). The causal relationship between income and taxation is also unclear, but some theories link income levels to tax levels and structures (Hinrichs 1966).[34]

Value added in manufacturing (% GDP) and industry (% GDP). Given the possibility that changes in economic structure might also explain changes in tax structure, we included manufacturing and industry value added.[35]

Trade as a percentage of GDP. There is a large theoretical and empirical literature connecting trade to the size of the state (Rodrik 1998).

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[32] Because voter turnout is quite stable in most countries over time, we estimate its effects with cross sections, rather than a panel.

[33] The final specification for each dependent variable only includes variables that were consistently significant at the 90 level (in point of fact, most are significant at the 99 confidence level).

[34] Adjusting national income for purchasing power parity proves to be a better fit in most cases, but it costs observations. Different measures of GDP do not substantially alter the conclusions.

[35] Value added in industry and manufacturing were not included in the final specifications because they considerably dropped the N (to around 1300). They were significant with some of the tax variables, but did not change the conclusions that follow.

Fuel and mining exports as a percentage of exports. Fuel and mineral exports have strong theoretical and empirical links to the level and structure of taxation because they may reduce the state´s dependence on citizens for revenue.

Total population (log), urban population (%) and working age population (pop15-64 %), population 65+ (%). Demographic composition, notably the working age population, may affect the state´s capacity to tax.

Fixed effects for years and units (used in all of the models presented below).

For the cross-section, we employed the variables above, plus all of the variables in the PT dataset. They include:

Ethnolinguistic fractionalization (elf)

Income inequality (gini)

Indicator variables for countries with Catholic, Protestant and Confucian populations exceeding 80 percent

Indicator variables for legal origin, colonial heritage, geographic regions and OECD membership

Indicator variables for federalism, presidentialism and single-member districts

Various measures of district magnitude, including the seat-to-vote ratio (seat_vote) and average district magnitude (truemagn)

Measures of graft and government efficiency

We also added indicator variables for compulsory voting (compulsory) and for countries with strict enforcement of compulsory voting laws (enforcement), taken from IDEA (2006)

Section 4: Results

For purposes of review, we present the results looking at the consequences of democracy for taxation in three Tables—two of which would presumably be confined to a web appendix. Table 1 (for the paper) provides a snapshot of the long-run relationships between democracy and tax levels and structures, with the contemporaneous value of Polity and up to 12 consecutive lags, using the

preferred specification for each dependent variable. For space reasons, the coefficients and standard errors on the control variables have been suppressed; additional results are available in Table 1B, which take a closer look at the specification with 11 consecutive lags ($\sum\beta_{2t0\rightarrow t-11}$), when most of the tax variables are close to their maximum coefficient and significance levels.[36] For people who prefer simpler models, Table 1C presents the results with 10-yr averages with the separate samples for "temporary" and "permanent" democracies. For people who prefer pictures, graphs are available. (Tables 3A-D provide summary statistics and correlation matrices.)

In Table 1, the tax variables, key independent variable (Polity) and main test statistics are listed down and the lag structure is listed across.[37] The F-test refers to the test of joint significance for the coefficients on Polity, indicating the existence of any systematic relationships.[38] The reported coefficient is the immediate effect of a change in democracy plus the sum of the estimated coefficients for each lag ($\sum\beta_{2t0\rightarrow t-q}$); the long-run multiplier is the sum of the coefficients divided by $1-\beta_1$. The AIC and BIC statistics at the bottom indicate that the long lags produce no harm in terms of over-fitting the models. Not shown in Table 1 is that fact that the fixed effects for units and years are typically significant at the 99.9 percent confidence interval (even with relatively full models),

[36] Table 1B shows the results with alternative samples and the 0-1 measure of democracy. Results with alternative control variables and with clustered and panel standard errors are also available.

[37]Social security was included in the system of equations, but we excluded it from the table. While social security taxes are also negative and significant with some specifications, all of the results hinge on one country, Argentina. Excluding Argentina (F no Argentina in Table 1A) or using a 0-1 categorical variable for democracy (Table 1A), there is no robust relationship between democratization and social security tax revenue.

[38] Because of multicollinearity, the ADL gives relatively imprecise estimates for the individual lags, which will be reflected in their standard errors. But the cumulative long-run estimates (or long-run propensities) are generally quite good, assuming the criteria above are satisfied (Wooldridge 2000).

and that the coefficients and significance levels of Polity decline with lags greater than 13 for all of the dependent variables, indicating that democracy has a one-off effect, much like we would expect. Likewise, the Breusch-Pagan test statistic for the independence of errors across models has been omitted, but it is worth noting that we can reject the null of independence at the 99.9 percent confidence level in all cases.

Table 1 shows that the immediate effect of an increase in the level of democracy on consumption taxes (β_{2t0}) is negative and marginally significant, but the relationship turns (and stays) positive and significant at the 1 percent level from five lags onward.[39] Eleven years after an increase in the level of democracy, the cumulative effect of a change reaches its highest estimated level, 0.0324.[40] The long-run effect of a one unit increase in Polity is a 0.13 percent increase in consumption taxes as a percentage of GDP, but a one standard deviation increase in Polity (7.63) translates into roughly a 1 percent increase in consumption taxes (roughly one-quarter of a standard deviation, SD=3.92). These results are highly contingent on the amount of time one allows democracy to act (i.e., with less than 4 years the coefficient is typically negative), but they are not sensitive to changes in the sample (e.g, excluding Eastern Europe, countries with recent transitions, or the OECD), to changes in how democracy is measured, or to alternative specifications. Using categorical variables for democracy (Tables 1B-1C), or single equation models, in fact, generates larger long-run propensities (1.1 and 0.14). More surprisingly, perhaps, is the fact that goods and services are fairly consistent across the Polity continuum, (e.g., testing on subsets of the continuum 0-10 or 11-20 yields positive and significant relationships, with long lags—results available).

