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On the Political Economy Determinants of Tax Reforms: Evidence from Developing Countries*

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December 2020

Abstract

This paper analyzes the role of political variables in the implementation of structural tax reforms in 45 emerging market and low-income economies during 2000-2015. The existing literature identifies several hypotheses that drive reforms, but empirical studies that support these hypotheses are lacking. Relying on a new database of structural tax reforms and on binary-type models, our results suggest that a left-wing government is less inclined to implement tax reforms while both proximity to elections and political strength or cohesion are positively associated with tax reforms. The influence of the left government is stronger in low-income than in emerging market economies and revenue administration reforms are resisted the most by such governments. Proximity to elections seems to trigger reforms of personal income tax (PIT) but opposite holds for trade tax reforms. Political cohesion is a necessary ingredient to reform most tax categories and revenue administration.

JEL: C33, C36, D63, E32, E62, H20

Keywords: fiscal policy; binary choice models; tax reforms; elections; political fragmentation; ideology

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1. Introduction

There is potential to raise more revenues from domestic sources in many low-income and emerging market economies, but resistance from vested interests has impaired the implementation of measures with revenue potential (Mullins et al., 2020). For example, favorable tax treatment accorded to certain consumers and producers has eroded the tax base in these countries. The bulk of tax concessions can be found in two areas: corporate income tax and value added tax. The average value of concessions is estimated at about 4 percent of GDP in Latin America and 2.9 percent in Africa and can be as high 40 percent of tax revenues (Gupta and Redonda, 2020). Because large and powerful players are able to opt out of the tax system, it affects the overall tax compliance as the general population becomes unclear about the benefits of paying taxes. The need for more revenues to support these countries' developmental needs has led policymakers and international organizations to call for efforts to undertake fiscal reforms, notably in the tax area. At the same time, such reforms are notoriously difficult to design and implement and little consensus exists over what factors can help break the deadlock, as theory is unsettled and empirical evidence is limited and often inconsistent (see e.g. Drazen, 2000; Acemoglu et al., 2006). Furthermore, political fragmentation has led to frequent changes to tax policies, creating uncertainty for the private sector and undermining efforts to mobilize domestic resources (Gupta and Liu, 2020). As an example, Zambia changed its mining tax regime seven times during the 2000-2019 period, mainly because different governments in power felt that the mining sector was not contributing enough to the country's development, turning it into a key election issue. A similar unpredictability has existed in other countries with tax policy changes in every budget, reflecting political divisions (e.g., Bangladesh and Kenya). In Bangladesh, the implementation of tax laws already approved by Parliament was repeatedly postponed because of political and electoral considerations.

The purpose of this study is to analyze political considerations that influence the implementation of structural tax reforms in a panel of emerging market and low-income economies. We use a new "narrative" database of major tax reforms implemented in 45 developing economies (23 emerging and 22 low-income) during the 2000-2015 period (Akitoby et al., 2020). An important novelty and strength of this database is the precise timing and nature of key

legislative tax actions that took place over the 15-year period under scrutiny. We study the extent to which ideology, electoral proximity and political strength of different groups has influenced the implementation of a series of tax reforms.

By means of binary type model estimations, we find that left-wing governments are less inclined to implement structural tax reforms while both proximity to elections and political strength or cohesion are positively associated with tax reforms. The influence of the left government is particularly strong in low-income than in emerging market economies and revenue administration reforms are resisted the most by such governments. Proximity to elections seems to trigger reforms of personal income tax (PIT) but opposite holds for trade tax reforms. The conclusions of this study should be of interest to those involved in tax reforms in emerging and low-income economies.

The remainder of the paper is structured as follows. Section 2 provides an overview of related literature on the political economy drivers of (tax) reforms. Section 3 presents the empirical strategy. Section 4 discusses the data and key stylized facts. Section 5 presents the baseline empirical results as well as sensitivity and robustness checks. The last section concludes.

2. Literature Review

Several political factors can affect the implementation of structural tax reforms. Three political considerations have attracted most attention from scholars in relation to fiscal policy decision-making, namely the role of ideology (Potrafke, 2017; Hallerberg and von Hagen, 2017)¹, the influence of elections (Klomp and de Haan, 2013; Hubscher and Sattler, 2017) and the impact of political fragmentation (Alesina and Perotti, 1995; Crivelli et al., 2015). Empirical evidence suggests that these factors have a varying degree of explanatory power (Gaspar et al., 2017). Moreover, the bulk of empirical analyses is done for advanced and emerging market economies.

¹ Relatedly, a recent paper by Duval et al. (2020) finds, by means of a Bayesian averaging maximum likelihood estimates (BAMLE) approach, that certain structural reforms (in the area of labor market, for instance) tend to occur in right-leaning governments, which is consistent with theories that highlight the ability of entrenched interests to block reforms (e.g. Tommasi and Velasco, 1996).

Ideology of decision-makers is reflected in tax-and-spending policies adopted by a government. Left-wing governments tend to be associated with higher public expenditures on welfare policies and a sizable public administration. To finance these expenditures, these governments would be expected to tax more and to tax more progressively (Angelopoulos et al.2012). There is some evidence that after banking crises and during fiscal adjustment episodes, left-wing governments are associated with different revenue-raising measures as compared with right-leaning governments (Hallerberg and von Hagen, 2017). In contrast, right-wing governments tend to opt for lower levels of public revenue, meaning less taxes. That said, the resistance of left-wing parties alongside those of their electorate to carry out reforms has been documented (see e.g. Bortolotti et al., 2003 for privatizations).

