eJournal of Tax Research (2023) vol. 21, no. 1, pp. 93-121

Exploring the deep determinants of tax revenues

Marius van Oordt*

Abstract

The tax effort literature explains cross-country variation in tax to GDP ratios using various determinants of tax revenues. To date, this literature has viewed this tax ratio primarily as a function of current economic and political circumstances, proximate determinants of tax performance. Borrowing from the development economics literature, this article explores 'deep determinants' or long-term variables of tax ratios. I consider how geography, formal institutions, and informal institutions influence tax ratios in a large cross-section of countries. A theory based on 'institutional efficiency' is proposed that may partly explain the lower tax ratios in many developing countries.

Keywords: tax ratios; tax effort; deep determinants; geography; institutions

* African Tax Institute, University of Pretoria, Pretoria, South Africa. Email: marius.vanoordt@up.ac.za.

1. INTRODUCTION

> A realistic understanding of the role of historical factors is essential for policy assessment. One could obtain misleading conclusions about the effects of specific policies and institutions when not taking into account the role of long-term variables.[1]

The tax effort literature improves our understanding of why some societies collect more tax revenues as a percentage of gross domestic product (GDP) than others.[2] Understanding this variation in tax ratios is valuable since many countries struggle to collect sufficient tax revenues. Traditionally, this variation is explained by what can be viewed as proximate determinants of tax ratios: economic development, trade, sector composition, corruption, voice and accountability, and similar factors that have higher variance. An exception to this is the past economic environment, as explored by Mkandawire and by Feger and Asafu-Adjaye.[3] These authors argue, with supporting evidence, that the economic environment found by colonisers influenced the policies implemented and, thereby, current tax ratios.

The economic environment found by colonisers is an example of a 'deep determinant' of tax ratios, the focus of this article. It is a variable that exposes the underlying, slow-changing or fixed structures that influence proximate determinants and also the tax ratio. Deep determinants, therefore, often work through the proximate determinants. Deep

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[1] Enrico Spolaore and Romain Wacziarg, 'How Deep Are the Roots of Economic Development?' (2013) 51(2) *Journal of Economic Literature* 325, 363.

[2] Seminal contributions to this literature are Jørgen R Lotz and Elliott R Morss, 'Measuring "Tax Effort" in Developing Countries' (1967) 14(3) *Staff Papers (International Monetary Fund)* 478, and Roy W Bahl, 'A Regression Approach to Tax Effort and Tax Ratio Analysis' (1971) 18(3) *Staff Papers (International Monetary Fund)* 570. Other important contributions include Jane H Leuthold, 'Tax Shares in Developing Economies: A Panel Study' (1991) 35(1) *Journal of Development Economics* 173; Vito Tanzi and Howell H Zee, 'Tax Policy for Emerging Markets: Developing Countries' (2000) 53(2) *National Tax Journal* 299; Janet G Stotsky and Asegedech WoldeMariam, 'Tax Effort in Sub-Saharan Africa' (International Monetary Fund Working Paper 97/107, 1997); Marcelo Piancastelli, 'Measuring the Tax Effort of Developed and Developing Countries: Cross Country Panel Data Analysis – 1985/95' (IPEA Discussion Paper 103, 2015 [2001]); James Alm, Jorge Martinez-Vazquez and Friedrich Schneider, '"Sizing" the Problem of the Hard-to-Tax' in James Alm, Jorge Martinez-Vazquez and Sally Wallace (eds), *Taxing the Hard-to-Tax: Lessons from Theory and Practice* (*Contributions to Economic Analysis* vol 268) (Elsevier, 2004) 11; Roy Bahl, 'Reaching the Hardest to Tax: Consequences and Possibilities' in James Alm, Jorge Martinez-Vazquez and Sally Wallace (eds), *Taxing the Hard-to-Tax: Lessons from Theory and Practice* (*Contributions to Economic Analysis* vol 268) (Elsevier, 2004) 337; Joweria M Teera and John Hudson, 'Tax Performance: A Comparative Study' (2004) 16(6) *Journal of International Development* 785; Abhijit Sen Gupta, 'Determinants of Tax Revenue Efforts in Developing Countries' (International Monetary Fund Working Paper 07/184, 2007); Richard M Bird, Jorge Martinez-Vazquez and Benno Torgler, 'Tax Effort in Developing Countries and High Income Countries: The Impact of Corruption, Voice and Accountability' (2008) 38(1) *Economic Analysis and Policy* 55; Carola Pessino and Ricardo Fenochietto, 'Determining Countries' Tax Effort' (2010) 195(4) *Hacienda Pública Española/Revista de Economía Pública* 65; Paul Clist and Oliver Morrissey, 'Aid and Tax Revenue: Signs of a Positive Effect since the 1980s' (2011) 23(2) *Journal of International Development* 165; Tuan Minh Le, Blanca Moreno-Dodson and Nihal Bayraktar, 'Tax Capacity and Tax Effort: Extended Cross-Country Analysis from 1994 to 2009' (World Bank Working Paper 6252, 2012); Ricardo Fenochietto and Carola Pessino, 'Understanding Countries' Tax Effort' (International Monetary Fund Working Paper 13/244, 2013).

[3] Thandika Mkandawire, 'On Tax Efforts and Colonial Heritage in Africa' (2010) 46(10) *Journal of Development Studies* 1647; Thuto Feger and John Asafu-Adjaye, 'Tax Effort Performance in Sub-Sahara Africa and the Role of Colonialism' (2014) 38 *Economic Modelling* 163.

determinants may also impact the tax ratio directly. Deep determinants show that history matters towards tax revenues and that tax revenues are path dependent.

The focus is on deep determinants since the argument, as borrowed from the development economics literature, is that proximate determinants are unlikely to experience significant change unless there is change in their underlying deep determinants. For instance, increasing trade openness, which has been shown to have a positive impact on tax ratios, may require changes in deep determinants, such as informal institutions. Changing deep determinants may, therefore, present a great challenge if such changes are a prerequisite to collecting sufficient tax revenues.

This article explores other deep determinants of tax ratios. I follow the deep determinants of economic development literature and consider whether geography, formal institutions and informal institutions influence tax ratios in a cross-section of 141 countries. Under geography, I consider the location and size of countries. Under formal institutions, the regime type and tax laws of countries are considered. To measure informal institutions, I rely on the work of Inglehart and Welzel and their culture map of 2014 (see Appendix B).[4]

The breadth of the reported estimates necessarily comes at a cost of rigour. Although the variables of interest tend to be exogenous, instrumental variables are relied on to address remaining endogeneity bias and some robustness tests are performed, I do not claim that any of the reported coefficients reflect a causal relationship. Such relationships will require further research.

The reported research is, therefore, exploratory in nature. The reason for the exploratory approach is to provide some justification for a theoretical concept – institutional efficiency – proposed in the conclusion. The theory formalises how knowledge of deep determinants and institutional economics can be incorporated in discussions on tax policy. The theory relates to the work of Boettke, Coyne and Leeson on institutional stickiness and path dependence.[5] The theory differs from that of Boettke, Coyne and Leeson by including enforcement characteristics and by focusing on minimising transaction costs, rather than whether an institution can be successfully introduced.

Since the focus of the article is on deep determinants of the tax ratio, which are supply-side factors, the suggested theory does not consider demand-side factors. The theory may, therefore, be less relevant for jurisdictions that can increase their tax ratios, but do not need additional tax revenues to meet their expenditure needs.

The remainder of the article is organised as follows. Section 2 explores the effect of geography on tax ratios. Section 3 explores the effect of institutions on tax ratios and section 4 concludes.

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[4] Ronald Inglehart and Christian Welzel, *Modernization, Cultural Change, and Democracy: The Human Development Sequence* (Cambridge University Press, 2005).

[5] Peter J Boettke, Christopher J Coyne and Peter T Leeson, 'Institutional Stickiness and the New Development Economics' (2008) 67(2) *American Journal of Economics and Sociology* 331.

2. GEOGRAPHY AND TAX RATIOS

2.1 The location of a country and tax ratios

The hypothesis explored in this section is that the location, climate, and disease environment of a country determined the diffusion of technology in the past. This diffusion partly determined which economic sectors developed. These patterns continue to exist today. High productivity sectors – generally established in urban areas – and international trade are generally easier to tax and administer than low productivity sectors or subsistence activities – generally established in rural areas. The difference in society's tax ratios may, therefore, be partially explained by the difference in their locations.

The historical arguments of this hypothesis are expertly illustrated by Diamond.[6] Originally, all human societies were hunter-gatherers. In moving from hunting-gathering to farming, Eurasia had a number of advantages. The local plants and animals were easier to domesticate. Animals that are useful for transport (eg, donkeys and horses) were native to Eurasia. Eurasia is further unique in that a similar latitude is shared throughout the continent, allowing for crops and animals domesticated in one area to adapt in another area. The plentiful supply of foods allowed for the division of labour, specialisation, technological innovation, and economic growth. The technology developed in Eurasia did not diffuse to other continents since ocean trade did not exist and the ecological zone of Africa was not suited to the plant species and domesticated animals of Eurasia. Consequently, Eurasia gained a substantial lead in population size, economic development, and specialisation – all of which are conducive to further technological development. At the onset of ocean travel, Eurasian countries had a substantial technological advantage in having guns, allowing these societies to extract from or settle in other societies.