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[39] The fact that consumption taxes are significant at T_0 is driven by a few observations (e.g., Eastern Europe, Kuwait).

[40] If we restrict our sample to "permanent"changes (e.g., countries that only experience one change to or from democracy within a five or 11 year window), we obtain similar results, albeit with slightly larger long-run propensities. See Table 1C for a quick summary.

Not all of the revenue from consumption taxes is new revenue, however. Roughly one-third of it reflects substitution from trade taxes, which are negative and significant at the 90-95 confidence interval from lag 2 onward. Much like consumption taxes, trade taxes reach their largest estimated coefficient (-0.0128) roughly a decade after a change in democracy. In the long-run, a one standard deviation increase in Polity decreases trade tax revenue by 0.37 percentage points, roughly 10 percent of a standard deviation (SD=3.79). As above, the reported coefficient is not especially sensitive to changes in the sample or to the manner in which democracy is measured.

The point estimate on Polity is also positive with taxes on income and capital with all lag structures. While never significant at the 5 percent level (or less), it is significant at the 10 percent level on three occasions (the sum of lags 0-3, 0-11 and 0-12). As with the other tax variables, the coefficient increases substantially with time, from 0.02 with three lags to a maximum of 0.044 with 11 lags. In the long-run, a standard deviation increase in Polity (with 11 lags) translates into a 1.2 percent increase in income and capital taxes (roughly one-quarter of a standard deviation, SD=4.81). These results, however, are highly sensitive to sample and measures, not just time. Excluding one influential case (Spain), using 0-1 categorical variables for democracy (Table 1A, Model 3), or excluding countries with steep falls in democracy (Table 1C), the immediate and cumulative effects of higher levels of democracy are always indistinguishable from zero.[41] Furthermore, as one might suspect, income and capital taxes are also (mildly) sensitive to the inclusion/exclusion of rentier states, notably Venezuela, Ecuador and Nigeria, where progressive taxes are (spuriously) correlated with higher Polity scores (Table 1C).

Total tax revenue follows a similar pattern as income and capital taxes. While the point estimate is consistently positive, it is not typically significant, especially with varying measures and

[41] The change in F-stat indicates that Spain makes a substantial difference. Note also that with the democracy dummy, where democracy is defined as Polity≥11, the F-value for the Wald test with income and capital taxes is generally above 0.5 (see Table 1B, columns 3-4).

samples. With the base model, it is generally positive, but only significant at conventional levels with a very long lags (10-12 years). It is not typically significant when jackknifed (Spain is influential), when rentier observations are excluded (Table 1B), or when consumption taxes are stripped out of total taxes.[42] Democratization reaches a maximum coefficient 0.0570 at 11 lags, roughly 1.7 percent of GDP when multiplied by one SD.

Table 2 presents the results looking only at the variation within democracies, using voter turnout. Like Persson and Tabellini (2004), we were bedeviled by the fact that it was difficult to establish a preferred specification since few of the control variables were robust. Furthermore, a number of controls that probably belong in the models—notably fuel exports and income inequality (gini)—cause a fairly precipitous decline in the sample (from 75 to 60). Nevertheless, the core results—that higher voter turnout generates a modest increase in consumption taxes, and less robustly, more overall tax revenue—are remarkably consistent across specification. Model 1 controls for GDP per capita. Model 2 includes a battery of controls for country characteristics and demography. Model 3 introduces institutional controls, including level of democracy (gastil), years of democracy (logged), federalism, presidentialism, district magnitude and compulsory turnout. Model 4 adds controls for graft, government efficiency and legal systems. Model 5 includes fuel exports and gini, which are saved for the end simply because they reduce the sample. While some of the models are quite ponderous, test diagnostics (AIC and RMSE) generally indicate that the additional controls are warranted. Model 5, in fact, has the highest R-squareds, the lowest mean squared errors and lowest AIC scores, making it the preferred model.[43]

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[42] We subtracted consumption taxes from total taxes and estimated the same models with a modified dependent variable (Total Tax2=Total Taxes-Consumption Taxes). Polity was never significant with the new DV, indicating that consumption taxes are the key component (results available).

[43] Given that this is a cross-section, the main threat is probably omitted variable bias; hence we have chosen to include more control variables rather than fewer. The results are also robust when other

With every specification, consumption taxes are significant at the 1 percent level, with a coefficient that is generally between 0.062 and 0.073. A one standard deviation increase in voter turnout (SD=16) is associated with roughly a 1 percent increase in consumption taxes as a percentage of GDP—a little more than 25 percent of a standard deviation across the sample. While voter turnout is not as robust with total tax revenue as with consumption taxes, there is a fairly systematic relationship; with the most fully specified models (4-5), the coefficient is approximately 0.13.[44] A one standard deviation increase in voter turnout translates into roughly a 2 percent in total tax revenue, just less than one quarter of a standard deviation. Voter turnout is not systematically related to any of the other tax variables (with the full sample).

One obvious concern is that voter turnout could be capturing the affect of democracy and vice-versa. Given this concern, we also ran the models with different samples, shown in Table 2A (for the internet). As before, we present rather full specifications since the RMSE and AICs tend to be lower. Restricting the sample to countries that were democratic before 1975 (or 1980), excluding the OECD, federal countries, or "bad" democracies (i.e., the countries that score the highest on the gastil index), has little affect on the coefficients or significance levels of consumption taxes. If anything, the coefficient for consumption taxes is larger in long-standing democracies (0.8 to 0.12).

