

Public Goods and Diversity in Democracies and Non-Democracies

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Abstract

This paper analyzes how ethnic diversity affects the provision of public goods in democratic and non-democratic societies when political parties compete for political support by offering a mix of private and public goods. Our model implies that increasing ethnic diversity that leads to more diverse preferences for public goods decreases the provision of public goods in democracies, where political power is distributed equally among citizens; there is no such effect in non-democracies. We can confirm our hypothesis by measuring the provision of public goods with government expenses, expenditures on health and life expectancy. Other proxies measuring the provision of public goods (such as expenditures on education, infant mortality or safe water) do not provide evidence that the link between ethnic diversity and public good provision depends on the political regime.

JEL classification: H41, P16, D72

Keywords: ethnic diversity, democracy and non-democracy, public good provision

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1 Introduction

Increasing diversity provides substantial opportunities for societies, for example positive effects on productivity (Ottaviano and Peri, 2006; Bellini et al., 2013), but also confronts them with new challenges, such as civil conflicts (Montalvo and Reynal-Querol, 2005; Bleaney and Dimico, 2017) and an increase in homicides (Hansmann and Quigley, 1982). Diversity also impacts the provision of public goods. Most economic studies find that ethnic diversity leads to a lower provision of public goods and that spatial segregation (Alesina and Zhuravskaya, 2011) or the salience of ethnic boundaries (Schaeffer, 2013) influence the strength of this effect.¹ How political institutions affect the link between ethnic diversity and the provision of public goods is, however, less clear and therefore the focus of this paper.

This paper provides a theoretical framework for analyzing public good provision in democracies and non-democracies when parties are attempting to gain political support. As highlighted by Deacon (2009), public good provision is, *ceteris paribus*, higher in democracies than in autocracies because private transfers are a better instrument than public goods for targeting a powerful elite in autocratic systems. In democracies where voting power is equally distributed, in contrast, the provision of public goods has a large impact on political support due to the non-exclusive character of public goods. As our analysis shows, it becomes more difficult to gain political support through the provision of public goods if voters are more diverse² and therefore have different preferences for public goods. Thus, the positive consumption externality related to public goods and its social benefits decrease if societies become more diverse. In non-democratic systems with a small powerful elite, increasing ethnic diversity among the non-elite has no effect. Our model consequently predicts that increased ethnic diversity leads to a decrease in the provision of public goods in democratic societies but has no similar effect in non-democracies.³ Finally, we confront our hypothesis with data on democracies and non-democracies using a set of proxies for public good provision. The empirical analysis provides evidence for our theoretical predictions when the provision of public goods is measured by government expenses, expenditures on public health or life expectancy. We do not find evidence for our hypothesis for other measures of public good provision (such as expenditures on education, infant mortality, or the provision of safe water). Thus, the empirical evidence is mixed, and the results depend on how the provision of public goods is measured.

¹For a survey of the literature see Stichnoth and van der Straeten (2013). Schaeffer (2013) discusses in greater detail the conditions under which (for example, national vs. regional level, measure of public good provision, academic discipline the study is related to) the literature is more likely to find a negative link between diversity and the provision of public goods.

²In our empirical analysis we will measure diversity with a novel measure of ethnic fractionalization. We use the terms diversity and ethnic fractionalization interchangeably.

³Bandiera and Levy (2011) show that in democracies, public good provision resembles the preferences of the elite if the poor are ethnically diverse, and that the outcome is closer to a non-democratic setting.

Our paper contributes to two strands of the literature. We connect the literature that evaluates the effect of diversity on the provision of public goods with the literature that analyzes how the provision of public goods is affected by the political system. In particular, we answer the following research question: Does the association between ethnic diversity and the provision of public goods depend on the political regime?⁴