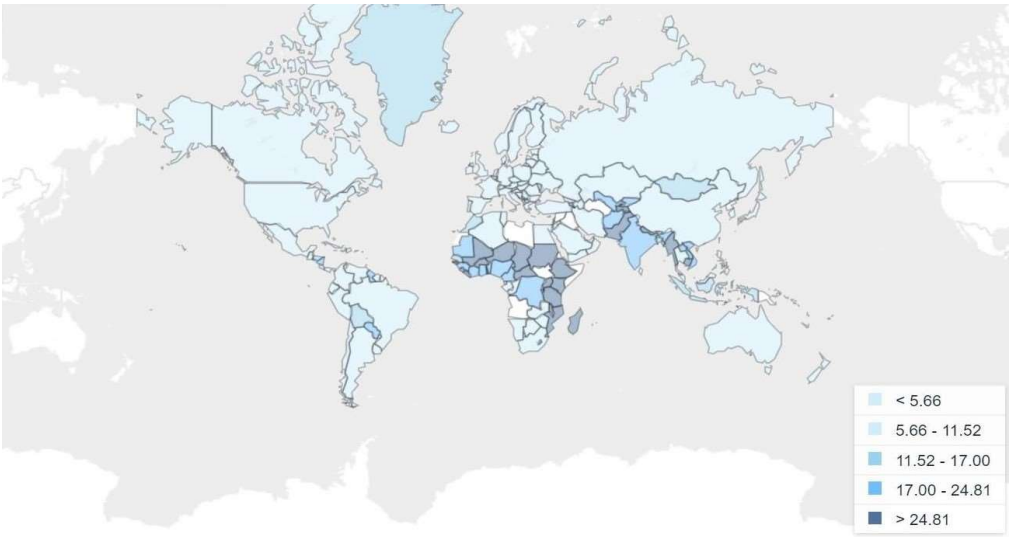
The decision to settle or extract was largely based on the favourability of the disease environment.[7] Where colonisers settled, the technology developed in Eurasia was diffused and continued to be developed. This technology decreased transport cost, which further increased economic development.[8]

The economic and technological development, coupled with larger population sizes and therefore more inventions, could have resulted in larger industry and services sectors. Where colonisers did not settle, technology likely developed at a slower rate and population sizes were likely lower due to the disease environment, resulting in smaller industry and service sectors and a reliance on the agricultural sector and subsistence activities. This could explain why the countries with the largest agriculture sectors today are located near the equator, in high temperature tropic areas, with few cold seasons and consequentially a high disease environment (see Figure 1). The generally small financial

[6] Jared M Diamond, *Guns, Germs, and Steel: The Fates of Human Societies* (WW Norton, 1997).
[7] Daron Acemoglu, Simon Johnson and James A Robinson, 'The Colonial Origins of Comparative Development: An Empirical Investigation' (2001) 91(5) *American Economic Review* 1369.
[8] John Luke Gallup, Jeffrey D Sachs and Andrew D Mellinger, 'Geography and Economic Development' (1999) 22(2) *International Regional Science Review* 179.

sectors found in countries with large agricultural sectors may also have limited the ability of the countries' governments to increase their tax ratios.[9]

Fig. 1: World Map of Agriculture to GDP



Source: World Bank. Note that no data is available for countries coloured in white.

I test the hypothesis that a country's location has an influence on tax ratios with the use of a cross-section dataset of at most 141 countries for the year 2014, using alternative models (refer to Table 1). Appendix A provides the sample and a description for all variables used in this article. The models contain predominantly geographical variables, geography described as being 'as exogenous a determinant as an economist can ever hope to get'.[10] The only non-geographical variables are malaria risk in 1965 and population size. Malaria risk in 1965 serves as a proxy for the disease environment faced by settlers and seems likely to be exogenous to current tax ratios. Formal testing for endogeneity by using various geographic variables as instruments supports this conclusion. Since current population size may be endogenous to tax ratios (and the coefficient is relevant for the remainder of the article), I use population size in 1960 as an instrument for current population size and two-stage least squares as the estimator when including population size. It seems unlikely that population size in 1960 will

[9] Roger Gordon and Wei Li, 'Tax Structures in Developing Countries: Many Puzzles and a Possible Explanation' (2009) 93(7-8) *Journal of Public Economics* 855.
[10] Dani Rodrik, Arvind Subramanian and Francesco Trebbi, 'Institutions Rule: The Primacy of Institutions over Geography and Integration in Economic Development' (2004) 9(2) *Journal of Economic Growth* 131, 133.

influence tax revenues through a channel not represented by the current population size and population size in 1960 may, therefore, be a valid instrument.[11]

Table 1: Country's Location and Tax Ratios

VARIABLES	(1) OLS	(2) OLS	(3) 2SLS	(4) OLS	(5) 2SLS
Temperature	-0.262***	-0.103	-0.0728	-0.102	
	(0.0994)	(0.123)	(0.120)	(0.127)	
Rainfall	0.0943	0.0553	0.0652	0.0558	
	(0.108)	(0.118)	(0.114)	(0.118)	
Area	-0.201***	-0.174***		-0.174***	
	(0.0617)	(0.0537)		(0.0539)	
Landlocked	-0.0800	-0.0201	-0.0102	-0.0187	
	(0.232)	(0.234)	(0.235)	(0.232)	
Malaria risk 1965		-0.242**	-0.226**	-0.239**	
		(0.105)	(0.105)	(0.118)	
Population			-0.160***		-0.168***
			(0.0519)		(0.0370)
Development				0.00747	
				(0.110)	
Tropical area					-0.266***
					(0.0828)
Coastline length					-0.0846**
					(0.0368)
Constant	0.0159	0.00399	0.000188		-0.0204
	(0.0935)	(0.0923)	(0.0917)		(0.0932)
Observations	141	141	140	141	115
R-squared	0.075	0.113		0.113	

Notes: Heteroscedasticity robust standard errors are provided in parentheses. Asterisks denote significance at the 1% (***), 5% (**), and 10% (*) levels. All variables are standardised.

Column 1 in Table 1 shows that countries with higher average temperatures have lower tax ratios. Column 2 shows that when controlling for the disease environment, temperature is no longer a significant determinant of tax ratios. Alternatively stated, temperature influences tax ratios, but only through its influence on the past disease environment. This provides support for the hypothesis that the past disease environment of a country and the consequent influence on the behaviour of settlers has an influence on tax ratios today. The immediate argument against such a conclusion would be that the disease environment changed population sizes, but as shown in Column 3, controlling for population has little influence on the coefficient of malaria risk.

[11] For both models estimated by two-stage least squares, the Kleibergen-Paap rk statistics indicated that the equations are not under-identified. The Kleibergen-Paap Wald rk F statistics indicated that the equations do not suffer from weak instruments.

Since the economic development literature finds a strong relationship between the past disease environment and economic development and economic development is shown to influence tax ratios in the tax effort literature, a further argument could be that the observed effect of the disease environment on tax ratios only runs through the level of economic development of countries. Column 4 shows that this is not the case; the past disease environment affects tax ratios irrespective of the level of development. This result is also not dependent on the specific country that colonised a country (result not shown). Column 5 further supports the hypothesis, showing that countries with larger tropical areas, where diseases were more common and settler mortality rates were high,[12] have lower tax ratios.

Taken together, the results in Table 1 support the hypothesis that the location of a country, and the implied history of this location, has an influence on tax ratios. It should however be made clear that the empirical results do not prove that it was the technology diffused by colonisers that influences tax ratios. Although this is likely one aspect, colonisers not only brought their technology and related knowledge to where they settled, but as will be explored later, also their institutions.

2.2 The size of a country and tax ratios

Table 1 shows that larger countries, based on area, population size or coastline length, tend to have lower tax ratios. Larger countries have larger internal markets, reducing the need to be open to international trade. In the tax effort literature, trade openness (exports plus imports over GDP) has received significant attention and is well established as a factor affecting tax ratios. Alesina and Wacziarg also provide robust estimations showing the negative cross-section effect of country size on international trade.[13] One potential explanation for the correlation between country size and tax ratios in Table 1 may, therefore, be that larger countries tend to conduct less international trade, a relatively easy tax handle. This is explored in Table 2.

As is evident in Table 2, trade openness has a positive correlation with tax ratios as found in the existing literature. After controlling for area, this correlation is not statistically significant. The same results are obtained when controlling for population size (not instrumented). It, therefore, appears that trade openness is not a robust determinant of tax ratios, as the previous studies suggest. There is an omitted variable that is correlated with trade openness and country size that is an important determinant of tax ratios.

[12] Diamond, above n 6.
[13] Alberto Alesina and Romain Wacziarg, 'Openness, Country Size and Government' (1998) 69(3) *Journal of Public Economics* 305.