Except for capital and income, which remains unaffected by virtually any treatment, changing the sample affects some of the other tax variables, however. In very long-standing democracies (pre-1975), more voter turnout translates into a larger increase in total tax revenue (around 0.20, roughly 3 percent of GDP in the long-run when multipled by one SD), a result that is consistent across specification. With non-federal countries and "good" democracies voter turnout is

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control variables (e.g., colonial origins and regional dummies) are added, but it was not worth showing. While we think the AIC is more appropriate given the sample size, it should be noted that model 5 also had the lowest BIC.

[44] Even when we strip out consumption taxes (FN41), the relationship remains fairly strong.

not significant with total tax revenue, a fairly consistent non-result.[45] Since we think federalism and OECD membership can be treated as intercept variables, and because the main concern is that democracy rather than voter turnout is driving taxes, we think model 5 is most appropriate. Our interpretation is that voter turnout translates into higher overall tax revenue, but this conclusion could be debated. What would be harder to debate is the fact that voter turnout generates more revenue from consumption taxes, which is consistent across samples and specifications.

Conclusion

This paper has explored the contemporary relationship between representation and taxation. Using moderately disaggregated tax data for more than 100 countries for as many as 30 years, we showed that an increase in democratization has no immediate effect on either tax levels or structures that is robust across samples. Assuming that the effects of democratization take as much as a decade to play out, our results indicate that both democratization and voter turnout unambiguously increased the amount of revenue states obtained from taxes on consumption. These results hold with the standard Polity measure, different definitions of democracy, and a variety of different samples. A one-standard deviation increase in both democracy and voter turnout would generate a 2 percent increase in consumption taxes as a percentage of GDP, the equivalent of one-half of a standard deviation increase in consumption taxes across the sample, or roughly two-thirds of total public health spending in the sample.[46] One sixth of this revenue represents substitution from trade taxes, which are also regressive, but five-sixths of it represents new revenue. Democracy is also consistently positive with total tax revenue and revenue from progressive taxes, but sensitive to specification and sample. Excluding influential cases and rentier observations, the relationship is not statistically significant, regardless of the lag structure. Voter turnout, by contrast, switches signs

[45] Social security taxes increase with voter turnout in non-OECD countries. Trade taxes are positive and significant with voter turnout in long-standing democracies; the result is semi-robust.

[46] The mean value for public health spending across all country-years is 3.3 percent of GDP.

with progressive taxes; it is positive and (generally) significant with total tax revenue, especially in long-standing democracies.

While we recognize that the data suffer from a number of imperfections and that it is impossible to reach strong conclusions without micro-level data about tax incidence, participation patterns and spending, we interpret the results as follows. Assuming (quite plausibly) that democratization and higher voter turnout shift the median voter to the left and that consumption taxes are regressive, then representation of $citizen_i$ leads to taxation of $citizen_i$, consistent with the neoclassical model of the state.

Whether representation of lower income groups also facilitates taxation on the wealthy is difficult to discern unambiguously. Consider first the popular version of the median-voter model. On the one hand, neither democratization, not voter turnout systematically generate progressive taxation, suggesting that popular versions of the median voter model are not generalizable—one only need to look to Latin America to find examples of dogs that did not bark (Tanzi 2000).[47] On the other hand, the point estimate for democratization is consistently positive with progressive taxes, and the Spanish case, in particular, indicates that some new democracies acquired more revenue from income and capital following their transition, suggesting that democracy can make a difference, conditional on other factors (notably national income).[48] Furthermore, given that rich

[47] With contemporaneous measures and very short lags, only the popular version of the median voter model has *any* support: Polity is consistently positive with income and capital taxes and negative with consumption taxes; the point estimates, however, are almost always insignificant and tiny, amounting to less than 0.5 percent of GDP when multiplied by one SD.

[48] Establishing what those factors are is an important item for research. As noted in FN 40, national income matters. One other possibility is that "state capacity" is the missing variable. Finding a valid measure of state capacity (let alone a time-varying measure) is not easy. Theoretically, employing state capacity as an explanatory variable begs the question of why less representative states with the

democracies with high Polity scores clearly raise more revenue from income and capital than all other countries in the sample, we know that in the long-run exceptional democracies tax the rich intensely. The question that we cannot answer with our data with any reliability is whether *changes in median-voter are the mechanism*. Our prior is that, within democracies, voter turnout is a better proxy for representation of lower income groups (and hence the position of the median-voter) than exceptional Polity scores, which tap into more than just representation (i.e., rule of law). Since voter turnout is never significant with capital and income taxes we doubt that the median-voter model explains why some democracies raise more from income and capital than other democracies. But our interpretation clearly hinges on our definition of representation; it also leaves the door open for further investigation, preferably with micro-data.

Consider second the standard version of the median voter model. Total tax revenue is consistently positive with democratization and generally significant with voter turnout, providing some support for the model, especially in long-standing democracies. The main things to note, however, are (1) that total tax revenue is not (close to being) significant with democracy/Polity when consumption taxes are stripped out, suggesting that democracy's main effect on total revenue is via consumption taxes; and (2) even long-standing democracies bank heavily on consumption and (surprisingly) trade taxes, which account for roughly half of the increase associated with higher voter turnout. Where the remaining revenue comes from is certainly a puzzle we would like to resolve—we suspect labor taxes play a large role, but cannot accurately separate them out in the World Bank data. In the absence of that data, we cannot reject the proposition that the overall tax rate is proportional, consistent with the prediction of the standard median-voter model. But even if this were the case, it is worth noting all of the coefficients are modest in magnitude—enough,

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capacity to tax the poor, but not the rich, do not just the money without granting representation. In other words, the absence of state capacity may explain why more representative countries do not tax the rich, but its presence cannot explain why more representative countries tax the poor.

perhaps, to mitigate inequality directly through the tax system at the margin, but not enough to transform the underlying distribution of income, at least in the short run.