Since diversity in society changes over time in both democratic and non-democratic countries (see Figure 1 in Section 3) and these changes play an important role for the performance of societies, it does not come as a surprise that the literature on the impacts of diversity on economic performance has increasingly grown.⁵ Most studies focus on the question of how ethnic diversity affects growth and the provision of public goods.⁶ While studies focusing on the effects of growth provide rather mixed evidence (e.g., Easterly and Levine, 1997; Bluedorn, 2001; Bove and Elia, 2017), the negative link between ethnic diversity and the provision of public goods is widely accepted in the empirical literature. This link is found in cross-country studies (e.g., La Porta et al., 1999; Ahlerup, 2009) but also within countries. Within-country evidence is provided by Alesina et al. (1999) for the US, Banerjee et al. (2005) and Banerjee and Somanathan (2007) for India, Alesina et al. (2019) for Indonesia, and Khwaja (2009) for Pakistan. Moreover, controlled lab experiments (Chakravarty and Fonseca, 2014) and field experiments (Habyarimana et al., 2007) enhance the argument. Most within-country studies are, however, conducted in democracies and evidence from non-democracies is scarcer and more mixed. While Khwaja (2009) finds the usual negative association between ethnic diversity and public good provision (more precisely, infrastructure) for Pakistan, Gao (2016) finds evidence for a positive link between ethnic diversity and the provision of public goods in Jordan.

Our study contributes to the literature that analyzes the effects of ethnic diversity on the provision of public goods in two ways. First, we provide a rigorous theoretical framework that explains the role of the political system in the association between ethnic diversity and the provision of public goods. Our argument is based on the assumptions that, first, political leaders attempt to gain more effective power than their competitors by offering a mix of private and public goods and, second, that ethnic diversity leads to more diverse preferences for public goods. In addition to the preference channel, the literature mentions further channels through which ethnic diversity affects the provision of public goods (for example, technology or strategy selection mechanisms (Habyarimana et al., 2007) or trust (Alesina and La Ferrara, 2002)). These additional channels are neglected in our analysis. Our second contribution to the literature is an empirical test

⁴Collier (2000) shows that ethnic diversity does not affect growth in democracies but has a negative effect on growth in dictatorships. In contrast to that study, we focus on the provision of public goods as the main output variable and find that diversity has an effect in democracies but not in non-democracies.

⁵Alesina and La Ferrara (2005) provide an overview of ethnic diversity and economic performance.

⁶Further aspects cover impacts of increased diversity on governmental quality (La Porta et al., 1999; Alesina and Zhuravskaya, 2011), inequality (Alesina et al., 2016) or trust and social cohesion (e.g. Delhey and Newton, 2005; Anderson and Paskeviciute, 2006).

of our theoretical hypothesis. Based on a variety of proxies for public good provision, we evaluate whether the link between ethnic diversity and the provision of public goods differs for democracies and non-democracies.

In addition to contributing to the literature that analyzes the impacts of ethnic diversity on the provision of public goods, we also extend the literature that focuses on the question of how the provision of public goods is affected by political institutions. Deacon and Saha (2006) present an overview of this literature. In general, there is a consensus that non-democratic governments provide a lower level of public goods. One theoretical argument is centered on the idea that democratic governments need support from a larger part of society than non-democratic regimes and that public goods are a better instrument than private goods for increasing the utility of large groups because of the positive externality related to their provision (see, e.g., Bueno de Mesquita et al., 2003; Deacon, 2009). Another argument is based on the different objectives of democratic and non-democratic governments. In McGuire and Olson (2006), the public good does not have a direct effect on utility but contributes to total taxable income. Since the autocrat is only interested in tax revenue while democratic leaders also benefit from after-tax private income, redistribution via public goods is smaller in non-democratic systems.

To test the hypothesis that public good provision is lower in non-democratic countries than in democratic countries, it is a natural starting point to evaluate government expenses. However, government expenses may be manipulated by non-democratic regimes (Deacon and Saha, 2006; Deacon, 2009). Therefore, the provision of specific public goods also plays an important role in the empirical literature when testing theoretical hypotheses. For example, Deacon (2009) finds a larger provision of environmental protection, road infrastructure, safe water, sanitation and education in democracies than in autocracies and that the differences in provision vary across public goods. Similar results are found for various indicators of health and education (Lake and Baum, 2001), health and therefore life expectancy (Besley and Kudamatsu, 2006), and environmental protection (Congleton, 1992). Although there is broad consensus that the provision of public goods is, in general, larger in democracies than in non-democracies, there are also some exceptions. Mulligan et al. (2004) do not find any significant differences with respect to government spending, spending on education or social spending between democracies and non-democracies but show that non-democracies spend more on the military. The latter finding might also explain the negative effect of democracy on infrastructure found by Saiz (2006). Finally, Lott (1999) finds that spending on education is in fact higher in non-democracies than in democracies and explains this result by the strong interest of non-democratic leaders in influencing young people's opinions towards supporting the current regime. In summary, how the provision of public goods is affected by the political system might depend on which kind public good is the focus of the analysis.