Table 2: Country's Size, Openness and Tax Ratios

VARIABLES	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS
Openness	0.161*	0.132	0.124	-0.0248	
	(0.0854)	(0.087)	(0.085)	(0.0694)	
Area		-0.108**			-0.166**
		(0.0466)			(0.0806)
Population			-1.67***	-0.532*	-0.416*
			(0.0454)	(0.277)	(0.230)
Constant	0.00736	0.00791	0.008	0.0690	0.0578
		(0.084)	(0.0836)	(0.0836)	(0.0861)
Observations	139	139	139	138	138
R-squared	0.025	0.036	0.052	0.223	0.181

Notes: Heteroscedasticity robust standard errors are provided in parentheses. Asterisks denote significance at the 1% (***), 5% (**), and 10% (*) levels. All variables are standardised.

A second potential explanation for the correlation between country size and tax ratios is that larger countries are more likely to have instituted federalism. Keen and Kotsogiannis show that, theoretically, the competition between states in a federal country for mobile tax bases can lead to lower tax rates (a horizontal externality).[14] At the same time, lower and higher levels of government face a common-pool problem in taxing the same base. Each state unduly discounts the impact of their tax rates on the federal tax base, which could result in tax rates that are too high relative to the social optimum (a vertical externality). Besley and Case show, theoretically and with evidence from the United States, that vote-seeking behaviour of politicians, coupled with taxpayers' awareness of tax rates in other states in a federal country, will reduce taxes.[15] Esteller-Moré and Solé-Ollé show that federalism leads to higher personal income taxes in the United States.[16] Brülhart and Jametti provide empirical evidence that in Sweden the vertical externality of federalism dominates the horizontal externality of federalism, leading to higher tax rates.[17] The correlation between country size and tax ratios, as well as the correlation between trade openness and tax ratios as frequently shown in the literature, may therefore be explained by federalism.

Besides having instituted federalism, larger countries are also more likely to have a greater diversity of cultures, which can be identified based on race and language and measured as ethnic fractionalisation. This is a third potential explanation for the correlation between country size and tax ratios. Such individual heterogeneity can decrease the likelihood that tax policies and public goods and services satisfy all

[14] Michael J Keen and Christos Kotsogiannis, 'Does Federalism Lead to Excessively High Taxes?' (2002) 92(1) *American Economic Review* 363.
[15] Timothy Besley and Anne Case, 'Incumbent Behavior: Vote-Seeking, Tax-Setting, and Yardstick Competition' (1995) 85(1) *American Economic Review* 25.
[16] Alex Esteller-Moré and Albert Solé-Ollé, 'Vertical Income Tax Externalities and Fiscal Interdependence: Evidence from the US' (2001) 31(2-3) *Regional Science and Urban Economics* 247.
[17] Marius Brülhart and Mario Jametti, 'Vertical versus Horizontal Tax Externalities: An Empirical Test' (2006) 90(10-11) *Journal of Public Economics* 2027.

citizens' preferences.[18] Easterly and Levine show that ethnic diversity adversely affects many public policies associated with economic growth and conclude that their 'results lend support to theories that interest group polarization leads to rent-seeking behavior and reduces the consensus for public goods'.[19] La Porta and co-authors show that ethnic heterogeneity is correlated with poorer quality of governance and Lago-Peñas and Lago-Peñas, as well as Xin Li show that ethnic fractionalisation is negatively correlated with tax morale.[20] The correlation between country size and tax ratios may, therefore, also be due to ethnic fractionalisation.

Building on the results in Table 1, Column 1 of Table 3, shows that after controlling for federalism, area no longer has a statistically or economically significant effect on tax ratios. Column 2, however, shows that ethnic fractionalisation does not have a similar effect on the coefficient of area. This suggests that larger countries in terms of area size are not necessarily more ethnically fractionalised. It, therefore, appears that the correlation between area and tax ratios runs through federalism.[21]

Under all the model specifications in Table 3, the effect of federalism remains statistically significant at the 1 per cent level, with large economic significance. The direction of correlation between federalism and tax ratios is, however, the opposite of that expected when only considering the results of Esteller-Moré and Solé-Ollé and Brülhart and Jametti. One potential explanation would be that the change in other political outcomes associated with federalism drives this result, but as shown in Column 4, controlling for political outcomes has nearly no influence on the coefficient of federalism. Another explanation is that vote-seeking behaviour of politicians and tax competition between federal states drives down tax rates and provides incentives to move mobile tax bases to lower tax rate states (a horizontal externality).

Ethnic fractionalisation also has a statistically and economically significant effect on tax ratios and the coefficient of ethnic fractionalisation shows robustness to the inclusion of basic control variables (Columns 2-5 in Table 3). Based on the existing literature, this result is as expected. The channel of correlation of ethnic fractionalisation does not, however, run through country size (measured in terms of area or population as in Column 5). Ethnic fractionalisation may, therefore, be a deep determinant of tax ratios in its own right.

Population remains significant after controlling for federalism and ethnic fractionalisation and the coefficient of population is almost identical to the 2SLS coefficient of population in Table 1. Adding further controls (not shown) has nearly no influence on the coefficient of population. This suggests that population size has an effect on tax ratios, irrespective of federalism or ethnic fractionalisation. One potential

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[18] Alberto Alesina, Enrico Spolaore and Romain Wacziarg, 'Trade, Growth and the Size of Countries' in Philippe Aghion and Steven N Durlauf (eds), *Handbook of Economic Growth, Vol 1B* (North-Holland, 2005) 1499.

[19] William Easterly and Ross Levine, 'Africa's Growth Tragedy: Policies and Ethnic Divisions' (1997) 112(4) *Quarterly Journal of Economics* 1203, 1241.

[20] Rafael La Porta, Florencio Lopez-de-Silanes, Andrei Shleifer and Robert Vishny, 'The Quality of Government' (1999) 15(1) *Journal of Law, Economics, and Organization* 222; Ignacio Lago-Peñas and Santiago Lago-Peñas, 'The Determinants of Tax Morale in Comparative Perspective: Evidence from European Countries' (2010) 26(4) *European Journal of Political Economy* 441; Sherry Xin Li, 'Social Identities, Ethnic Diversity, and Tax Morale' (2010) 38(2) *Public Finance Review* 146.

[21] Openness is also no longer a statistically significant determinant of tax ratios after controlling for federalism (result not shown).

explanation for this correlation may be that there are economies of scale in supplying public goods. Larger populations may also provide challenges in tax enforcement, especially for countries with limited tax administration capacity. Taxpayers' perceived probability of detection may also decrease as population sizes increase.

Table 3: Country's Size (Area and Population), Federalism, Ethnic Fractionalisation and Tax Ratios

VARIABLES	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS
Area	-0.0472	-0.127***	-0.0630	-0.0248	
	(0.0713)	(0.0416)	(0.0713)	(0.0694)	
Population					-0.166**
					(0.0806)
Federal	-0.617**		-0.530*	-0.532*	-0.416*
	(0.294)		(0.294)	(0.277)	(0.230)
Ethnic Fractionalisation		-0.330***	-0.265***	-0.216**	-0.321***
		(0.0721)	(0.0866)	(0.105)	(0.0809)
Religion Fractionalisation			0.0200	-0.0704	
			(0.0896)	(0.0891)	
Development			0.117	0.0960	
			(0.0872)	(0.140)	
Latitude				-0.217**	
				(0.108)	
Population density				-0.0885	-0.108
				(0.0663)	(0.0793)
Control of corruption				0.00292	
				(0.239)	
Government effectiveness				0.139	
				(0.338)	
Regulatory quality				-0.246	
				(0.247)	
Political stability				-0.0236	
				(0.118)	
Rule of law				-0.0124	
				(0.344)	
Voice and accountability				0.386***	
				(0.142)	
Constant	0.0919	-0.00439	0.0744	0.0690	0.0578
	(0.0893)	(0.0809)	(0.0875)	(0.0836)	(0.0861)
Observations	141	138	138	138	138
R-squared	0.060	0.126	0.158	0.223	0.181

Notes: Heteroscedasticity robust standard errors are provided in parentheses. Asterisks denote significance at the 1% (***), 5% (**), and 10% (*) levels. All variables are standardised.

3. INSTITUTIONS AND TAX RATIOS

3.1 Formal institutions and tax ratios

Diamond's discussion, as summarised in section 2, focuses on the diffusion of technology and how this led to Eurasian dominance. But the plentiful supply of food and consequent division of labour, population growth, and trade do not only benefit technological development. The interaction between different social groups and societies necessitates the establishment of new institutions. The institutions developed and established in Eurasia were replicated in societies where colonisers settled and many continue to exist today.[22] Today, non-settler societies often also enforce formal institutions originating from Eurasian societies. Formal institutions are regarded as deep determinants because they are historically determined, slow changing and, therefore, path dependent.

North often illustrates the role of institutions in a society by referring to a game of sports, say football (soccer).[23] There are formal (predominantly written) rules indicating what a player may or may not do (eg, handle the ball), which are enforced by referees. There are also informal rules that relate to sportsperson-like behaviour (eg, to not aim the celebration of a goal at the opposing team), often enforced by other players or the spectators. But if two societies are not playing the same game of sports, the rules will look remarkably different. If the second society is playing, say, baseball, there will be a rule that the ball should be hit with a bat, a rule that is not possible in football. Since the rules differ, behaviour associated with the rules differs.