In other words, our data is somewhat consistent with a median-voter conception of taxation in both its popular and standard forms, but it does not lend strong support either. On the other hand, the data does clearly support the notion that representation draws lower income groups into the tax system. While one could plausibly argue that these results represent an economically efficient solution (Przeworski and Wallerstein 1988; Lindert 2004), we believe that they also represent an efficient political solution: because exchanging services for taxes is cheaper than clubbing people for their money, governments tax people who control spending. The paradox of representation and taxation is less of a paradox if we believe the extant findings about welfare spending (Kato 2003) and basic public services (Lake and Baum 2001), which indicate that representation of the poor also connects them to services. Presumably, lower income groups accept higher taxes when they have representation because they believe that these funds will pay for goods and services they value, notably education and health care. Our intuition is that taxes (generally) follow services, explaining why taxes lag democratization by some five years. We also suspect that, in the long-run, the connection between taxes and services plays a far more meaningful role in the reduction of inequality than immediate tax and transfer schemes, which are the typical actors in political economy models. Unlike annual tax and transfer schemes, which appear to have transitory effects on inequality and poverty (see Corak 2006 and associated references), investments in health care and education can lead to permanent changes in the distribution of human capital; that, in turn, can lead to permanent changes in the distribution of wealth, income and opportunities in society. This interpretation squares well with the findings of Lindert (2004) and Piketty and Saez (2006), who show that inequality fell steeply in today's wealthy countries after services (notably public

education) expanded, but before progressive taxes truly began to bite.[49] In other words, representation matters—not so much because of one-off tax and transfer schemes, but because of its long-run effects on the distribution of human capital.

Finally, we hope these findings will spur more research into tax systems since the question of who pays what, when and how has been relatively neglected in the academic literature, even though it has tangible consequences. Filling in the tax side of the ledger should provide a more accurate picture of the relationship between states and citizens. Our data analysis presents some stylized facts about recent tax trends, but it is far from definitive in terms of assessing the relevant theories. Not only would it be useful to have micro-level data, which would allow for more rigorous tests, but we hope to see an empirical investigation of this sort for previous eras since there are several important features of the contemporary era that may constrain governments in ways that heretofore did not exist. Not only is the contemporary level of globalization quite high, but the nature (e.g., income level) of recently democratizing countries is distinct. In other words, the data indicate that representation generated a particular form of taxation over the past 30 years. Whether it is a universal pattern is worth examining with more data, given the findings herein.

[49] One striking stylized fact that receives too little attention is that the "Great Compression" in incomes and wages (1920s-1950s) occurred after increases investments in public education in many places, but well before the welfare state came into its own (mid 1950s onward). See Lindert (2004, especially chapters 1 and 5), Piketty and Saez (2006), and Goldin and Margo (1992).

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Table 1: The cumulative long-run effect of changes in the Polity index, ∑lags 0-12

Lag	T_0	∑0-1	∑0-2	∑0-3	∑0-4	∑0-5	∑0-6	∑0-7	∑0-8	∑0-9	∑0-10	∑0-11	∑0-12
Consumption													
F-test	0.0893	0.1147	0.1824	0.1293	0.0197	0.0052	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0000**	0.0000
∑Coefficient	-0.0095				-0.0056	-0.0015	0.0067	0.0119	0.0156	0.0210	0.0302	**0.0324**	0.0324
Long-run	-0.0400				-0.0234	-0.0066	0.0276	0.0492	0.0642	0.0862	0.1197	**0.1297**	0.1279
Control Variables DV_{t-1}, population (log), fixed effects for units and years													
Trade													
F-test	0.6725	0.1963	0.0442	0.0402	0.0887	0.0626	0.0901	0.0546	0.0606	0.0351	**0.0139**	0.0225	0.0185
∑Coefficient			-0.0037	-0.0010	-0.0007	-0.0019	-0.0041	-0.0078	-0.0052	-0.0100	**-0.0128**	-0.0100	-0.0049
Long-run			-0.0148	-0.0042	-0.0029	-0.0078	-0.0166	-0.0312	-0.0207	-0.0400	**-0.0478**	-0.0387	-0.0188
Control Variables DV_{t-1}, GDPPC (log), fixed effects for units and years													
Income & Capital													
F-test	0.2205	0.1835	0.3198	0.0902	0.1352	0.1754	0.2521	0.2756	0.1855	0.1579	0.0683	**0.0983**	0.1201
Coefficient				0.0199							0.0364	**0.0440**	
Long-run				0.0815							0.1460	**0.1707**	
F no Spain	**0.3902**	**0.3405**	**0.5343**	**0.2036**	**0.2704**	**0.3624**	**0.4627**	**0.5293**	**0.4446**	**0.4330**	**0.2213**	**0.3609**	**0.3717**
Control Variables DV_{t-1}, fuel exports %, GDPPC (log), tradeGDP, fixed effects for units and years													
Total Taxes													
F-test	0.9632	0.8217	0.6542	0.2494	0.1246	0.2180	0.2437	0.2996	0.1142	0.1460	0.0450	**0.0492**	0.0412
∑Coefficient											0.0480	**0.0570**	0.0430
Long-run											0.1905	**0.2268**	0.1676
F no Spain	**0.7568**	**0.6869**	**0.4949**	**0.2532**	**0.1702**	**0.2957**	**0.3611**	**0.4542**	**0.2460**	**0.3059**	**0.1135**	**0.1471**	**0.1107**
Control Variables DV_{t-1}, fuel exports %, tradeGDP, fixed effects for units and years													
AIC	17494	17497	17494	17467	17433	17406	17355	17327	17301	17133	16742	16533	16232
BIC	22005	22041	22070	22074	22070	22073	22052	22054	22059	21919	21557	21375	21057
N (full sample)		1750	1749	1745	1740	1735	1730	1724	1719	1711	1704	1694	1661
Groups (full sample)		106	106	106	106	106	106	106	106	106	106	106	106