The empirical evidence obtained to date has primarily been obtained via cross-sectional

or within-country analyses. In contrast, we test our main hypothesis that the association between diversity and the provision of public goods depends on the political regime using recently published data on ethnic fractionalization (Dražanová, 2020) in a panel of 148 countries over the period from 1990 to 2013.⁷ We use a large set of proxies for public goods that can be categorized either as expenditure measures (for example, government expenses and expenditures on health) or quantity measures (such as life expectancy or hospital beds).

The paper is structured as follows. Section 2 provides a theoretical framework that explains how diversity affects public good provision in democracies and non-democracies. After describing the data in Section 3, we empirically test our theoretical predictions in Section 4. Section 5 provides robustness checks. Finally, Section 6 concludes the paper.

2 Theoretical framework

Following Deacon (2009), we assume a society where two political candidates maximize their total political support by offering individuals a mix of private and public goods.⁸ While in a democracy, each individual has the same effective voting power, in non-democracies effective voting power is controlled by a small elite. To capture the effects of an increase in diversity on the provision of public goods, we assume that preferences for public goods are heterogeneous. More precisely, different groups of voters might prefer different public goods. An increase in diversity is associated with an increase in the number of public goods that are preferred by society, that is, we follow the preference mechanism discussed in Habyarimana et al. (2007).⁹

Society consists of N individuals, each of which is endowed with income ω and belongs to one of $k \in \{1, \dots, K\}$ different groups.¹⁰ The number of individuals belonging to group k is denoted by n_k , where $n_k > 0$ and $\sum_k n_k = N$. Each individual that belongs to group k derives utility from the consumption of a private good c_k . In addition, there are public goods. The number of public goods varies with the diversity in society. We assume that each group derives utility G_j from the consumption of exactly one public good with $j \in \{1, \dots, J\}$. There might, however, be public goods that benefit more than one group of individuals, that is, $J \leq K$. The utility of an individual that belongs to group k and

⁷Due to data limitations, we run some model specifications with a reduced sample.

⁸By public goods, we mean publicly provided goods. Schündeln (2013) offers some evidence that ethnic diversity has different impacts on the provision of public goods depending on whether the goods are publicly or privately provided.

⁹Interestingly, Habyarimana et al. (2007) do not find any evidence for the preference mechanism when conducting experiments in Uganda. Our theoretical results would suggest that the preference mechanism does not matter in this case since Uganda has non-democratic structures.

¹⁰Note that the number of groups in general does not affect the optimal mix of private and public goods as long as the distribution of political power is not affected (see the discussion in Deacon (2009); fn. 14). In contrast, we show that if groups differ with respect to their preferences, the political equilibrium will be affected.

derives utility from the consumption of the public good G_j is denoted by $U(c_k, G_j)$, where utility increases in both goods at a diminishing rate.

If $J = 1$, only one pure public good that benefits all individuals in society is provided. An increase in J implies an increase in diversity, that is, preferences for the public goods become more heterogeneous. Let $S_j \subset \{1, \dots, K\}$ denote the subset of groups that derive utility from the consumption of the public good j , where S_j are disjoint subsets. The number of individuals deriving utility from the consumption of the partial public good G_j is denoted by m_j where $\sum_j m_j = N$. If, for example, groups $k = 1$ and $k = 2$ benefit from the public good j , it is $m_j = n_1 + n_2$. We define an increase in diversity as follows:

Definition 1 (Diversity) *Society becomes more diverse if some individuals become interested in a new public good. Formally, we assume that one of the initial groups in society splits into two groups, where one of these new groups prefers a public good that was not initially provided.*