The literature also identifies the political cycle as an important driver of reforms by emphasizing political capital requirements to break reform deadlock as well as re-election pressures and rarely these objectives conflict with one another. In fact, national elections can be a source of policy volatility when the incumbents seek to use tax and spending policies for re-election purposes. The underlying objective of incumbents is to influence the median voter during the elections. This is because reforms may entail short-term costs while gains can take time to materialize. Consequently, some have found that reforms are less likely before elections and more likely in the beginning of a term (see e.g. Alesina et al., 2006; Bonfiglioli and Gancia, 2013 that looked at structural reforms more generally in labor and product markets in advanced economies). In countries where fiscal institutions are weak and budget transparency lacking, there is risk that election-induced tax and spending policies may not be appropriate from a macroeconomic perspective.

In a government with a large number of veto players and fragmented decision making, there is a tendency to preserve the status quo on fiscal matters (Tsebelis, 1995, 2000, 2002). Changes in tax and spending policies occur only when a certain number of institutional or partisan actors agree. As the number of veto players increases, fiscal policy changes become slower, leading to suboptimal fiscal policy outcomes (Spolaore, 2004). This problem is compounded when there are major ideological differences among veto players, making likelihood of a policy change from the status quo even more difficult (Franzese, 2007; Tsebelis and Chang, 2004). While in theory

fractionalization in the government coalition should increase the ability of small parties to block reforms (Alesina and Drazen, 1991), its empirical impact has ranged from entirely insignificant (Wiese, 2014) to highly significant (Alesina et al., 2006).

Note that reform strategies such as packaging or sequencing of reforms have been found to overcome some of the political conundrums discussed earlier (see e.g. Cacciatore et al. (2016) for a theoretical model-based result). Furthermore, while some studies have documented a positive effect of democracy on reforms (Giuliano et al., 2013), we do not test for it here because the time span covered ranges from 2000 to 2015 and the majority of countries under scrutiny has score high on this dimension in the often used Polity IV index (in addition to the fact that these slow-moving indicators are captured by fixed effects).

3. Econometric Methodology

A structural tax reform (*STR*) for country i at time t takes the value one as identified in the narrative database—the next section provides details on data. All other non-reform years take the value zero.² Based on this binary characterization, our baseline exercise consists in estimating logistic regressions to assess the likelihood of a tax reform by testing specifically the political economy channel, while controlling for other variables identified in the literature affecting the implementation of reforms.³ In particular, we estimate the following reduced-form model:⁴

$$\text{Prob}(\text{STR} = 1|X) = \Phi(\lambda_i + \text{Pol}'\alpha + X'\beta) \quad (1)$$

² The database also includes what we call “tax reversals”, that is, reforms that reduce revenue collection. Note that the database from Akitoby et al. (2020) considers large tax revenue changes on the aggregate but also identifies tax reforms by sub-category (cf. footnote 6). Some of the reforms using tax specific instruments may be revenue decreasing. These are identified in Akitoby et al. (2020) Appendix table 4. Overall, in their database they identify 163 reforms associated with positive revenue changes against 36 reforms associated with negative revenue changes, that is, the latter corresponds to 18% of the total of 199 major tax reforms. Given the low proportion of reform reversals in the total universe of observations, we decided to leave these out of the analysis.

³ This is akin to the methodology proposed by Aoyagi and Ganelli (2015), who considered – looking at another issue, namely inclusive growth - the direct impact of a fixed block of structural determinants, coupled with a set of controls.

⁴ For details on this binary choice model see, for example, Greene (2012, Ch. 17).

where α , β are vectors of the parameters to be estimated, Pol is a vector of political economy determinants, X is a vector of exogenous control variables, and $\Phi(\cdot)$ is the logistic function.⁵ λ_i denote country fixed effects to capture unobserved heterogeneity and different initial conditions or underlying structural characteristics. Our list of control variables includes: real GDP growth, inflation rate, trade openness and the unemployment rate. Such structural forces have also been put forward as influential forces to propel the reform momentum. For instance, small open economies may be more amenable to reform due to greater exposure to competitive pressures and international policy diffusion (see e.g. Belloc and Nicita, 2011). The structural model associated with (1) can be written as:

$$STR = \lambda_i + \alpha Pol_{it} + \beta X_{it} + \varepsilon_{it} \quad (2)$$

The STR variable can take the value one if there is a reform in any area of taxation including revenue administration.⁶

$STR_{it} = 1$ if $STR_{it}^* > 0$, and 0 otherwise.

with $i = 1, \dots, N$; $t = 1, \dots, T$; λ_i captures the unobserved individual effects; and ε_{it} is an error term.

4. Data and Stylized Facts

4.1 Structural Tax Reforms

Countries influence the composition of their tax system by making changes to tax bases, tax rates and exemptions. The tax reform database used in this study has several advantages: it identifies the precise nature and exact timing of major tax actions in key areas of tax policy and revenue administration; identifies the precise tax reforms that underpin what otherwise looks like a gradual improvement in standard tax-to-GDP; identifies major reforms that truly led to increases in revenue, as opposed to just a long list of (small or not economically meaningful) policy changes.

⁵ We should note that, as probit models do not render themselves well to the fixed-effects treatment due to the incidental parameter problem (Wooldridge, 2002, Ch. 15, p. 484), we estimate a logit model with fixed-effects.

⁶ Eight categories are considered and detailed in the next section, namely reforms in the area of: personal income tax, corporate income tax, general goods and service tax, value added tax, excises, trade taxes, property taxes and revenue administration.