Notes: Models estimated via seemingly unrelated regressions, with fixed effects for units and years. All regressions (unless noted) use the same 106 countries, with Polity data starting in 1960. Control variables and other test statistics have been suppressed (details are shown in Table 1A). Other revenue and social security have have been suppressed for space reasons (see Table 1A). F-test refers to (Wald) test of joint significant for (cumulative) lagged values of Polity. Coefficients (largest in **bold**) are shown only when the lagged values of Polity are significant at the 90 percent confidence interval or better. For DVs that are heavily influenced by one country, we show the results without that country. Similar results hold if we exclude countries with recent transitions (e.g., Eastern Europe), or if we use the same sample through 11 lags (N=1694), or if we include other variables from the list above, such as war, which were not robust and hence not included in the final models. See Tables 1B-D for extensive sensitivity analysis. Using a relatively long lag structure with a constant sample (N=1694), marginally decreases the AIC and RMSEs, but marginally increases the BIC. For all of the independent variables, the coefficients and significance levels decline with lags greater than 13.

Table 1B: Democracy and the Composition of Taxes ∑ lags 0-11

	Model 1	Model 2	Model 3	Model 4
	Polity ∑ lags 0-11	Polity ∑ lags 0-11	Democracy 0-1 ∑ lags 0-11, Polity≥11= Democracy	Democracy 0-1 ∑ lags 0-11 Polity≥11= Democracy
Consumption Tax (GS)				
DV_{t-1} (SE)	0.7501 (0.0072)	0.7488 (0.0072)	0.7509 (0.0071)	0.7494 (0.0072)
Polity/Democracy F-test	**0.0000**	**0.0000**	**0.0000**	**0.0000**
∑coefficient Polity/Democracy	**0.0324**	**0.0312**	**0.2641**	**0.2805**
Long-run effect (units)	**0.1297**	**0.1244**	**1.1005**	**1.119**
Logpop (SE)	0.6179 (0.1464)	0.6007(0.1475)	0.5858 (0.1455)	0.5741 (0.1468)
R-squared	0.9681	0.9682	0.9681	0.9683
Trade Tax				
DV_{t-1} (SE)	0.7435 (0.0080)	0.7418 (0.0081)	0.7433 (0.0080)	0.7415 (0.0081)
Polity/Democracy F-test	**0.0225**	**0.0329**	**0.0695**	**0.0998**
∑coefficient Polity/Democracy	**-0.0100**	**-0.0088**	**-0.0870**	**-0.0656**
Long-run effect (units)	**-0.0387**	**-0.0342**	**-0.3403**	**-0.2538**
GDPPC (log)	-0.4825 (0.1095)	-0.5210(0.0952)	-0.5138 (0.0942)	-0.5090 (0.0949)
R-squared	0.9311	0.9308	0.9310	0.9307
Social Security Tax				
DV_{t-1}	0.7569 (0.0079)	0.7575 (0.0080)	0.7570 (0.0079)	0.7572 (0.0080)
Polity/Democracy F-test	0.1176	0.1335	0.5762	0.5592
∑coefficient Polity/Democracy				
Long-run effect (units)				
Fuel exports	-0.0025 (0.0014)	-0.0025(0.0014)	-0.0025 (0.0014)	-0.0025 (0.0014)
Population (log)	-0.5219 (0.1368)	-0.5201(0.1377)	-0.5086 (0.1361)	-0.5132 (0.1371)
R-squared	0.9881	0.9878	0.9880	0.9877
Capital & Income (CAP)				
DV_{t-1}	0.7462 (0.0069)	0.7449 (0.0070)	0.7470 (0.0069)	0.7454 (0.0070)
Polity/Democracy F-test	**0.0983**	**0.3601**	**0.6042**	**0.9090**
∑coefficient Polity/Democracy	**0.0440**			
Long-run effect (units)	**0.1707**			
Fuel exports	0.0119 (0.0029)	0.0120 (0.0029)	0.0121 (0.0029)	0.0121 (0.0029)
GDPPC (log)	0.6467 (0.1831)	0.5261 (0.0996)	0.5104 (0.0984)	0.5080 (0.0992)
TradeGDP	0.0116 (0.0025)	0.0118 (0.0025)	0.0112 (0.0025)	0.0113 (0.0025)
R-squared	0.9528	0.9528	0.9525	0.9526
Total Tax (TAX)				
DV_{t-1}	0.7481 (0.0064)	0.7464 (0.0064)	0.7486 (0.0064)	0.7466 (0.0064)
Polity/Democracy F-test	**0.0492**	**0.1471**	**0.0153**	**0.0375**
∑coefficient Polity/Democracy	**0.0570**		**0.7041**	**0.5454**
Long-run effect (units)	**0.2268**		**2.8020**	**2.1532**
Fuel exports	0.0093 (0.0033)	0.0095 (0.0033)	0.0096 (0.0033)	0.0096 (0.0033)
TradeGDP	0.0111 (0.0025)	0.0114 (0.0025)	0.0107 (0.0025)	0.0109 (0.0025)
R-squared	0.9695	0.9695	0.9695	0.9695
N	1694	1667	1694	1667
Groups	106	105	106	105
F-Independence	0.0000	0.0000	0.0000	0.0000
Sample	all countries	No Spain	All countries	No Spain