The political process is described by two political candidates $i \in \{A, B\}$ who compete for the support of politically influential groups in society. Competition takes place through the tax and transfer system, which determines the consumption of the private and public good for each group in society.¹¹ For reasons of simplicity, we assume that the political candidates can directly determine the levels of private and public consumption if they are in power. The political program of candidate i can be summarized as $(\{c_k^i\}, \{G_j^i\})$, where $\{c_k^i\}$ denotes the private consumption levels of individuals belonging to the different groups and $\{G_j^i\}$ denotes the levels of the public goods. The budget constraint for candidate i is

$$\sum_k n_k c_k^i + \alpha \sum_j G_j^i \leq \sum_k n_k \omega \quad (1)$$

where α denotes the rate of transformation between private and public goods. Given the political program of candidate i , the utility of an individual belonging to group k and deriving utility from the consumption of good j is $U_{kj}^i \equiv U(c_k^i, G_j^i)$. Groups have idiosyncratic preferences x_k for candidate A , where x_k follows the distribution function $F_k(x_k)$.¹² Political preferences are the private information of the groups and not known to the candidates. That is, given the programs offered by candidates A and B , the probability that group k will support candidate A is $F_k(U_{kj}^A - U_{kj}^B)$. Depending on the political system individuals belonging to different groups have different political power.

¹¹Banerjee and Somanathan (2007) find evidence for India that public goods are provided in line with the preferences of powerful groups in society.

¹²Note that we assume that the distribution is not affected by a change in diversity, that is, while the preferences for public goods change, political preferences are not directly affected. If voters have stronger preferences to vote for leaders of the same ethnicity, as argued by Banerjee and Pande (2007), changes in ethnic diversity will affect idiosyncratic political preferences. Huber and Suryanarayan (2016) provide some evidence that increasing fractionalization can affect political preferences.

The effective political power of an individual belonging to group k is

$$\gamma_k = \frac{\pi_k}{n_k} F'_k(0) \quad (2)$$

where π_k defines the exogenously given political power of group k and $F'(0)$ measures the sensitivity of group k in response to consumption differences. The distribution of exogenous power ($\{\pi_k\}$) characterizes the society. More precisely, an equal distribution of political power indicates a democratic society, while in non-democracies political power is unequally distributed towards a small elite. It is beyond the scope of this paper to analyze why political power is more unequally distributed in some countries, nor do we analyze which groups in society are able to obtain relatively more power. We adopt a short-term perspective and treat political power as exogenous. We also assume that the distribution is not affected by a change in ethnic diversity.

Both political candidates choose their programs ($\{c_k^i\}, \{G_j^i\}$) to obtain more effective political support than their competitor. In addition to the budget constraint in Equ. (1), political candidates have to ensure a subsistence level of private consumption \hat{c} for all individuals. Taking both constraints into account, the objective of candidate A is

$$\begin{aligned} \max_{\{c_k^A\}, \{G_j^A\}} \Pi_A &= \sum_k \pi_k F_k(U^A(c_k^A, G_j^A) - U^B(c_k^B, G_j^B)) \\ \text{s.t.} \quad \sum_k n_k c_k^A + \alpha \sum_j G_j^A &\leq \sum_k n_k \omega \quad \text{and} \quad c_k^A \geq \hat{c} \quad \forall k. \end{aligned} \quad (3)$$

Independent of the political system, we can derive some general results characterizing the political equilibrium. Assuming a symmetric equilibrium and that the subsistence minimum is not binding (that is, $\mu_k = 0$), it is

$$\frac{U_{ck}^A}{U_{\tilde{c}k}^A} = \frac{\gamma_{\tilde{k}}}{\gamma_k} \quad (4)$$

(see Appx. A.1 for a detailed derivation). Based on Equ. (4), the relation of the marginal utilities derived from the consumption of the private good for two groups k and \tilde{k} is inversely proportional to the relation of the two groups' effective power, captured by $\gamma_{\tilde{k}}/\gamma_k$. Thus, the larger the relative effective power of a group, the smaller its marginal utility derived from private consumption and therefore the larger its private consumption.