It should be noted that the tax reform database provides no information regarding the current (or past) fiscal stance in the countries under scrutiny, which is not the purpose of this paper.

Tables 1-3 present stylized facts on reforms in the following categories: personal income tax (PIT), corporate income tax (CIT), goods and services taxes split between 3 subcategories (value added taxes (VAT), excises and other goods and services taxes), trade taxes, property taxes and, finally, revenue administration.⁷ The time evolution (interquartile range) of these taxes in percent of GDP for the sample of countries under scrutiny is displayed in Figure A1 in the Appendix and Table A1 presents summary statistics. Note that the vast majority of tax revenue reforms in our sample were in the category of goods and services taxes and most reforms were implemented during the period 2010-2015 (Table 1). Exceptions are, e.g., tax reforms in the area of excises, trade or property, which were implemented more during 2000-2004. In Sub-Saharan Africa (SSA) the majority of tax revenue reforms were in the area of goods and services, and during the 2000-2004 period. In the more recent period, SSA has been focusing more on CIT reforms.

Table 1. Number of country-years with tax mobilization shocks by sub-periods

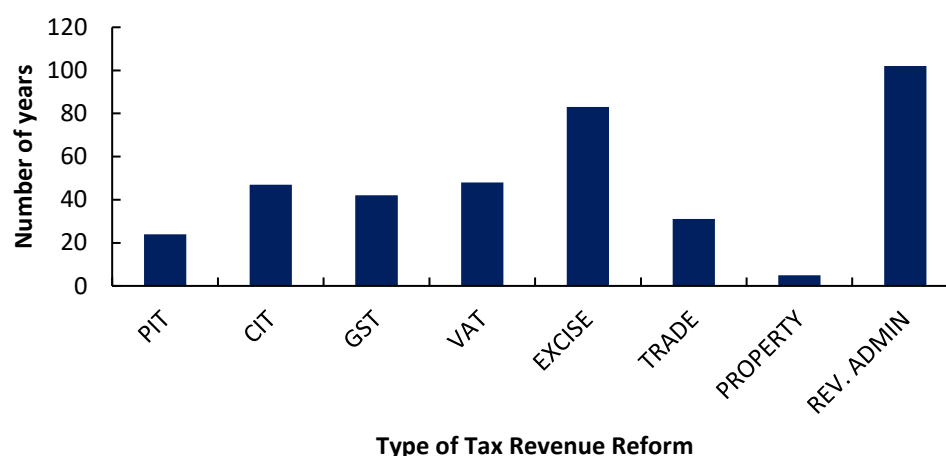
	2000- 2004	2005- 2009	2010- 2015	2000- 2004	2005- 2009	2010- 2015
Sample	all	all	all	SSA	SSA	SSA
PIT	9	6	9	1	3	0
CIT	17	9	21	17	9	21
Goods and Services Taxes	67	32	74	27	9	17
<i>GST</i>	15	6	21	8	3	6
<i>VAT</i>	21	10	17	10	3	4
<i>EXCISE</i>	31	16	36	9	3	7
TRADE	15	7	9	13	3	5
PROPERTY	4	1	0	4	0	0
REVENUE ADMINISTRATION	9	0	2	4	0	1

Figure 1 provides the number of years of tax reforms identified in the sample and illustrates the heterogeneity of reforms efforts by type. Excise reforms have been more frequently

⁷ Revenue administration reforms includes measures in 8 distinct areas, namely: i) management, governance and Human Resources; ii) large taxpayers office and segmentation; iii) IT system; iv) registration and filling; v) audit and verification; vi) management of payment obligations; vii) improving compliance; viii) customs clearance. According to Akitoby et al. (2020), hiring more qualified staff, strategic planning and monitoring performance, focusing on training and strengthening tax legislation to empower revenue collection agencies were the most commonly implemented measures (77 percent of episodes).

implemented. In general, fewer major reforms have been implemented in the areas of property taxes. Reforms in tax administration have been more the rule than the exception, accompanying a specific tax policy measure. Out of 119 years of tax reforms, only 17 corresponded to tax policy measures not accompanied by improvements in revenue administration.

Figure 1. Number of country-years with tax revenue reforms by type
(45 developing economies, 2000-2015)



In terms of geographical distribution, emerging market economies did more reforms in the area of personal income tax, value-added and excises, while low-income countries focused more on trade taxes (Table 2). As for other categories of taxes both groups are comparable and also when it comes to revenue administration reforms.

Table 2. Reform shocks by group of countries (number of tax reform country-years)

	EME	LIC	SSA	Resource-Rich	Fragile
<i>Number of countries</i>	23	22	10	6	13
PIT	16	8	4	2	4
CIT	23	24	12	4	6
Goods and Services Taxes	99	74	53	14	49
<i>GST</i>	20	22	17	2	10
<i>VAT</i>	30	18	17	0	17
<i>EXCISE</i>	49	34	19	12	22
TRADE	10	21	21	5	15
PROPERTY	1	4	4	0	4
REVENUE ADMINISTRATION	57	45	33	7	24

Finally, tax reforms have been more frequently implemented during periods of higher economic growth—that is when the real GDP growth in each country was above its historical average (Table A3 in the Appendix).

4.2 Political Economy

To test the role of political variables in facilitating or impeding structural tax reforms, we propose an approach that relies on a principal component analysis (PCA), with variables grouped around three political dimensions: ideology, electoral proximity and political strength. Data on political economy variables are retrieved from Database of Political Institutions (DPI) (Cruz et al., 2015).