Notes: This table provides details the specifications in Table 1, using both Polity and a 0-1 categorical definition of democracy, where democracy equals 1 when Polity≥11. Coefficients only reported when measures of democracy are significant at 10 percent level or better. All control variables are significant at 10 percent level or better. All regressions include fixed effects for years and units. Robust SE shown (see Table 1C for clustered SE). One other thing to note is that while social security is almost significant in models 1-2 above, it is not close to being significant in either direction when Argentina is excluded. Nearly identical results are obtained using the sum of lags 0-10 or 0-12. This table can be confined a web appendix.

Table 1C: Democracy and Taxes: Sensitivity tests with 10-yr moving average, 1970-1999

Model Description	All countries, no restrictions			No Rentier observations, Jackknifed re-sampling			**More Democratic**: Polity score today equal or higher than polity 10 years ago, $Polity_{it} \geq Polity_{it-10}$			**Democratic Reversal**: Polity score today 5 or more points lower than 10 years ago, $Polity_{it} \leq Polity_{it-10} - 5$		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Mod. 10	Mod. 11	Mod. 12
DV	GS	CAP	TAX	GS	CAP	TAX	GS	CAP	TAX	GS	CAP	TAX
DV_{t-1}	0.814	0.748	0.787	0.797	0.706	0.771	0.796	0.740	0.785	0.315	0.228	0.161
	(0.035)**	(0.035)**	(0.033)**	(0.044)**	(0.048)**	(0.036)**	(0.047)**	(0.046)**	(0.037)**	(0.133)*	(0.050)**	(0.101)
polity_10ave	**0.024**	**0.030**	**0.035**	**0.026**	**0.022**	**0.027**	**0.027**	**0.021**	**0.015**	**-0.164**	**0.260**	**0.082**
	(0.010)*	**(0.015)***	**(0.023)**	**(0.012)***	**(0.014)**	**(0.027)**	**(0.011)***	**(0.016)**	**(0.029)**	**(0.117)**	**(0.099)****	**(0.132)**
Pop., log	0.340	-0.632	-1.258	0.553	-0.058	-0.836	0.354	-0.812	-0.972	-9.090	-3.279	-17.618
	(0.307)	(0.522)	(0.865)	(0.382)	(0.523)	(0.951)	(0.378)	(0.635)	(1.085)	(4.517)*	(4.378)	(8.724)*
Fuel Exports	0.000	0.011	0.006	-0.001	0.014	0.010	0.003	0.010	0.007	-0.051	0.150	0.035
	(0.003)	(0.005)*	(0.004)	(0.007)	(0.007)	(0.006)	(0.003)	(0.005)*	(0.005)	(0.047)	(0.086)	(0.127)
GDPPC, log	-0.008	0.568	-0.034	-0.085	0.311	-0.528	0.105	0.613	0.246	-2.078	3.993	1.970
	(0.226)	(0.271)*	(0.441)	(0.337)	(0.177)	(0.483)	(0.297)	(0.304)*	(0.600)	(0.831)*	(1.326)**	(1.974)
Trade GDP	0.000	0.011	0.013	0.000	0.010	0.014	-0.001	0.014	0.014	0.001	-0.009	-0.029
	(0.002)	(0.004)**	(0.005)*	(0.002)	(0.004)*	(0.007)*	(0.002)	(0.004)**	(0.006)*	(0.012)	(0.015)	(0.056)
War	0.153	-0.008	0.029	0.165	-0.088	-0.003	0.131	0.155	0.232	-0.177	-0.327	-0.744
	(0.120)	(0.182)	(0.357)	(0.155)	(0.207)	(0.428)	(0.125)	(0.235)	(0.495)	(0.192)	(0.461)	(0.518)
Constant	-4.660	4.750	19.076	-6.850	-1.750	17.654	-5.497	7.048	13.317	0.000	0.000	0.000
	(4.675)	(7.489)	(13.268)	(6.048)	(8.556)	(23.433)	(5.676)	(9.597)	(16.609)	(0.000)	(0.000)	(0.000)
N, Groups	1700	1705	1727	1545	1550	1572	1426	1431	1448	124	124	129
	106	106	106	96	96	96	102	102	102	24	24	24
FE year, unit	yes, yes	yes, yes	yes, yes	yes, yes	yes, yes	yes, yes	yes, yes	yes, yes	yes, yes	yes, yes	yes, yes	yes, yes

Notes: Single equation models with clustered standard errors. * significant at 5%; **significant at 1%. This table presents results using a simple moving average for democracy (Polity T_{-10} to T_0, labelled polity_10ave) for the main tax revenue categories (labelled GS for consumption, CAP for income and TAX for total tax revenue) in time T_0. Models 1-3 include all countries/observations in the dataset. Models 4-6 exclude rentier observations and have been estimated with jackknifed re-sampling techniques. Models 7-12 compare the consequences of higher democracy levels for more time, conditional on the ending level of democracy. Models 7-9 only contains observations where $country_{it}$ has remained equally (or become more) democratic between T_{-10} and T_0; Models 10-12 only contain observations where the Polity score at T_0 was 5 or more points below the Polity score T_{-10}, signaling a significant democratic reversal. Because of the small sample size, lagged DV and FE, Models 10-12 should not be taken too seriously. The main point of Models 6-12 is to show that last-minute coups are not driving our main results. These results are not very sensitive to changes in the cut-off point for democratic reversal. While declines of less than 4 points have no meaningful consequence for taxes, declines of more than 5 points (i.e., 6-9) are consistent with the figures above. This table can be placed in a web appendix.