The level of private and public consumption for group k in a symmetric equilibrium is

$$\frac{\sum_{k \in S_j} n_k \gamma_k U_{G_j}^A}{\gamma_k U_{ck}^A} = \alpha \quad (5)$$

(see Appx. A.2 for a detailed derivation). Based on Equ. (5), the sum of marginal utilities

derived by the consumption of the public good weighted by the effective power of the respective individuals, relative to the weighted marginal utility of private consumption, equals the cost of transformation between the private and the public good.¹³

2.1 Democracies

In democracies, all individuals have equal effective power, that is, $\gamma \equiv \gamma_k$ for all k . Equ. (5) then reads

$$\frac{U_{G_j}^A}{U_{c_k}^A} = \frac{\alpha}{m_j} \quad (6)$$

for all public goods $j \in \{1, \dots, J\}$. Equ. (6) implies that the fewer individuals benefit from the consumption of some public good the higher the marginal rate of substitution between the public and the private good. In other words, the fewer individuals that benefit from the consumption of the public good G_j , the less of this public good is provided and the higher the provision of private good c_k . This directly leads to Proposition 1.

Proposition 1 *In democracies, increasing diversity leads to less interest in some public goods and therefore to a lower provision of these public goods.*

Proof: See Appx. A.3. □

Proposition 1 predicts a negative association between ethnic diversity and the provision of public goods. The intuition behind the result is as follows: Increased diversity is accompanied by more heterogeneous preferences for public goods and the fact that fewer individuals are interested in some specific public good. Therefore, the positive consumption externality becomes less relevant, and less of the public good is provided. Since the main mechanism is that ethnic diversity reduces the externality associated with public goods, we strongly believe that our results also hold when groups are interested in more than one public good and that increased diversity only reduces the utility individuals derive from the consumption of the public good. The argument that ethnic diversity reduces the external effect of public goods complements the analysis by Alesina and Zhuravskaya (2011), who explain a negative effect of ethnic diversity on governmental quality with ethnical voting. We show that even if political preferences are not affected by ethnicity, governmental quality measured as public good provision decreases.

An additional mechanism, which is not explicitly captured in the analysis, is the fact that the costs of public good provision might be an increasing function of the number of public goods. Thus, because of economies of scale it is easier to offer one public good

¹³If all individuals have the same effective power, i.e., $\gamma \equiv \gamma_k$ for all k , and there is only one pure public good, G_j , the condition reduces to the well-known Samuelson condition, $\frac{\sum_k n_k U_{G_j}^A}{U_{c_k}^A} = \alpha$.

at a large scale than many public goods at a smaller scale. In this case, an increase in diversity that leads to an increase in the number of public goods increases the rate of transformation between private and public goods, that is, α . If more diverse societies face larger transformation costs from private to public goods, Equ. (6) implies a further reduction of all public goods in society.

2.2 Non-democracies

In non-democracies, the effective political power is unequally distributed. More precisely, we assume that some groups, representing the elite $E \subset \{1, \dots, K\}$, have equal effective political power, that is, $\gamma_k > 0$ for all $k \in E$, while all other groups, the non-elite $k \in D = \{1, \dots, K\} \setminus E$, do not have any effective political power, that is, $\gamma_k = 0$ for all $k \in D$. Public goods that are preferred by the elite do not generate utility for non-elite groups.¹⁴ Combining the first-order conditions for the provision of private and public goods for the elite again yields Equ. (6) where j is a public good generating utility for the elite. In contrast, political candidates have no incentive to provide other public goods than those preferred by the elite, that is, $G_j = 0$ if G_j is not preferred by the elite.

Non-elite groups do not have any effective power and therefore only receive their subsistence minimum of private consumption (see Appx. A.4 for a detailed derivation of the result). Since an elite is usually a rather small and homogeneous group, it is likely that although society becomes more diverse overall, the elite does not. We therefore assume that an increase in diversity affects the non-elite but not the elite.