These rules that are collectively recognised and accepted, together with the identification of the players, referees and spectators, provide for a selection of powers, obligations, rights and responsibilities to the players, referees and spectators.[24] In this sense an institution is any collectively accepted system of rules. Formal institutions are created and enforced inside officially sanctioned channels, while informal institutions are created and enforced outside officially sanctioned channels.[25]

The measurement of formal institutions has proven to be an empirical challenge. In the development economics literature, political outcomes are often used as a measure of formal institutions.[26] I take the view of Glaeser and co-authors that these outcomes are not the ideal measures of formal institutions.[27] Political outcomes (obtained primarily from survey data) are likely a function of formal institutions, informal institutions,

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[22] Diamond, above n 6; William Easterly and Ross Levine, 'Tropics, Germs, and Crops: How Endowments Influence Economic Development' (2003) 50(1) *Journal of Monetary Economics* 3.

[23] Douglass C North, *Institutions, Institutional Change and Economic Performance* (Cambridge University Press, 1990) ('*Institutions, Institutional Change and Economic Performance*'); Douglass C North, *The Role of Institutions in Economic Development: Gunnar Myrdal Lecture* (United Nations, 2003).

[24] John R Searle, 'What Is an Institution?' (2005) 1(1) *Journal of Institutional Economics* 1.

[25] Gretchen Helmke and Steven Levitsky, 'Informal Institutions and Comparative Politics: A Research Agenda' (2004) 2(4) *Perspectives on Politics* 725.

[26] See, for example, Stephen Knack and Philip Keefer, 'Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures' (1995) 7(3) *Economics and Politics* 207, and Robert E Hall and Charles I Jones, 'Why Do Some Countries Produce So Much More Output Per Worker Than Others?' (1999) 114(1) *Quarterly Journal of Economics* 83.

[27] Edward L Glaeser, Rafael La Porta, Florencio Lopez-de-Silanes and Andrei Shleifer, 'Do Institutions Cause Growth?' (2004) 9(3) *Journal of Economic Growth* 271.

enforcement characteristics, and the personal characteristics, values, and biases of those in government and of those completing the surveys.

An institution is a collectively accepted system of rules. According to Ellickson a rule is a guideline that influences human behaviour.[28] To influence human behaviour the rule should be enforced, which requires sanctions or rewards. It is not a requirement that enforcement is perfect or that each instance of breaking the rule is met with sanctions. In my view, formal institutions are therefore dichotomous; the collectively accepted (eg, generally written) system of rules is either enforced (through official channels) and therefore an institution, or it is not. Any non-dichotomous measure will likely be subject to the strength of enforcement of the system of rules, going beyond the definition of an institution.

The potential importance of formal institutions in understanding tax ratios is already suggested by the robust connection between federalism and tax ratios in Table 3. Federalism is a system of rules that, among other things, provides for shared taxing rights between lower and higher levels of government. As shown, this formal institution seems to provide incentives and constraints that are associated with decreased tax ratios.

The work of Bird, Martinez-Vazquez and Torgler also suggested the importance of formal institutions.[29] The authors refer to societal institutions and measure these in terms of governance, voice and accountability, political stability, rule of law, and control of corruption. These variables may be correlated with formal institutions and can be thought of as proximate determinants of tax ratios. They exhibit greater variance than the variables considered in this article.

3.1.1 Formal regime type and tax ratios

Whether a country is a democracy and has a parliamentary system can be expected to influence tax ratios. The representative or median voter models of the size of government depends on the extent of suffrage and majority rule.[30] These systems are indicative of whose voice enters policy-making and the constraints on policy-makers and politicians.[31] These models generally predict that democracy should lead to greater preference for redistribution and there exists robust empirical evidence supporting this prediction.[32] Another theory, as suggested by Olson,[33] is that under authoritarian systems governments would attempt to be as large as possible (as found by Mulligan,

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[28] Robert C Ellickson, *Order Without Law: How Neighbors Settle Disputes* (Harvard University Press, 1991).

[29] Richard M Bird, Jorge Martinez-Vazquez and Benno Torgler, 'Societal Institutions and Tax Effort in Developing Countries' (Andrew Young School of Policy Studies Working Paper 04-06, 2004).

[30] For example, Anthony Downs, 'An Economic Theory of Political Action in a Democracy' (1957) 65(2) *Journal of Political Economy* 135; Kevin WS Roberts, 'Voting over Income Tax Schedules' (1977) 8(3) *Journal of Public Economics* 329; Allan H Meltzer and Scott F Richard, 'A Rational Theory of the Size of Government' (1981) 89(5) *Journal of Political Economy* 914.

[31] Andrew C Gould and Peter J Baker, 'Democracy and Taxation' (2002) 5 *Annual Review of Political Science* 87; Margaret Levi, *Of Rule and Revenue* (University of California Press, 1989).

[32] Carles Boix, 'Democracy, Development, and the Public Sector' (2001) 45(1) *American Journal of Political Science* 1; Toke S Aidt and Peter S Jensen, 'Tax Structure, Size of Government, and the Extension of the Voting Franchise in Western Europe, 1860–1938' (2009) 16(3) *International Tax and Public Finance* 362; Timothy Besley and Torsten Persson, 'The Origins of State Capacity: Property Rights, Taxation, and Politics' (2009) 99(4) *American Economic Review* 1218 ('The Origins of State Capacity').

[33] Mancur Olson, 'Dictatorship, Democracy, and Development' (1993) 87(3) *American Political Science Review* 567.

Gil and Sala-i-Martin).[34] Persson and Tabellini[35] find that presidential systems decrease tax revenues (parliamentary systems increase tax revenues), although this result is questioned by the replication study of Blume and co-authors, which uses a larger sample.[36] The results reported in this section are from a greater number of observations than these previous studies (141 compared to 88 by Blume and co-authors and 76 by Persson and Tabellini).

The majority of past studies on democracy and government size measure the relationship between the *extent* of democratisation and government size (ie, a continuous variable). The interest in this section is whether the formal institutions of democracy and parliamentary systems have an effect on tax ratios (ie, a binary variable). To this end, a country is classified as a democracy if there exists a system of rules that is enforced (irrespective of strength) that gives citizens the right to vote in an election, freely and fairly. The democratic outcomes of having this system of rules, post-enforcement, are not of interest. Similarly a system of rules is classified as parliamentary if: (1) the system has elected executives; (2) the system has a prime minister; (3) the president cannot veto legislation without a supermajority support from parliament, and (4) the president cannot appoint or dismiss prime ministers *and* dissolve parliament.

Both democracy and parliamentary systems are most likely endogenous to tax ratios and will suffer from omitted variable bias without proper controls.[37] The formal institutions of democracy and parliamentary systems were not implemented randomly. Przeworski and co-authors consider these institutions to emerge as a consequence of economic development and social transformation.[38] To establish whether democracy and parliamentary systems have an effect on tax ratios, I control for the level of development, other variables that have been shown to influence the level of development in the deep determinants of economic development literature and variables indicative of society and societal development.

Column 1 in Table 4 shows that democracy is positively correlated with tax ratios. When only controlling for factors relating to economic development, the coefficient of democracy appears to be robust (Column 2). The coefficient of democracy remains fairly robust after including factors representing social transformation (Columns 3 and 4), taking into account that including the schooling variable (a proxy for human capital) reduces the sample size. Column 5 shows that after including all control variables, democracy is no longer statistically significant although remaining economically significant. The evidence suggests that institutionalising democracy is likely to increase tax ratios, although this should not be expected to always be the case.

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[34] Casey B Mulligan, Ricard Gil and Xavier Sala-i-Martin, 'Do Democracies Have Different Public Policies than Nondemocracies?' (2004) 18(1) *Journal of Economic Perspectives* 51.

[35] Torsten Persson and Guido Tabellini, *The Economic Effects of Constitutions* (MIT Press, 2005).

[36] Lorenz Blume, Jens Müller, Stefan Voigt and Carsten Wolf, 'The Economic Effects of Constitutions: Replicating – and Extending – Persson and Tabellini' (2009) 139(1-2) *Public Choice* 197.

[37] It seems unlikely that the coefficients will suffer from simultaneity or reverse causality bias in that countries become democratic or adopt a parliamentary system as a result of tax ratios. This is suggested by Michael L Ross, 'Does Taxation Lead to Representation?' (2004) 34(2) *British Journal of Political Science* 229, but he does not find empirical evidence that higher tax ratios lead to democratisation.

[38] Adam Przeworski, Michael E Alvarez, José Antonio Cheibub and Fernando Limongi, *Democracy and Development: Political Institutions and Well-Being in the World, 1950–1990* (Cambridge University Press, 2000).