Table 2: Voter turnout and tax structures in democracies

	Consumption	Inc. & Cap.	Trade tax	Social Sec.	Other tax	Total Tax
Model 1						
Voter Turnout	0.0889***	0.0283	-0.0041	0.0483	0.0049	0.1684***
(SE)	(0.0258)	(0.0311)	(0.0175)	(0.0373)	(0.0079)	(0.0567)
R-squared	0.1825	0.2243	0.2087	0.2117	0.1222	0.3350
F	0.0002	0.0000	0.0001	0.0000	0.0054	0.0000
N	75	75	75	75	75	75
RMSE	3.1908	3.8498	2.1633	4.6165	0.9733	7.0231
AIC	1867					
Control Variables	GDPPC (log)					
Model 2						
Voter Turnout	0.0696***	0.0223	0.0010	0.0085	0.0032	0.1051**
(SE)	(0.0225)	(0.0332)	(0.0154)	(0.0285)	(0.0080)	(0.0456)
R-squared	0.5103	0.3035	0.5169	0.6395	0.2877	0.6625
F	0.0000	0.0000	0.0002	0.0000	0.0000	0.0004
N	75	75	75	75	75	75
RMSE	2.4696	3.6479	1.6903	3.1218	.8767	5.0036
AIC	1802					
Controls	GDPPC, population (log), trade/GDP, pop1564%, pop65%, land area (log), latitude, war					
Model 3						
Voter Turnout	0.0617***	-0.0089	0.0086	0.0042	0.0052	0.0716
(SE)	(0.0217)	(0.0313)	(0.0155)	(0.0284)	(0.0077)	(0.0456)
R-squared	0.6165	0.4812	0.5893	0.6969	0.4373	0.7154
F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0004
N	75	75	75	75	75	75
RMSE	2.185535	3.14837	1.55847	2.86245	.779269	4.5949
AIC	1789					
Controls	GDPPC, population (log), trade/GDP, pop1564%, pop65%, land area (log), latitude, war, elf, gastil, fed, pres, compulsory vote, district magnitude, years democratic (log)					
Model 4						
Voter Turnout	.0617***	0.0165	0.0110	0.0335	0.0039	0.1289***
(SE)	(0.0202)	(0.0304)	(0.0161)	(0.0260)	(0.0081)	(0.0422)
R-squared	0.7114	0.5726	0.6197	0.7823	0.4658	0.7836
F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	74	74	74	74	74	74
RMSE	1.8894	2.8387	1.5093	2.4291	.7626	3.9482
AIC	1755					
Controls	GDPPC, population (log), trade/GDP, pop1564%, pop65%, land area (log), latitude, war, fuel exports, elf, gastil, fed, pres, compulsory vote, district magnitude, years democratic (log), government efficiency, graft, legal systems					
Model 5						
Voter Turnout	0.0726***	0.0279	0.0023	0.0335	-0.0087	0.1292**
(SE)	(0.0201)	(0.0312)	(0.0134)	(0.0336)	(0.0070)	(0.0505)
R-squared	0.7993	0.6955	0.7450	0.7818	0.5962	0.8073
F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	60	60	60	60	60	60
RMSE	1.5313	2.3734	1.0209	2.5532	.5323	3.8392
AIC	1368					
Controls	GDPPC, population (log), trade/GDP, pop1564%, pop65 %, land area (log), latitude, war, fuel exports, elf, gastil, fed, pres, compulsory vote, district magnitude, years democratic (log), government efficiency, graft, legal systems, fuel exports, gini					