Ideology: This dimension captures whether a ruling government is left-wing or not. The DPI original value “chief executive party orientation (*execrlc*)” takes three discrete values: 1 for right-wing parties, 2 for central and 3 for left. We define “left” as taking the value 1 if “*execrlc*” takes the value 3, and zero otherwise.

Electoral proximity: This dimension would take into account the time that policy-makers have before forthcoming elections. Politicians facing elections might have higher or lower incentives to implement certain tax reforms depending on the tax area, vested interests and constituency voting support. We use three variables to compute the proximity to elections PCA. A higher electoral proximity is associated with a longer length of time in office for the party of the chief executive, a larger number of years of the chief executive in office and a higher number of elapsed years from the current term. Only the first principal component is retained since the first factor explains more than 48 percent of the variance in the standardized data (see Table 3).

Political strength: This dimension would capture the number of political actors participating in fiscal decisions, which typically exhibit conflicting demands. These actors could be parties in government - or in opposition -, interest groups or, more generally, veto players. Strong governments are those which operate in less fragmented political environments. We use four variables to compute the strength PCA. More political strength is associated with a high margin of parliamentary majority, executive control of all houses, and a weak opposition given by a larger

number of parliamentary seats and voting share of the ruling government. Only the first principal component is retained as it explains more than 60 percent of the variance in the standardized data.

Table A2 in the Appendix lists the corresponding PCAs' factor loadings and uniqueness. We can interpret them as follows. For instance, with regard to political strength, the resulting factor appears to describe mostly the margin of majority and control of all houses, as indicated by their lower uniqueness.

4.3 Other Data

Real GDP growth, inflation rate, trade openness and the unemployment rate all come from the IMF's World Economic Outlook (WEO) database. These control variables enter with a one-year lag to minimize reverse causation issues.

5. Empirical Results

5.1 Baseline

We begin with the estimation of our baseline logistic regression equation (1). We do so by adding not only the relevant control variables but also each block of political economy variables (ideology, election proximity and political strength) entering independently (specifications 1-3). We then replace the individual political economy variables with the computed PCAs (specifications 4-6). Results are reported in Table 3. The more developed a country is, the more likely it is to implement tax reforms. In contrast, countries characterized by high inflation tend to implement a fewer tax reforms possibly due to the availability of seigniorage and heightened economic volatility that makes the outcome of a given reform more uncertain. A poor labor market also seems to propel tax reforms while the effect of trade openness is statistically more ambiguous (but positive in specification 1 – in line with the findings by Belloc and Nicita, 2011). Turning to political variables, estimates with each of them entering in isolation does not give us a uniform picture nor strong results. The PCA alternative in contrast suggests that a left-wing government is less likely to implement tax reforms while both proximity to elections and political strength or cohesion are positively associated with such reforms.

Table 3: Determinants of structural tax reforms, baseline model

Specification	(1)	(2)	(3)	(4)	(5)	(6)
Real GDP	0.051 (0.033)	4.047*** (0.525)	3.842*** (0.585)	4.040*** (0.520)	3.833*** (0.575)	3.288*** (0.728)
Inflation rate	-2.892*** (0.871)	-2.166** (1.059)	-4.614*** (1.783)	-2.142** (1.050)	-4.299** (1.760)	-8.991*** (2.738)
Trade openness	0.008*** (0.002)	-0.002 (0.005)	0.002 (0.005)	-0.002 (0.005)	0.005 (0.005)	0.004 (0.005)
Unemployment rate	0.166* (0.099)	0.768* (0.455)	0.483 (0.449)	0.813* (0.455)	0.484 (0.450)	0.634 (0.491)
Margin of majority			-0.000 (0.001)			
Control of all houses			0.001** (0.001)			
Number government seats			-0.008 (0.006)			
Government voting share			0.011 (0.013)			
Party of the chief executive length of time in office		0.037* (0.022)				
Chief executive years in office		-0.019 (0.034)				
Years elapsed from current term		0.001 (0.071)				
Left-wing	-0.077 (0.064)					-0.885*** (0.227)
PCA electoral proximity				0.153 (0.141)		0.374* (0.209)
PCA political strength					0.270 (0.194)	2.550*** (0.802)
Observations	923	679	624	679	624	458
Pseudo-R2	0.042	0.221	0.219	0.219	0.213	0.278

Note: All models are estimated by logit. Dependent variable is the structural tax reform binary variable. Standard errors are reported in parenthesis. Country fixed effects estimated but omitted. The constant term is not reported for parsimony. *, **, *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.

Table 3 used any tax policy or revenue administration reform as a dependent variable without making a differentiation among reform types. In Table 4, we remedy this and study the likelihood of reforms of different taxes/measures. For this purpose, we re-run specification (6) in Table 3 for alternative binary-type dependent variables. Out of the 7 tax reform categories, we examine the reform type that a left-leaning government would least likely implement. We find that revenue administration reforms fall in such category and so do reforms in PIT, CIT, VAT and excises. Electoral proximity seems to trigger personal income tax (PIT) reforms but has the opposite effect for trade tax reforms. More consistently, political cohesion is a necessary ingredient to move the tax reform agenda forward. This is true for most categories of tax policy instruments as well as changes in the revenue administration.