Table 4: Influence of Democracy on Tax Ratios

VARIABLES	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS
Democracy	0.550***	0.506**	0.345**	0.336*	0.328
	(0.190)	(0.218)	(0.170)	(0.196)	(0.207)
Latitude		-0.155			-0.0937
		(0.0971)			(0.0925)
Population		-0.160***			-0.0858
		(0.0590)			(0.0638)
Landlocked		0.0562			0.0704
		(0.232)			(0.246)
Development		0.147*			0.113
		(0.0876)			(0.114)
Protestant			0.248***	0.238**	0.183
			(0.0947)	(0.105)	(0.111)
Muslim			-0.161	-0.0590	-0.0412
			(0.101)	(0.105)	(0.104)
Scientific articles			-0.140***	-0.159***	-0.101
			(0.0359)	(0.0428)	(0.0817)
Schooling				0.116	0.101
				(0.0942)	(0.0898)
Constant	-0.374**	-0.356*	-0.235	-0.174	-0.181
	(0.167)	(0.209)	(0.151)	(0.168)	(0.199)
Observations	141	141	141	118	118
R-squared	0.066	0.126	0.184	0.168	0.188

Notes: Heteroscedasticity robust standard errors are provided in parentheses. Asterisks denote significance at the 1% (***), 5% (**), and 10% (*) levels. All variables are standardised.

The evidence on parliamentary systems presented in Table 5 is similar to that of democracy in Table 4. The coefficient of parliamentary systems, however, has greater statistical and economic significance than the coefficient of democracy. The coefficient of parliamentary systems also appears to be more robust than that of democracy. This suggests that the formal institution of democracy is of general importance to tax ratios, but the specific system of rules applied within a democracy (in this case parliamentary or presidential) is of greater importance. Kunicová and Rose-Ackerman show that presidential systems are more susceptible to corrupt political rent-seeking and argue that legislative bargaining patterns partly drive their results.[39] Within tax laws, rent-seeking behaviour can be associated with tax cuts and exemptions aimed at specific interest groups and it is possible that this political influence on taxation is less pronounced when

[39] Jana Kunicová and Susan Rose-Ackerman, 'Electoral Rules and Constitutional Structures as Constraints on Corruption' (2005) 35(4) *British Journal of Political Science* 573.

political power is more distributed. Rent-seeking behaviour could also influence tax morale, decreasing tax compliance.[40]

Table 5: Influence of a Parliamentary System on Tax Ratios

VARIABLES	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS
Parliamentary	0.748***	0.778***	0.570***	0.640***	0.708***
	(0.166)	(0.208)	(0.151)	(0.191)	(0.221)
Latitude		-0.165*			-0.111
		(0.0924)			(0.0852)
Population		-0.163***			-0.133**
		(0.0534)			(0.0600)
Landlocked		0.0124			0.00431
		(0.212)			(0.220)
Development		0.0387			-0.0158
		(0.0993)			(0.137)
Protestant			0.250***	0.253**	0.218*
			(0.0940)	(0.0999)	(0.114)
Muslim			-0.147	-0.0302	-0.00934
			(0.109)	(0.109)	(0.108)
Scientific articles			-0.136***	-0.146***	-0.0394
			(0.0341)	(0.0414)	(0.0753)
Schooling				0.0751	0.102
				(0.1000)	(0.0928)
Constant	-0.349***	-0.360**	-0.257**	-0.224*	-0.243*
	(0.109)	(0.144)	(0.104)	(0.114)	(0.141)
Observations	133	133	133	113	113
R-squared	0.135	0.190	0.245	0.244	0.264

Notes: Heteroscedasticity robust standard errors are provided in parentheses. Asterisks denote significance at the 1% (***), 5% (**), and 10% (*) levels. All variables are standardised.

3.1.2 Tax laws and tax ratios

The specifics contained within tax laws – 'the paradigmatic system of rules'[41] – determine the upper bound amount of tax revenue that governments can collect and the ease and consequences of tax evasion. It is therefore not surprising that there exists a large body of literature focused on the specific provisions contained within tax laws.

Tax laws reside in legal systems that were instituted centuries ago. La Porta and co-authors argue that a civil legal tradition can be taken as an intent to build institutions to

[40] Benno Torgler, Markus Schaffner and Alison Macintyre, 'Tax Compliance, Tax Morale and Governance Quality' (Center for Research in Economics, Management and the Arts Working Paper No 2007-17, 2007).
[41] David A Weisbach, 'Formalism in the Tax Law' (1999) 66(3) *University of Chicago Law Review* 860, 860.

further the power of the state and a common law tradition indicates the intent to limit rather than strengthen the state.[42] Under civil law, tax laws tend to be more formal and systematic with statutes drafted in greater detail than under common law.[43] In common law countries, the court generally plays a greater role in developing tax laws than in civil law countries. Thuronyi argues that the legal traditions and other historic commonality or influence on tax laws allow for the grouping of countries into tax families.[44] Countries falling into the same tax family have similar tax laws and legislation is often imitated in a tax family. The results in section 2 of this article suggest that history – specifically whether colonisers settled – matters for tax ratios. This section explores whether history through its influence on legal systems and tax laws is also important in understanding tax ratios. Specifically, I estimate the effect of tax laws, grouped into tax families, on tax ratios.

The results in Table 6 show that the historical influence on legal systems and specifically tax laws does have an effect on tax ratios (Column 1). Specifically, the Commonwealth, French, Northern European and Southern European tax families exhibit greater tax ratios than the other tax families. This effect, however, is not robust to basic control variables – especially societal features (Column 2) – or to using two stage least squares as the estimator (Column 3).[45] This aligns with the literature on tax culture,[46] and suggests that tax laws are a bottom-up institution where society determines the rules, rather than the rules being created and enforced without consent and approval from society. If tax laws are a bottom-up institution, informal institutions should be important towards a greater understanding of tax ratios.

[42] La Porta et al, above n 20.
[43] Victor Thuronyi, *Comparative Tax Law* (Kluwer Law International, 2003).
[44] Ibid.
[45] Latitude is used as an instrument for Northern European, the tax family with the greatest economic significance in the models using OLS as the estimator. The correlation between latitude and Northern European is 0.66. Latitude is exogenous to tax ratios. According to the Kleibergen-Paap rk LM statistic and the Kleibergen-Paap rk Wald F statistic, the equation is not under-identified and does not suffer from weak instruments.
[46] See, for example, Birger Nerré, 'Tax Culture: A Basic Concept for Tax Politics' (2008) 38(1) *Economic Analysis and Policy* 153.

Table 6: Influence of Tax Families on Tax Ratios

VARIABLES	(1) OLS	(2) OLS	(3) 2SLS
Commonwealth	0.913**	0.309	
	(0.373)	(0.406)	
American	0.351	-0.511	
	(0.407)	(0.452)	
French	0.740*	0.577	
	(0.409)	(0.490)	
Latin American	0.408	-0.278	
	(0.333)	(0.402)	
Transitional and post-conflict	0.550	0.244	
	(0.348)	(0.374)	
Northern European	1.480***	0.640	0.0826
	(0.427)	(0.550)	(0.615)
Southern European	0.890**	0.337	
	(0.399)	(0.443)	
Japanese	0.123	-0.454	
	(0.344)	(0.397)	
Development		0.0136	
		(0.102)	
Latitude		-0.0637	
		(0.109)	
Protestant		0.228**	0.286**
		(0.112)	(0.126)
Muslim		-0.285**	-0.224**
		(0.110)	(0.106)
Constant	-0.757**	-0.256	-0.00708
	(0.322)	(0.363)	(0.0961)
Observations	137	137	137
R-squared	0.109	0.239	

Notes: Heteroscedasticity robust standard errors are provided in parentheses. Asterisks denote significance at the 1% (***), 5% (**), and 10% (*) levels. All variables are standardised.

3.2 Informal institutions and tax ratios

In his book titled *The Ecology of Human Development*, Bronfenbrenner writes:

> Finally, there is a striking phenomenon pertaining to settings at all three levels of the ecological environment outlined above: within any culture or subculture, settings of a given kind – such as homes, streets, or offices – tend to be very much alike, whereas between cultures they are distinctly different. It is as if within each society or subculture there existed a blueprint for the organization of every type of setting. Furthermore, the blueprint can be changed, with the

> result that the structure of the settings in a society can become markedly altered and produce corresponding changes in behavior and development.[47]

These blueprints of organisation and behaviour are akin to the informal institutions discussed by North; they are systems of rules administered and enforced through non-official channels that give rise to shared expectations in behaviour.[48]

In section 2, it was concluded that factors related to racial and linguistic diversity may impact tax ratios. These indicators of social diversity, together with others such as economic inequality and socioeconomic status, are indicative of the diversity of informal institutions in a society. The effort and cost to create and enforce formal institutions – such as tax laws – would be partially dependent on the informal institutions in a society.[49] This could be an explanation for the lower tax ratios observed in more diverse societies. But, it is not only the diversity of informal institutions that can have an effect on tax ratios, but also the nature of the informal institutions themselves.

Since most informal institutions cannot be directly observed in the same manner that most formal institutions can, measurement of informal institutions provides a greater challenge. Informal institutions are continuously developing and enforcement is an integral part of this development. This means that, unlike formal institutions, only the outcomes of most informal institutions can be measured, at least those applicable in the context of cross-country analysis. Since this is the case, the measures of informal institutions relied on in this section are outcomes of informal institutions, admittedly not an ideal measure.