Table 2B: Voter turnout and tax structures in democracies

	Consumption	Inc. & Cap.	Trade tax	Social Sec.	Other tax	Total Tax
Model 6 Democracy before 1975						
Voter Turnout	0.0810***	0.0790	0.0544***	0.0367	-0.0213	0.2351**
(SE)	(0.0295)	(0.0735)	(0.0166)	(0.0728)	(0.0126)	(0.1005)
R-squared	0.9207	0.6906	0.9211	0.8035	0.7674	0.8338
F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	32	32	32	32	32	32
RMSE	1.0647	2.6473	.5998	2.6208	0.4545	3.6170
AIC	686					
Controls	GDPPC, population (log), trade/GDP, pop1564%, pop65 %, land area(log), latitude, war, fuel exports, elf, fed, pres, compulsory vote, district magnitude, government efficiency, graft, legal systems, fuel exports, gini					
Model 7 Good democracies= Gastil below 3.5 (75th percentile)						
Voter Turnout	0.0546**	0.0234	-0.0032	-0.0129	-0.0100	0.0442
(SE)	(0.0226)	(0.0455)	(0.0177)	(0.0444)	(0.0092)	(0.0594)
R-squared	0.9030	0.7367	0.7297	0.8363	0.6152	0.8842
F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	45	45	45	45	45	45
RMSE	1.1507	2.3246	.9015	2.2657	.4678	3.0268
AIC	978					
Controls	GDPPC, population (log), trade/GDP, pop1564%, pop65 %, land area(log), latitude, war, fuel exports, elf, years democratic (log), fed, pres, compulsory vote, district magnitude, government efficiency, graft, legal systems, fuel exports, gini					
Model 8 No Federal Countries						
Voter Turnout	.0605***	.0243	-.0128	.0113	-.0080	.0750
(SE)	.0197	.0367	.0141	.0356	.0077	.0522
R-squared	0.8279	0.6743	0.7931	0.7989	0.6176	0.8420
F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	49	49	49	49	49	49
RMSE	1.3579	2.5196	.9682	2.4445	.5272	3.5868
AIC	1097					
Controls	GDPPC, population (log), trade/GDP, pop1564%, pop65 %, land area(log), latitude, war, fuel exports, elf, gastil, years democratic (log), pres, compulsory vote, district magnitude, government efficiency, graft, legal systems, fuel exports, gini					
Model 9 No OECD						
Voter Turnout	.0592***	.0139	-.0142	.0369***	-.0048	.0931**
(SE)	.0167	.0187	.0159	.0129	.0058	.0364
R-squared	0.8488	0.8687	0.7179	0.9597	0.7834	0.8960
F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	39	39	39	39	39	39
AIC RMSE	1.1106	1.2383	1.0584	.8583	.3840	2.4189
AIC	751					
Controls	GDPPC, population (log), trade/GDP, pop1564%, pop65 %, land area(log), latitude, war, fuel exports, elf, gastil, years democratic (log) fed, pres, compulsory vote, district magnitude, government efficiency, graft, legal systems, fuel exports, gini					

Table 3A Summary statistics

	Panel			1990-98 X-section		
	N	Mean	SD	N	Mean	SD
Consumption	1750	6.010	3.975	76	7.835	3.573
Capital & Income	1750	6.399	4.921	76	7.150	4.371
Social Security	1750	3.034	4.401	76	4.631	5.213
Trade	1750	3.105	3.897	76	2.322	2.669
Total Taxes	1750	20.342	9.571	76	22.912	8.614
Polity	1750	10.909	7.660			
Voter Turnout				82	65.734	16.001

Table 3B: Correlation Matrix (Panel)

	Tax	Cons	CAP	Trade_tx	SS_tax	Oth_tx	Polity	Fuel	GDPPC	Pop
TaxGDP	1.000									
Consumption	0.6998	1.0000								
Cap &Inc	0.6805	0.3051	1.0000							
Trade_Tax	0.0278	**0.2692**	**0.1919**	1.0000						
Soc_Sec_Tx	0.6592	0.4470	0.2263	**0.3324**	1.0000					
Other_tax	0.3098	0.2721	0.0329	**0.1221**	0.2511	1.0000				
Polity	0.4569	0.3994	0.3673	**0.2818**	0.4323	0.0267	1.0000			
Fuelex	**0.1421**	**0.3177**	0.1374	0.0566	**0.1710**	**0.1165**	**0.2427**	1.0000		
GDPPC (log)	0.5325	0.4065	0.4503	**0.3782**	0.5753	0.2725	0.5490	**0.0544**	1.0000	
Population	**0.1829**	0.0014	**0.0226**	**0.4791**	0.0988	**0.1410**	0.1164	**0.0776**	**0.0795**	1.0000
TradeGDP	0.3310	0.0570	0.2393	0.0819	0.2854	0.2233	0.0054	0.0792	0.2378	**0.5931**

Pairwise correlations. Negative in **Bold**.

Table 3C: Correlation Matrix (X-section)

	Tax	Cons	CAP	Trade_tx	SS_tax	Vturn	GDPPC	Fuel	GINI	ELF
TaxGDP	1.0000									
Consumption	0.6907	1.0000								
Cap &Inc	0.6139	0.2434	1.0000							
Trade_Tax	**0.2596**	0.4490	0.1310	1.0000						
Soc_Sec_Tx	0.7386	**0.4205**	**0.2354**	**0.4562**	1.0000					
Vturnout	0.4242	0.4139	0.2336	0.2644	0.1722	1.0000				
GDPPC (log)	**0.5647**	**0.2931**	0.4662	0.5120	0.3665	0.3522	1.0000			
Fuelex	**0.1228**	**0.1093**	0.1044	**0.1087**	**0.2093**	**0.1700**	0.0316	1.0000		
GINI	**0.5428**	**0.3699**	**0.1722**	**0.6060**	**0.1559**	**0.3234**	**0.3779**	0.0966	1.0000	
ELF	**0.3358**	**0.2605**	**0.1365**	**0.3840**	**0.2883**	**0.3292**	**0.5311**	**0.0803**	0.2689	1.0000
TradeGDP	0.2505	0.0926	0.1511	0.0425	0.2161	0.3919	**0.0260**	0.1539	**0.0671**	**0.1009**

Table 3D: Levin-Lin-Chu tests

	Consumption	Income 1	Income 2	Social Sec.	Tax/GDP	Trade
Year	1972-98	1972-98	1975-97	1972-98	1972-98	1972-98
Groups	30	30	51	30	29	30
Observations	770	770	1094	770	746	770
Augmentation	2 lags	2 lags	2 lags	2 lags	2 lags	2 lags
t-star	-3.764	-2.106	-3.771	-6.930	-4.221	-0.436
P > t	0.0001	0.0176	0.0001	0.0000	0.0000	0.3311

Levin, Lin Chu Augmented Dickey-Fuller tests required balanced panels, so we cannot apply them to the full sample. While the results above sacrifice width for length, similar results are obtained with broader, but shorter sample (e.g., Income 2). For all but trade taxes we can comfortably reject the null of non-stationarity.