Table 4: Determinants of structural tax reforms, by tax category

Specification Dependent variable (tax reform)	(1) PIT	(2) CIT	(3) GST	(4) VAT	(5) Excises	(6) Trade	(7) Property	(8) Revenue Administration.
Real GDP	-3.342* (1.793)	2.548 (2.029)	5.298*** (1.571)	2.460*** (0.902)	4.689*** (1.304)	2.662 (4.811)	745.892 (0.000)	3.538*** (0.783)
Inflation rate	-11.583** (4.652)	-5.961 (4.456)	-2.342 (5.121)	-4.429 (4.371)	-7.873** (3.244)	-86.614** (42.071)	428.666 (0.000)	-7.788*** (2.805)
Trade openness	0.001 (0.006)	0.007 (0.008)	0.004 (0.010)	-0.001 (0.010)	0.000 (0.007)	0.628** (0.316)	11.505 (0.000)	0.005 (0.006)
Unemployment rate	2.675* (1.473)	1.680 (1.111)	10.718*** (3.747)	0.192 (0.838)	3.150*** (1.001)	23.347* (14.330)	1,023.122 (0.000)	0.619 (0.509)
Left-wing	-1.924*** (0.624)	-1.669*** (0.626)	0.034 (0.976)	-1.140*** (0.310)	-1.342*** (0.309)	24.896* (13.183)	-59.314 (0.000)	-0.866*** (0.242)
PCA electoral proximity	1.226** (0.528)	0.207 (0.460)	-0.446 (0.483)	0.120 (0.272)	0.315 (0.291)	-4.083** (1.971)	-49.036 (0.000)	0.253 (0.227)
PCA political strength	5.800*** (1.658)	2.006* (1.086)	6.654* (3.571)	-0.945 (1.396)	3.166** (1.383)	187.969* (105.813)	-255.184 (0.000)	2.419*** (0.812)
Observations	126	122	127	254	286	101	61	399
Pseudo-R2	0.278	0.273	0.355	0.188	0.335	0.773	1.000	0.269

Note: All models are estimated by logit. Dependent variables identified in the second row. Standard errors are reported in parenthesis. Country fixed effects estimated but omitted. The constant term is not reported for parsimony. *, **, *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.

Revenue administration reforms can involve multiple areas which are potentially sensitive to political influences. To delve deeper into the results, we re-did the previous exercise by zooming into the 8 specific areas of revenue administration for which we have information. Again, the more left-wing the government is, the more reluctant it is to reform the revenue administration (Table 5). Being close to elections acts as a catalyst of revenue administration reforms particularly in the areas of HR, IT, registration and filling, audit, management of payment obligations and customs clearance. The lack of political fragmentation (that is, a higher PCA of political strength) increases the likelihood of reforms in this area. All in all, by looking at the standardized coefficients (not shown) one could argue that proximity to elections together with political cohesion can overcome the resistance to reform by left-leaning government.

Table 5: Determinants of revenue administration reforms

Specification Dependent variable (Rev. Adm. area/reform)	(1) Management & HR	(2) Large taxpayers' office	(3) IT system	(4) Registration & filing	(5) Audit & verification	(6) Management payment obligations	(7) Improving compliance	(8) Customs clearance
Real GDP	-0.163 (1.153)	2.900* (1.540)	1.145 (1.021)	0.581 (1.133)	1.310 (0.962)	-0.789 (1.893)	2.553* (1.513)	0.979 (1.395)
Inflation rate	-1.711 (5.829)	-4.038 (6.068)	-6.059 (5.609)	-10.368* (5.953)	-1.740 (3.913)	-1.022 (6.963)	-10.710 (7.386)	-8.516 (7.185)
Trade openness	0.012* (0.007)	0.014* (0.008)	0.005 (0.006)	0.013* (0.007)	0.009 (0.006)	0.010 (0.007)	-0.007 (0.023)	0.011 (0.008)
Unemployment rate	0.577 (0.957)	-0.348 (0.709)	0.606 (0.925)	-0.611 (0.777)	-0.083 (0.606)	-0.608 (0.792)	3.000* (1.602)	-0.186 (0.851)
Left-wing	-0.700** (0.283)	-0.902*** (0.324)	-0.598** (0.281)	-0.592** (0.296)	-0.562** (0.260)	-1.922** (0.903)	-0.519 (0.331)	-1.377*** (0.453)
PCA electoral proximity	0.888** (0.346)	-0.084 (0.403)	0.533* (0.296)	0.903** (0.359)	0.568** (0.280)	1.691*** (0.593)	0.040 (0.401)	1.146** (0.454)
PCA political strength	3.471** (1.439)	2.316 (1.609)	2.341* (1.214)	4.930*** (1.626)	2.623** (1.141)	3.245** (1.507)	3.632** (1.751)	4.692** (2.111)
Observations	198	151	208	175	245	111	153	112
Pseudo-R2	0.172	0.165	0.137	0.206	0.121	0.188	0.202	0.214

Note: All models are estimated by logit. Dependent variables identified in the second row. Standard errors are reported in parenthesis. Country fixed effects estimated but omitted. The constant term is not reported for parsimony. *, **, *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.

Next, we carry out an additional sensitivity check by splitting our sample along income and geographical lines and re-estimating the logistic regressions. Results, reported in Table 6, show evidence from using the baseline dependent variable, that is, STR, as well as the sub-component relative to revenue administration reforms only (the equivalent of specification 8 in Table 4). We can observe that the reform-hindering effect of the left ideology is stronger in low-income countries than in emerging market economies (the difference is statistically significant both in general tax reforms and revenue administration reforms). Excluding fragile states removes the significance of electoral proximity, while excluding resource-rich countries strengthens the negative impact of leftist governments and positive impact of political strength on the likelihood of reforms.