I rely on the work of Inglehart and Welzel and their culture map of 2014 (see Appendix B), which is based on the results of the World Values Survey (WVS).[50] Inglehart and Welzel identify two measures of cultural values from a factor analysis of 10 items of the WVS (refer to Table 7). These two measures are traditional versus secular-rational values and survival versus self-expression values. Together, the two measures explain 71 per cent of cross-national variation in the 10 items analysed. Appendix A provides full definitions for the two measures.

[47] Urie Bronfenbrenner, *The Ecology of Human Development: Experiments by Nature and Design* (Harvard University Press, 1979) 4.
[48] North, *Institutions, Institutional Change and Economic Performance*, above n 23.
[49] Masahiko Aoki, *Toward a Comparative Institutional Analysis* (MIT Press, 2001).
[50] Inglehart and Welzel, above n 4.

Table 7: Inglehart-Welzel Values Measure

	Factor loadings
Traditional values emphasise the following (Secular-rational values emphasise the opposite):	
God is very important in respondent's life.	.91
It is more important for a child to learn obedience and religious faith than independence and determination.	.88
Abortion is never justifiable.	.82
Respondent has strong sense of national pride.	.81
Respondent favours more respect for authority.	.73
Survival values emphasise the following (Self-expression values emphasise the opposite):	
Respondent gives priority to economic and physical security over self-expression and quality of life	.87
Respondent describes self as not very happy.	.81
Homosexuality is never justifiable.	.77
Respondent has not and would not sign a petition.	.74
You have to be very careful about trusting people.	.46

Source: Inglehart and Welzel, above n 4, 49.

It is an empirical challenge to estimate the influence of informal institutions (represented by the two measures in Table 7) on tax ratios. Informal institutions are both an input and an outcome of, among other things, the economic environment of a society, which includes taxes. Estimation by OLS can therefore be expected to suffer from omitted variable and reverse causality bias. To obtain consistent estimates, variables that are correlated with informal institutions, but not with tax ratios (other than through their correlation with informal institutions and other control variables) are required.

Tabbellini shows that culture has a causal effect on economic development.[51] Based on the findings of Tabbellini, it can be expected that past indicators of economic development will be highly correlated with cultural traditions of earlier generations. The level of urbanisation in 1960 and economic development in 1973 are, therefore, used as instruments for informal institutions. Without further control variables, the covariance between these instruments and the error term in the second-stage regression may not be equal to nil. Both instruments are correlated with the current level of development (and associated factors) and informal institutions (as included) may not capture all the variance in current development.[52] Controlling for exogenous determinants of economic development (and associated factors) should address this issue and result in the instruments being exogenous. Additional controls (which also act as instruments) being latitude, population size in 1960, the area of a country, and whether a country is landlocked are therefore added to the equations. After including these control variables,

[51] Guido Tabellini, 'Culture and Institutions: Economic Development in the Regions of Europe' (2010) 8(4) *Journal of the European Economic Association* 677.

[52] An OLS regression of the level of development on the two measures of informal institutions has an R-squared of 0.69 indicating that a large portion of the variance in current development is captured by these two measures.

statistical tests (the Hansen J statistic) show that the two instruments are valid and should not be included in the second-stage regressions directly.

The results in Table 8 show the effect of informal institutions on tax ratios. Societies with more secular-rational values have significantly greater tax ratios than societies with traditional values (Column 1). Societies with traditional values – in contrast with secular-rational values – emphasise the importance of religion, family, nation, respecting authority and social conformity and are less open to foreign influence. This could lead to homogenous informal institutions that emphasise the importance of obeying rules and also emphasise that rules and rule-makers should not be questioned. Further, traditional societies may have informal institutions that emphasise that their institutions should be developed and evolve locally and not as a result of foreign influence. Questioning rules and rule-makers and being open to implementing institutions (and here specifically tax laws) that have shown success elsewhere may be important if a society is to have formal institutions that adjust and are able to adjust to changing economic and social reality. Basic empirical evidence supports this view. Traditional values are positively correlated with having policies that do not promote private sector development (r=0.49) and positively correlated with perceived corruption in the public sector (r=0.51).[53]

Societies with more self-expression values have significantly greater tax ratios than societies with survival values (Table 8, Column 2). Societies with survival values emphasise economic and physical security, feel threatened by foreign influence, ethnic diversity and cultural change and have an authoritarian political outlook. The informal institutions in survival societies can be expected to be similar to those in traditional societies. In addition, it can be expected that the emphasis on economic and physical security, and the threat of foreign influence and cultural change, may limit the adoption of new technologies and thereby economic development. Basic empirical evidence supports this; survival societies have on average larger agricultural sectors (r=0.32) and are less developed (r=0.75). As shown in the tax effort literature, these characteristics of the economic environment are associated with decreased tax ratios.

Societies with self-expression values emphasise trust, tolerance, civic activism, individual autonomy and have a democratic political outlook. In self-expression societies, one can expect to find informal institutions emphasising equality, involvement in the rule-making process and accountability of those who make the rules. Further, acceptance of foreign institutions can be expected to be greater in these societies than in traditional or survival societies. This can lead to formal institutions that are better aligned with economic and social reality; the correlation between self-expression societies and policies that promote private sector development is 0.67. Further, the informal institutions in self-expression societies can be expected to increase entrepreneurial activities and opportunities, supporting the creation of new technologies and economic development. This could partly explain the on average larger service sectors (r=0.45) and higher level of economic development (r=0.75) in these societies. Self-expression societies also have lower levels of perceived corruption in the public sector (r=0.74). The economic and political environment is therefore better suited for increased tax ratios.

[53] Data used for the correlations reported in this section are contained in the Worldwide Governance Indicators: World Bank, https://info.worldbank.org/governance/wgi/.

Self-expression societies are also on average more rule abiding (r=0.72). This is different to traditional societies who are less rule abiding (r=0.56) although having informal institutions that emphasise rule obedience. It appears that institutions that support the involvement of society in the creation of rules that represent their interests drives rule obedience, rather than institutions emphasising rule obedience. Stronger enforcement of formal institutions is not necessarily the answer (as much of the tax literature emphasises). Supporting the development of improved informal institutions and creating formal institutions that represent these informal institutions could be a more fruitful approach.

Table 8: Influence of Informal Institutions on Tax Ratios[54]

VARIABLES	(1) 2SLS	(2) 2SLS
Traditional – secular-rational values	0.586***	
	(0.224)	
Survival – self-expression values		0.408***
		(0.157)
Latitude	-0.182	0.109
	(0.123)	(0.0820)
Population 1960	-0.210***	-0.115*
	(0.0448)	(0.0699)
Area	-0.0603	-0.0838
	(0.0416)	(0.0818)
Landlocked	-0.151	-0.0917
	(0.224)	(0.221)
Constant	0.191	-0.0369
	(0.138)	(0.115)
Observations	83	83

Notes: Heteroscedasticity robust standard errors are provided in parentheses. Asterisks denote significance at the 1% (***), 5% (**), and 10% (*) levels. All variables are standardised.

4. CONCLUSION AND POLICY IMPLICATIONS

A few reccurring themes can be identified based on the results presented in this article. The first is that for tax ratios, history matters. The importance of wars on the development of taxes is well documented in the tax literature. The narrative of colonialism on taxation and especially tax ratios has received less attention. Feger and Asafu-Adjaye show that factors capturing the current economic environment and incidence of wars are insufficient to explain tax ratios.[55] In the narrative, the authors,

[54] The Kleibergen-Paap rk LM statistic showed that the equations were not under-identified. The Kleibergen-Paap rk Wald F statistic showed that the equations do not suffer from weak instruments. Under the Hansen J statistic the joint null hypothesis that the instruments are valid could not be rejected.

[55] Feger and Asafu-Adjaye, above n 3.

similar to Mkandawire, suggest that the economic environment of countries at the time of colonisation, emphasising the extent that mineral wealth has been discovered, influences current levels of tax ratios.[56] Although mineral wealth most likely played a part in the policies implemented during colonisation, this article provides an alternative narrative that emphasises geography, rather than the economic environment.

It is shown that the past disease environment is a significant determinant of tax ratios and that the effect does not run only through the influence of the past disease environment on economic development (as shown by Acemoglu, Johnson and Robinson).[57] It is suggested that this effect is as a result of the institutions and, importantly, the technology and ideas of settlers, which were implemented and applied where they settled. Adopting foreign technology may be particularly important for developing countries if they are to increase their tax ratios.

Second, for tax ratios the division of powers matter. The results in this article suggest that toward increased tax ratios, democratic institutions can be preferred to authoritarian institutions and parliamentary institutions can be preferred to presidential institutions. Societies with informal institutions aligned with democratic principles also exhibit greater tax ratios. These results suggest that a greater division of power is beneficial to tax ratios. This suggestion is, however, not supported by the finding that federal institutions, which likely lead to tax competition, have a negative effect on tax ratios. Taking the findings on democratic institutions, parliamentary institutions, and federalism into consideration, it appears that the division of power can increase tax ratios, but these effects may be dampened if such division results in tax competition.