Proposition 2 *In non-democracies, increasing diversity among the non-elite does not affect the provision of public goods.*

Proof: See Appx. A.5. □

The intuition behind Proposition 2 is as follows: In non-democracies, the effective political power is in the hands of an elite. Thus, the non-elite does not affect the objective of the political leaders besides that they have to receive a subsistence minimum of private consumption. Changes in the preference structure for public goods among the non-elite consequently do not affect the optimal mix of private and public goods offered by the political parties. We believe that it is rather unlikely that the elite becomes more diverse. If there is, however, increasing diversity among the elite, there will be similar effects as in democracies. In summary, we expect no association between ethnic diversity and the provision of public goods in non-democracies or at least a weaker negative relationship than in democracies. In a next step, we confront our theoretical predictions with the data.

¹⁴Note that the optimal provision of public goods is not affected by this assumption. Non-elite groups that would receive utility from the consumption of a public good preferred by an elite group do not affect the first-order condition for the provision of public goods in Equ. (A.3) because $\gamma_k = 0$ for all $k \in D$.

3 Data and descriptive statistics

3.1 Public good provision

We use a set of alternative proxies to measure the provision of public goods. Our proxies can be separated into two categories, expenditure measures and indicators measuring the amount of public goods. An advantage of using data on public expenditures is that they cover all public goods that belong to a specific economic sector (for example, health) and that they are usually available for a large number of countries over a long time period. A disadvantage with expenditure data, however, is that they may be manipulated by non-democratic regimes (Deacon and Saha, 2006; Deacon, 2009). We therefore complement our expenditure measures with different direct measures of public good quantities. Government expenditures are general government expenses, expenditures on health, expenditure on education, and military expenditures. All expenditures are in percentage of GDP.¹⁵ For the quantity measures, we focus on public goods related to the health sector. We do not focus on public goods related to education because there is some evidence that non-democratic regimes use educational systems to control the information that citizens receive and therefore have an incentive to overinvest in these kinds of public goods (Lott, 1999). Public health is measured by life expectancy at birth, the infant mortality rate per 1,000 live births, hospital beds per 1,000 people, and the percentage of people using safely managed drinking water services (safe water).¹⁶ All data are provided by the World Bank.

3.2 Political regime

To categorize the political regime of countries included in the analysis, we use the dichotomous autocracy-democracy regime data provided by Bjørnskov and Rode (2020). The authors updated and expanded the Cheibub et al. (2010) database, following their minimalist definition of democracy. A country is categorized as democratic if free and fair elections enable peaceful leadership turnover.

3.3 Diversity

To measure diversity, we make use of the recently published Historical Index of Ethnic Fractionalization (Dražanová, 2020). The dataset provides an index for ethnic fractionalization for 162 countries on a yearly basis for 1945-2013. Due to other data restrictions, we focus on the period 1990-2013. Technically, ethnic fractionalization is calculated based

¹⁵We expect government spending to adjust rather quickly in contrast to more fundamental public goods such as legal certainty.

¹⁶Lake and Baum (2001), Bueno de Mesquita et al. (2003), and Ahlerup (2009) use similar proxies as measures of public good provision.



Figure 1: Ethnic fractionalization (efindex) over time.

on the annual shares of ethnic groups within a country using a transformation of the Herfindahl concentration index, such that higher values indicate higher levels of fractionalization. In the most extreme cases, the index would take the value 0 if all individuals in a country belonged to the same ethnic group, and it would take the value 1 if every individual belonged to an individual group. The dataset allows us to study the effects of diversity across countries and over time, which is a strong advantage compared to previous studies on the effects of diversity that mainly provide cross-country evidence. Alesina et al. (2003), Fearon (2003), and Fearon and Laitin (2003) provide data on ethnic and linguistic fractionalization. Montalvo and Reynal-Querol (2005) use data on ethnic and religious diversity. Figure 1 shows the development of ethnic fractionalization for all countries and separated by regime type during our sample period. We observe that ethnic fractionalization increased in democratic countries, while non-democracies have become more homogeneous on average.

3.4 Controls

In addition to our variables of interest, that is, diversity and political regime, we control for a country's region, GDP per capita in purchasing power parity at constant 2017 international dollars, total population size, percentage of population aged 65 and above, and total rents to natural resources in percentage of GDP.