Table 6: Determinants of inclusive growth: sub-sample analysis

Specification	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable (tax reform)	General tax reform				Rev. Adm. reform	
Sample	EME	LIC	Excl. Fragile States	Excl. Resource Rich	EME	LIC
Real GDP	2.038** (0.890)	5.020*** (1.364)	0.697 (0.957)	0.888 (0.960)	1.637* (0.895)	8.667*** (2.454)
Inflation rate	-9.322** (3.985)	-14.955*** (4.766)	-5.232 (3.489)	-7.489* (4.273)	-9.438** (4.531)	-10.711** (5.140)
Trade openness	-0.017* (0.010)	0.015* (0.008)	-0.007 (0.011)	0.010 (0.007)	-0.018* (0.011)	0.017* (0.010)
Unemployment rate	0.169 (0.783)	1.141 (0.832)	1.226 (0.778)	0.597 (0.557)	0.533 (0.860)	1.161 (0.961)
Left-wing	-0.772** (0.313)	-1.355*** (0.382)	-0.825*** (0.246)	-1.099*** (0.271)	-0.540* (0.329)	-1.833*** (0.490)
PCA electoral proximity	-0.054 (0.278)	1.090*** (0.405)	0.339 (0.252)	0.573** (0.263)	0.062 (0.296)	-0.030 (0.565)
PCA political strength	1.141 (0.978)	5.598*** (1.927)	3.134*** (1.094)	5.232*** (1.406)	0.665 (0.972)	8.318*** (2.813)
Observations	294	163	281	280	235	163
Pseudo-R2	0.231	0.430	0.187	0.210	0.204	0.486

Note: All models are estimated by logit. Dependent variables identified in the second row. Standard errors are reported in parenthesis. Country fixed effects estimated but omitted. The constant term is not reported for parsimony. *, **, *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.

5.2 Robustness

To test for the robustness of the results of the logistic regressions, we re-estimated the baseline model with a number of alternative estimators.

First, we re-estimate the baseline specification resorting to an Ordinary Least Squares (OLS) approach.

Second, we use a probit approach.

Thirdly, and relatedly, we create a new count variable that adds the different reforms in sub-categories of taxation to have a scaling dimension for a given country and year. As a result, we estimate a multinomial probit model (MNP) to take account of alternative combinations of tax reforms. The MNP model is used with discrete dependent variables that take on more than two outcomes that do not have a natural ordering. In our context, there are up to 6 possible combinations of reforms that can be considered (from zero to plus five), such that the larger the number of reforms the better in our context. In the MNP model, the choice probabilities among a set of categorically distributed alternatives are simultaneously estimated.⁸ The stochastic error

⁸ MNP was the chosen method since the alternative, a multinomial logit model (MNL) assumes the independence of irrelevant alternatives (IIA). A violation of the IIA assumption results in inconsistent estimates. To test for a potential violation of the IIA assumption, we performed a Hausman-McFadden test and a Small-Hsiao test. Because the results of both the Hausman-McFadden and Small-Hsiao tests did not point at a confirmation of the IIA assumption, we could not safely use the MNL estimation and decided in favor of the MNP.

terms for the implementation of this model are assumed to have independent, standard normal distributions. Evaluating the likelihood function involves computing probabilities from the multivariate normal distribution.⁹ The dependent variable “STR=1” in equation (1) can be replaced by “STR=0,1,2,3,4,5” in the multinomial probit estimations in our panel dataset.

Fourth, we employed an ordered logit model under the assumption that the larger the number of tax reforms the better in our context.

Finally, we employ a rare events logit (or relogit) estimator. In a logistic regression, the Maximum Likelihood estimates are consistent but only asymptotically unbiased. The basic problem is having a number of units (structural tax reforms) in a panel that has no events. This means that the country-specific indicators corresponding to the all-zero countries perfectly predict the zeroes in the outcome variable (Gates, 2001; King, 2001).¹⁰ The simplest way of dealing with this problem is decreasing the rareness of the event of interest: by lowering the threshold of what constitutes the event of interest or expanding the data selection period, for example, there is less need to correct for rareness. Alternatively, the King and Zeng’s (2001) bias correction method, the relogit estimator, can be used.¹¹ The relogit estimator for dichotomous dependent variables provides a lower mean square error in the presence of rare events and can be defined as follows:

$$\text{Prob}(STR_{it} = 1|Z_{it}) = \Phi(Z'_{it}\vartheta) \Leftrightarrow \text{Prob}(STR_{it} = 1|S_{it}, X_{it}) = \Phi(\alpha_i + Pol_{it}'\eta + X_{it}'\gamma) \quad (5)$$

with $i = 1, \dots, N$; $t = 1, \dots, T$, where $\Phi(\cdot) = \frac{1}{1+e^{-(Z'_{it}\vartheta)}} = \frac{1}{1+e^{-(\alpha_i+Pol'_{it}\eta+X'_{it}\gamma)}}$, α, η, γ are the vectors of the parameters to be estimated, and $\Phi(\cdot)$ is the logistic function.

The parameters can be estimated by maximum likelihood.¹² However, as pointed out by King and Zeng (1999a, 1999b, 2001), the estimates of $\Phi(\cdot)$ and $\Phi(\cdot) \cdot [1 - \Phi(\cdot)]$ among observations that include rare events (in our case, for which $STR = 1$) will be typically larger than those among observations that do not include rare events (i.e., for which $STR = 0$). Consequently, their

⁹ See Cameron and Trivedi (2005, chap. 15) for a discussion of multinomial models, including multinomial probit. Long and Freese (2014, chap. 8) discuss the multinomial logistic, multinomial probit and stereotype logistic models.