Third, for tax ratios formal and informal institutions matter. Since institutions are slow changing, advising changes to formal and informal institutions may not be particularly helpful for countries which require additional tax revenues in the short term. For the short term, knowledge of the effect of institutions on tax ratios may be more useful in how tax policy is designed and debated. Incorporating the results presented in this article, Figure 2 provides a theory on how greater cognisance of institutions can be useful in designing tax policy.[58]

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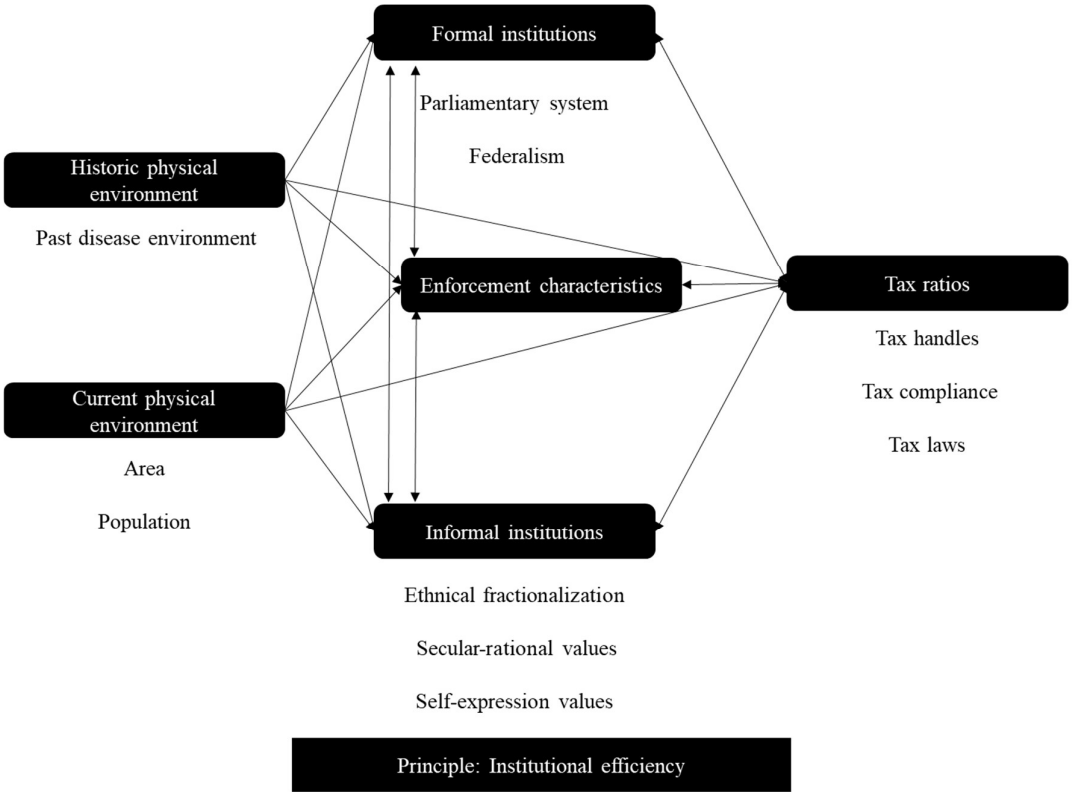
[56] Ibid.

[57] Acemoglu, Johnson and Robinson, above n 7.

[58] The theory does not attempt to include all factors that influence tax ratios. There are many factors that influence tax design and tax ratios that are not considered in this article. Inequality is an example of such a factor, as discussed in Kenneth L Sokoloff and Eric M Zolt, 'Inequality and Taxation: Evidence from the Americas on How Inequality May Influence Tax Institutions' (2006) 59(2) *Tax Law Review* 167.

Fig. 2: Institutional Efficiency



Source: author.

At the far left of Figure 2 is the historical and current physical environment. Both of these have an indirect influence on tax ratios, through their influence on formal institutions, informal institutions, and enforcement characteristics (specifically technology and human capital, but also state capacity in general).[59] They also have a more direct influence on tax ratios by influencing the established determinants of tax ratios, being tax handles (eg, supply and demand factors such as sectoral composition, development and governance), tax compliance and tax laws.[60]

At the centre of Figure 2 are formal institutions, enforcement characteristics, and informal institutions. Formal institutions, informal institutions, and their enforcement characteristics all influence each other. Together with the physical environment, these three components influence tax ratios and there is reverse feedback from tax ratios to

[59] On state capacity, see eg Besley and Persson, 'The Origins of State Capacity', above n 32.
[60] With reference to Figure 2, it can be seen that there is no reverse feedback from institutions or tax ratios to the physical environment. This is based on the results of this article and it seems reasonable to assume that there are some instances where taxes influence the physical environment (for instance environmental taxes). This influence is, however, likely to be small compared to the influence of taxes on institutions.

these institutions and enforcement characteristics. The theoretical principle that I propose here is institutional efficiency.

When proposing a new formal institution (eg, tax law), institutional efficiency will be high if: (1) the proposed formal institution does not adversely influence the intended outcomes of other existing formal institutions; (2) the proposed formal institution is aligned with the existing informal institutions, and (3) the proposed formal institution does not adversely influence the existing informal institutions. The higher the institutional efficiency, the lower the transaction costs of the policy.

The transaction costs of the policy will include implementation costs, adjustment costs, and enforcement costs. Implementation costs include political costs (for instance, the loss of votes), costs to obtain consensus on the policy, the costs of citizen organisations in lobbying, costs to translate the policy to law, and the loss suffered from the adverse influence of the proposed formal institution on other existing formal institutions and informal institutions. A potential example of an implementation cost due to the influence of a new formal institution on informal institutions is the introduction of a municipal tax leading to an informal rule that littering is acceptable since citizens believe they now pay for street cleaning services.

Adjustment costs relate to the costs of relevant actors (policy-makers, politicians, tax administrators, and taxpayers) changing their behaviour as a result of the proposed policy. The most effective and rewarding behaviour of these actors is often learned over time. Changes in formal institutions may result in these actors having to re-learn what the most effective and rewarding behaviour entails. Firms may, for instance, have to restructure and since this change in behaviour takes time, the change in formal institutions decreases the economic efficiency of the policy.

Enforcement cost is primarily a function of the alignment or misalignment between formal and informal institutions and the enforcement characteristics of the society. Formal and informal institutions will closely align where the formal rules reflect the informal rules held by the majority of society. For instance, where there exists an informal rule that tax avoidance is wrong, countries should be able to levy higher taxes at lower enforcement costs. Since formal institutions will only influence human behaviour to the extent that they are enforced, keeping enforcement costs manageable is essential for the proposed formal institution to have the desired outcome. If additional enforcement costs are to be minimised, changing informal institutions should precede a change in formal institutions.

Figure 2 also presents a warning for tax policy in developing countries. The traditional and survivalist values that are predominant in many developing countries, coupled with poor enforcement characteristics, mean that tax policies generally employed in developed countries are likely to suffer from great institutional inefficiency if applied in developing countries. It is likely that the transaction costs of such policies will be very high and a proposed or even written policy may become largely irrelevant to the outcome of that policy. This may be a partial explanation for why tax policies that work in developed countries often fail in developing countries and learning to tax (in Nicholas Kaldor's famous words[61]) is more difficult than it may appear. Successful policy may

[61] See Nicholas Kaldor, 'Will Underdeveloped Countries Learn to Tax?' (1963) 41(2) *Foreign Affairs* 410.

require an in-depth understanding of the informal institutions residing in countries, bringing sociology squarely into the field of fiscal policy.

APPENDIX A. SAMPLE, VARIABLES, SOURCES AND MEANING

The sample includes Afghanistan, Albania, Algeria, Angola, Antigua and Barbuda, Armenia, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bhutan, Bosnia, Botswana, Brazil, Bulgaria, Burkina Faso, Cabo Verde, Cambodia, Canada, Central African Republic, Chile, China, Colombia, Congo, Rep., Costa Rica, Cote d'Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Dominica, Dominican Republic, Egypt, El Salvador, Estonia, Ethiopia, Fiji, Finland, France, Georgia, Germany, Ghana, Greece, Grenada, Guatemala, Honduras, Hungary, Iceland, India, Indonesia, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Korea, Rep., Kuwait, Kyrgyzstan, Lao PDR, Latvia, Lebanon, Lesotho, Liberia, Lithuania, Luxembourg, Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Mauritius, Micronesia, Moldova, Mongolia, Morocco, Mozambique, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Nigeria, Norway, Oman, Pakistan, Paraguay, Peru, Philippines, Poland, Portugal, Romania, Russia, Rwanda, Samoa, Sao Tome and Principe, Senegal, Serbia, Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, Solomon Islands, South Africa, Spain, Sri Lanka, St. Kitts and Nevis, St. Lucia, Suriname, Swaziland, Sweden, Switzerland, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Vanuatu, Vietnam, Zambia.