3.5 Descriptive statistics

Table 1 presents the means of all data included in our analysis grouped by political regime. All government expenditures are lower in non-democracies than in democracies,

	Non-democracies	Democracies
Government expenditures		
Government expenses	20.605	25.294
Expenditures on health	1.989	3.880
Expenditures on education	4.131	4.577
Military expenditures	3.258	1.744
Public health		
Life expectancy	62.914	71.190
Infant mortality	52.015	24.997
Hospital beds	3.556	4.783
Safe water	62.458	79.542
Diversity		
Ethnic fractionalization	0.516	0.393
Controls		
GDP per capita	12,977.820	19,479.430
Population (million)	33.498	28.326
Population 65up	4.482	8.988
Natural resources	13.082	3.244

Table 1: Group means by political regime (1990 - 2013).

except spending on the military, which plays a more important role in non-democratic countries (Albalade et al., 2012). We also observe that democracies on average perform better in every aspect of public health than non-democracies. Life expectancy is higher, infant mortality is lower, there are more hospital beds, and more people have access to safe water. Diversity (measured by ethnic fractionalization), population size, and total rents to natural resources as a percentage of GDP are higher in non-democratic regimes than in democracies, while the percentage of people 65 or older and GDP per capita are lower. Table B.1 in the appendix provides an overview of the data availability and general descriptive statistics.

4 Empirical analysis

The main hypothesis of this paper, namely that ethnic diversity is negatively associated with the provision of public goods in democracies but has no impact in non-democracies, is tested with the following empirical model:

$$public\ goods_{i,t} = \alpha + \beta_1 \cdot democracy_{i,t} + \beta_2 \cdot diversity_{i,t} + \beta_3 \cdot democracy_{i,t} \cdot diversity_{i,t} + controls_{i,t} + \theta_t + \varepsilon_{i,t} \quad (7)$$

$Public\ goods_{i,t}$ is the proxy variable for public good provision in country i at time t . $Democracy_{i,t}$ is a dummy variable that equals 1 if country i is classified as democratic

	Government expenses (1)	Expenditures on health (2)	Expenditures on education (3)	Military expenditures (4)
Democracy	6.338*** (1.093)	0.904*** (0.164)	-0.799** (0.328)	-0.375** (0.157)
Diversity	1.555 (1.760)	-0.268* (0.152)	-1.639*** (0.444)	-0.799*** (0.234)
Democracy \times Diversity	-6.076*** (2.066)	-1.092*** (0.237)	1.667*** (0.446)	0.261 (0.253)
Log GDP per capita	2.652*** (0.319)	0.387*** (0.046)	0.531*** (0.072)	0.360*** (0.048)
Log population	-1.584*** (0.143)	-0.056*** (0.020)	-0.179*** (0.031)	0.002 (0.018)
Population 65up	0.055 (0.082)	0.203*** (0.012)	0.026* (0.015)	-0.043*** (0.011)
Natural resources	-0.038* (0.022)	-0.011*** (0.002)	-0.011** (0.005)	0.030*** (0.005)
Constant	16.938*** (4.894)	-1.627*** (0.608)	2.320** (0.938)	0.235 (0.581)
Diversity + Democracy \times Diversity	-4.521*** (1.067)	-1.361*** (0.199)	0.027 (0.207)	-0.538*** (0.125)
Region Dummies	YES	YES	YES	YES
Year Dummies	YES	YES	YES	YES
Countries	115	148	141	143
Years	1990–2013	2000–2013	1990–2013	1990–2013
Observations	1,600	2,028	1,907	3,041
Adjusted R ²	0.394	0.686	0.152	0.367
F Statistic	41.43***	249.22***	22.32***	23.02***

Note: ***/**/* denotes significance at 1%/5%/10%; heteroskedasticity-robust standard errors in parentheses.

Table 2: Government expenditures and diversity in democracies and non-democracies

in year t and 0 otherwise. $Diversity_{i,t}$ contains the annual ethnic fractionalization index. The association of diversity with public good provision in non-democracies is captured by β_2 , while this association is captured by $\beta_2 + \beta_3$ in democracies. $Controls_{i,t}$ consist of other variables that are likely to influence public good provision including logarithmized GDP per capita, logarithmized population size, the percentage of the population aged 65 and above, total natural resource rents as a percentage of GDP, and a country's region. Finally, θ_t are time dummies that capture year effects. We do not use country dummies because changes in political regime within a country are extremely rare over the period of our analysis (less than two percent of our observations are characterized by a regime transition).