¹⁰ This is a well-known phenomenon in the statistical literature (for an overview see Gao and Shen, 2007).

¹¹ King and Zeng (2001) describe rare events as “dozens to thousands of times fewer ones [...] than zeroes”.

¹² And the variance of the estimated coefficients can be expressed as $Var(\hat{\beta}) = (Z'VZ)^{-1}$, where V is a diagonal matrix, with diagonal entries equal to $\Phi(\cdot) \cdot [1 - \Phi(\cdot)]$. In the case of rare events, $\Phi(\cdot)$ will be generally small.

contribution to the variance will be smaller, rendering additional ‘rare’ events more informative than additional ‘frequent’ events. Therefore, we follow King and Zeng (1999a, 1999b) and correct for the small sample and rare events biases and estimate a relogit model where the sampling design is random or conditional on Z_{it} .¹³

The regression results of these alternative estimators are reported in Table 7.

Table 7: Determinants of inclusive growth: robustness to alternative estimators

Specification Estimator	(1) OLS	(2) Probit	(3) MNP	(4) Ordered Logit	(5) Relogit
Real GDP	0.475*** (0.080)	1.949*** (0.411)	0.331*** (0.111)	3.791*** (0.706)	0.068* (0.040)
Inflation rate	-0.192* (0.108)	-5.366*** (1.591)	-2.337 (2.223)	0.907 (0.859)	-6.802*** (1.589)
Trade openness	-0.000 (0.001)	0.002 (0.003)	0.018*** (0.005)	-0.011* (0.007)	0.011*** (0.003)
Unemployment rate	0.059 (0.069)	0.369 (0.292)	1.035*** (0.383)	0.749 (0.597)	0.054 (0.132)
Left-wing	-0.095*** (0.027)	-0.487*** (0.125)	-0.150 (0.198)	-0.490*** (0.187)	-0.438*** (0.100)
PCA electoral proximity	0.014 (0.025)	0.225* (0.120)	0.405* (0.215)	0.030 (0.188)	0.251** (0.118)
PCA political strength	0.086* (0.053)	1.412*** (0.451)	-0.208 (0.578)	0.131 (0.453)	0.399* (0.229)
Observations	507	458	507	507	507
R2	0.274				
Pseudo-R2		0.282		0.267	

Note: estimator identified in the second row. Standard errors are reported in parenthesis. Country fixed effects estimated but omitted. The constant term is omitted for parsimony. *, **, *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.

OLS estimates yield weaker results than those in Table 5, as one loses statistical significance of most macroeconomic controls and the two PCA variables. Probit estimates, in contrast, are very much in line with the logistic counterpart. The MNP keeps the positive and significant influence of electoral proximity on the likelihood of tax reforms, but the other two political economy proxies are not statistically different from zero. Finally, the relogit confirms the previous set of findings: negative and significant effect of left-wing governments and positive and significant effect of electoral proximity and political strength.

¹³ We use the software package “relogit” provided by Tomz et al. (1999).

6. Conclusions

In this paper, we studied the role of political variables in facilitating or impeding structural tax reforms in 45 emerging market and low-income economies during 2000-2015. The focus was on the contribution of ideology, the influence of elections and the impact of political fragmentation in political decision making—the three aspects that the literature has identified as key political variables.

The results suggest that a left-wing government is less inclined to implement tax reforms while both proximity to elections and political strength or cohesion are positively associated with tax reforms. The reform-hindering effect of the left ideology is stronger in low-income than in emerging market economies. Interestingly, revenue administration reforms are resisted the most by left-leaning governments. Proximity to elections seems to trigger reforms of personal income tax (PIT) but opposite holds for trade tax reforms. Not surprisingly, political cohesion is a necessary ingredient to reform most tax categories and revenue administration.

Within tax administration, closeness to elections acts as a catalyst of reforms particularly in the areas of human resources, IT, registration and filling, audit, management of payment obligations and customs clearance. Greater political cohesion enhances the likelihood of reforms in these areas. All in all, proximity to elections together with political cohesion can overcome the resistance to reform by left-leaning government.

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APPENDIX

List of Countries by Region

Sub-Saharan Africa (# 17): Burundi, Cabo Verde, Central African Republic, Comoros, Republic of Congo, Gambia, Guinea-Bissau, Guinea, Liberia, Malawi, Rwanda, Seychelles, Senegal, Sierra Leone, Namibia, Uganda, Burkina Faso

Asia (# 8): Cambodia, Laos, Maldives, Nepal, Philippines, Solomon Islands, Tonga, Tuvalu.