Variable	Source	Meaning
Area	CEPII	Area of country in kilometres
Civil law	Thuronyi[62]	Binary. Countries in which a civil law system is applied as opposed to a common law system.
Coastline length	World Factbook	Length of coastline in kilometres
Control of corruption	World Bank	Perceptions of the extent that public power is exercised for private gain, including both petty and grand forms of corruption, as well as 'capture' of the state by elites and private interests.
Democracy	Boix, Miller and Rosato[63]	Binary. A country is classified as a democracy if there exists a system of rules that is enforced that

[62] Thuronyi, above n 43, 40.

[63] Carles Boix, Michael K Miller and Sebastian Rosato, 'Boix-Miller-Rosato Dichotomous Coding of Democracy, 1800-2010' (2014), updating Carles Boix, Michael K Miller and Sebastian Rosato, 'A Complete Data Set of Political Regimes, 1800-2007' (2013) 46(12) *Comparative Political Studies* 1523. Available at:

		gives citizens the right to vote in an election, freely and fairly.
Development	World Bank	GDP per capita
Development 1973	Maddison Project database	GDP per capita in 1973
Ethnic Fractionalisation	Alesina and others[64]	Reflects the probability that two randomly selected people from a given country will not belong to the same racial or linguistic group.
Federal	World Factbook	Binary. Indicates whether a country has a system of rules that allow for the division of power between two levels of government.
Government effectiveness	World Bank	Perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.
Landlocked	CEPII	Binary. A country has no access to the ocean.
Latitude	CEPII	Degrees in latitude from the North pole
Malaria risk 1965	Conley, McCord and Sachs[65]	Percentage of population at risk of malaria
Muslim	World Factbook	Percentage of population who classify themselves as being Muslim
Parliamentary	World Bank	A system is classified as parliamentary if: (1) the system has elected executives; (2) the system has a prime minister; (3) the president cannot veto legislation without a supermajority support from parliament; (4) the president cannot appoint or dismiss prime ministers *and* dissolve parliament.
Political stability	World Bank	Perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism.
Population	World Bank	Number of citizens in a country
Population density	World Bank	Number of citizens per square kilometre
Protestant	World Factbook	Percentage of population who classify themselves as being Protestant
Rainfall	World Bank	Average yearly rainfall
Regulatory quality	World Bank	Perceptions of the ability of the government to formulate and implement sound policies and regulations, which permit and promote private sector development.

https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/28468.

[64] Alberto Alesina, Arnaud Devleeschauwer, William Easterly, Sergio Kurlat and Romain Wacziarg, 'Fractionalization' (2003) 8(2) *Journal of Economic Growth* 155 ('Fractionalization').

[65] Dalton Conley, Gordon C McCord and Jeffrey D Sachs, 'Africa's Lagging Demographic Transition: Evidence from Exogenous Impacts of Malaria Ecology and Agricultural Technology' (National Bureau of Economic Research Working Paper 12892, 2007).

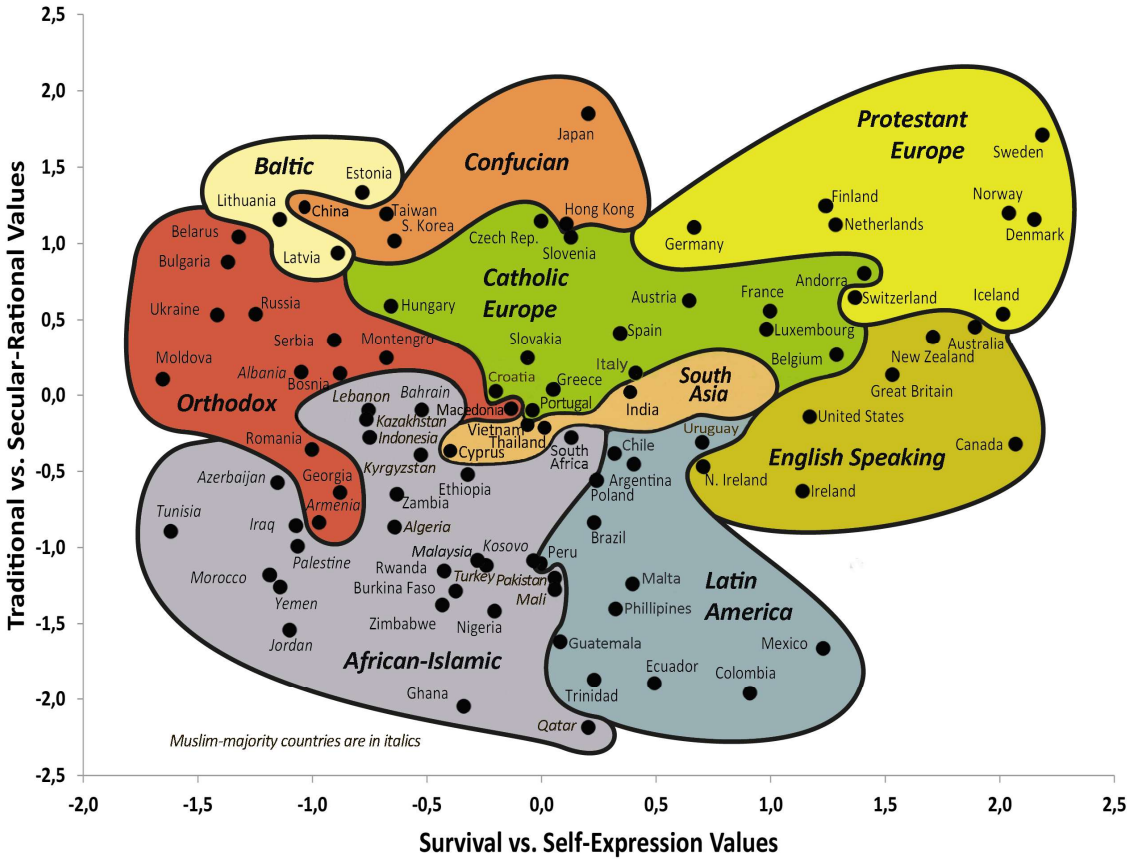
Religion Fractionalisation	Alesina and others[66]	Reflects the probability that two randomly selected people from a given country will not belong to the same religious group
Rule of law	World Bank	Perceptions of the extent that agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
Tax ratios	World Bank	Total tax revenues over GDP
Temperature	World Bank	Average yearly temperature
Traditional – secular-rational values	Inglehart and Welzel[67]	This dimension 'reflects the contrast between societies in which religion is very important and those in which it is not, but deference to the authority of God, fatherland, and family are all closely linked with each other. The importance of the family is a major theme: in traditional societies, a main goal in most people's lives is to make their parents proud; and one must always love and respect one's parents regardless of how they behave; conversely, parents must do their best for their children, even at the cost of their own well-being; and people idealize large families (and actually have them: high scores on this dimension correlate strongly with high fertility rates). Although the people of traditional societies have high levels of national pride, favor more respect for authority, take protectionist attitudes toward foreign trade, and feel that environmental problems can be solved without international agreements, they accept national authority passively: they rarely discuss politics. In preindustrial societies the family is crucial to survival. Accordingly, societies at the traditional pole of this dimension reject divorce and take a pro-life stance on abortion, euthanasia, and suicide. They emphasize social conformity rather than individualistic striving, support deference to authority, and have high levels of national pride and a nationalistic outlook. Societies with secular-rational values have the opposite preferences on all of these topics'.
Tropical area	Portland State University	Percentage of land in geographical tropics
Scientific articles	World Bank	Scientific and technical journal articles refer to the number of scientific and engineering articles

[66] Alesina et al, 'Fractionalization', above n 64.
[67] Inglehart and Welzel, above n 4.

		published in the following fields: physics, biology, chemistry, mathematics, clinical medicine, biomedical research, engineering and technology, and earth and space sciences.
Schooling	World Bank	Tertiary school enrolment
Survival – self-expression values	Inglehart and Welzel[68]	This dimension 'taps a syndrome of tolerance, trust, emphasis on subjective well-being, civic activism, and self-expression that emerges in postindustrial societies with high levels of existential security and individual autonomy. At the opposite pole, people in societies shaped by existential insecurity and rigid intellectual and social constraints on human autonomy tend to emphasize economic and physical security above all; they feel threatened by foreigners, ethnic diversity, and cultural change – which leads to intolerance of gays and other outgroups, insistence on traditional gender roles, and an authoritarian political outlook. A central component of this dimension involves the polarization between materialist and postmaterialist values. These values tap an intergenerational shift from emphasis on economic and physical security, toward increasing emphasis on self-expression, subjective well-being, and the quality of life. This cultural shift is found throughout postindustrial society; it emerges among birth cohorts that have grown up under conditions in which one can take survival for granted. These values are linked with the emergence of growing emphasis on environmental protection, the women's movement, and rising demands for participation in decision making in economic and political life'.
Tax families	Thuronyi[69]	Refer to page 43 to 44 of Thuronyi.
Voice and accountability	World Bank	Perceptions of the extent that a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.

[68] Ibid.
[69] Thuronyi, above n 43.

APPENDIX B. CULTURE MAP



Source: Inglehart and Welzel, above n 4, based on www.worldvaluessurvey.org.