Latin America (# 10): Ecuador, Nicaragua, Paraguay, Uruguay, Bahamas, Barbados, Dominica, Guyana, Belize, Jamaica

Commonwealth of Independent States (# 5): Armenia, Georgia, Kyrgyzstan, Moldova, Ukraine

Middle East (# 4): Afghanistan, Algeria, Mauritania, Morocco

Eastern Europe (# 1): Bulgaria

Table A1. Summary Statistics – Tax Revenues (% GDP), 2015

Variable	observations	Mean	Standard deviation	minimum	maximum
Tax revenue	45	18.12	6.38	6.50	32.24
PIT	25	3.33	2.00	0.21	7.19
CIT	26	2.67	1.33	0.0004	5.71
Property	23	0.58	0.72	0.0004	2.52
GST	31	6.25	2.60	1.35	11.04
VAT	28	6.21	2.63	0.03	11.04
Excises	28	2.41	1.37	0.18	5.35
Tax	32	2.87	3.02	0.02	11.97

Table A2: PCAs' Factor Loadings and Uniqueness

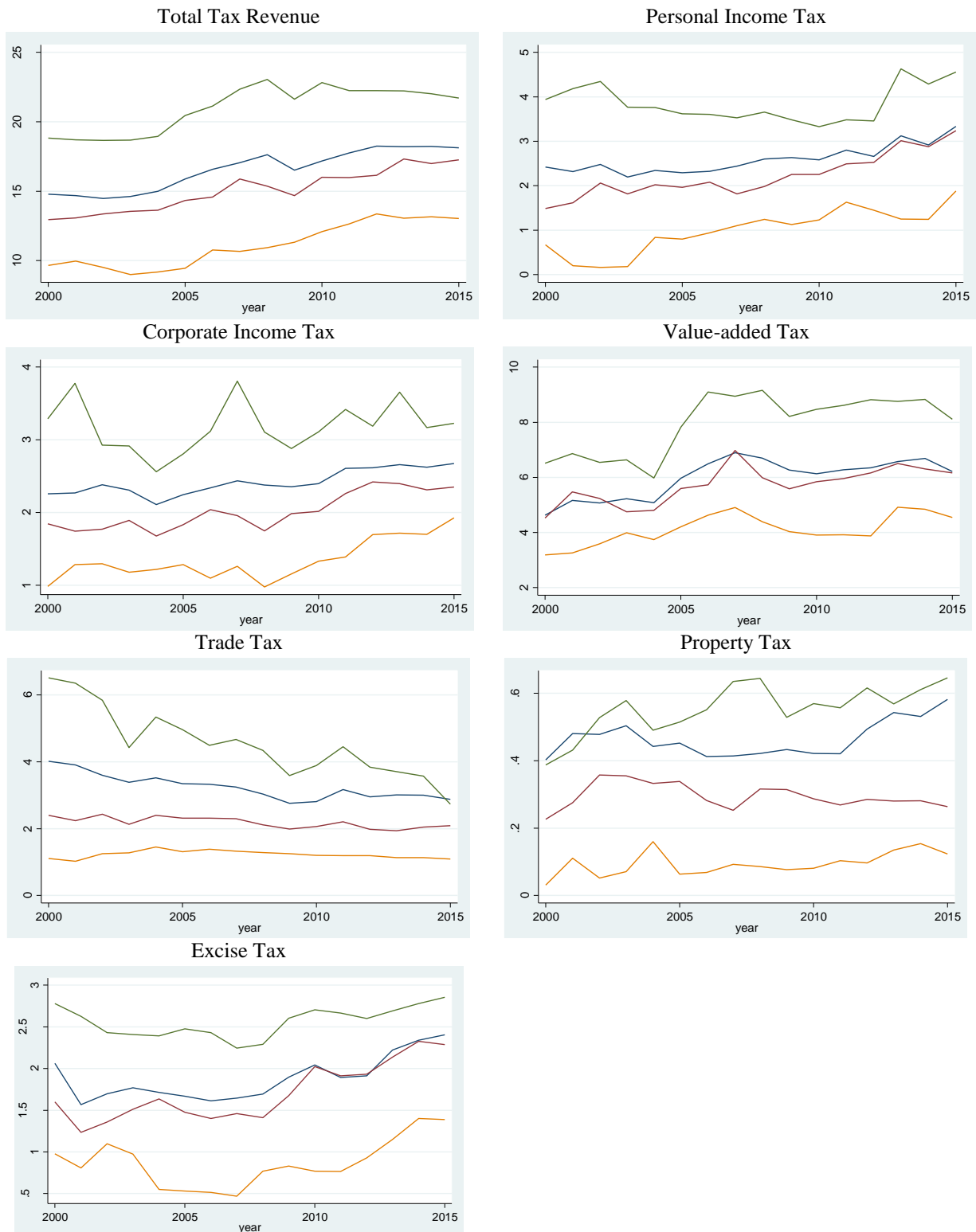
Variables	Factors		Uniqueness
	proximity	Strength	
longer length of time of party in office	0.79		0.37
higher number of years available for the chief executive in office	0.81		0.34
years left in the current term	0.40		0.83
margin of majority		0.87	0.23
executive control of all houses		0.83	0.30
government voting share		0.61	0.63
government number of seats		0.77	0.40
% explained	0.48	0.61	

Table A3. Tax Reform shocks over the business cycle (number of tax reform country-years)

	Lower economic growth	Higher economic growth
PIT	8	16
CIT	20	27
Goods and Services Taxes	75	98
<i>GST</i>	17	25
<i>VAT</i>	20	28
<i>EXCISE</i>	38	45
TRADE	10	21
PROPERTY	2	3
REVENUE ADMINISTRATION	48	54

Note: lower (higher) economic growth = real GDP growth below (above) the reforming country's historical average.

Figure A1. Composition of tax revenues (% GDP) in 45 developing countries, 2000-2015



Note: green line denotes the 75th percentile of the respective distribution; the blue line denotes the mean; the red line denotes the median; and the yellow line denotes the 25th percentile of the respective distribution. All charts expressed in percentage of GDP.

Source: IMF WEO.