We provide results for both categories of proxies for public good provision, that is, for

government expenditures and quantity measures. The regression results for government expenditures are reported in Table 2. For total government expenses we find, in line with our theoretical prediction, a negative association with diversity in democracies and no significant relationship for non-democratic regimes. Using expenditures on public health, we find similar results although we also observe some weak negative correlation between diversity and health-related public expenditures in non-democracies. Our theoretical model can explain this with some increase in diversity among the elite. The picture is more diverse when it comes to public expenditures on education. The negative association of ethnic fractionalization with expenditures on education is restricted to non-democratic regimes. For all three expenditure measures, we find significant differences in how diversity is associated with the provision of public goods. Thus, the political regime matters. Only for military expenditures does the link between diversity and the provision of public goods not differ between regimes.

Since expenditure measures simultaneously capture quantity and price effects and are vulnerable to manipulation by non-democratic regimes (Deacon and Saha, 2006; Deacon, 2009), we complement our analysis by using quantity measures as dependent variables. Table 3 presents regression results for our quantity measures of public health. For life expectancy, we can confirm our hypothesis. The association between diversity and life expectancy differs significantly between democracies and non-democracies (column (1)). While there is no significant link between the two variables in non-democratic regimes, they are negatively correlated in democratic regimes. In contrast, the link between diversity and the other three measures of public health – infant mortality, hospital beds and safe water – (columns (2)-(4)) does not depend on the political regime.¹⁷

In summary, for the majority of proxies that are based on public expenditures we find that the association between diversity and public good provision depends on the political regime. In particular, for total government expenses and expenditures on health, we find a negative correlation between diversity and the provision of public goods in democracies but no correlation in non-democracies, providing evidence for our theoretical predictions. When using quantity measures to proxy for the provision of public goods, the picture is more ambiguous. Only for life expectancy we can confirm our theoretical hypothesis. There is no significant difference between political regimes when public good provision is measured by military expenditure, infant mortality, hospital beds or safe water.

Note that, in contrast to the theoretical analysis, our empirical analysis does not claim any causal effect of increasing ethnic diversity on the provision of public goods. Based on Tiebout (1956), individuals might locate in countries that offer a specific mix of public goods. In such a case, the provision of public goods might initiate migration and therefore affect ethnic diversity. We would, however, expect that individuals are more

¹⁷Note that regarding infant mortality, a positive coefficient implies a lower level of public goods, while a negative coefficient indicates higher public good provision.

	Life expectancy (1)	Infant mortality (2)	Hospital beds (3)	Safe water (4)
Democracy	3.720*** (0.421)	-5.370*** (1.278)	-1.125*** (0.276)	-3.739 (2.646)
Diversity	-0.486 (0.624)	10.018*** (1.840)	-0.637* (0.344)	0.582 (3.894)
Democracy \times Diversity	-3.818*** (0.660)	3.004 (2.278)	0.216 (0.448)	-0.584 (4.172)
Log GDP per capita	3.365*** (0.108)	-14.653*** (0.375)	-0.108 (0.071)	16.883*** (0.566)
Log population	0.089* (0.051)	0.712*** (0.177)	-0.066* (0.034)	0.479 (0.340)
Population 65up	0.165*** (0.025)	0.059 (0.094)	0.270*** (0.025)	0.949*** (0.130)
Natural resources	-0.071*** (0.007)	0.338*** (0.026)	0.034*** (0.005)	-0.024 (0.039)
Constant	35.111*** (1.385)	154.549*** (5.453)	5.146*** (0.904)	-109.885*** (9.067)
Diversity + Democracy \times Diversity	-4.304*** (0.344)	13.022*** (1.435)	-0.421 (0.305)	-0.002 (2.508)
Region Dummies	YES	YES	YES	YES
Year Dummies	YES	YES	YES	YES
Countries	148	148	147	85
Years	1990–2013	1990–2013	1990–2013	2000–2013
Observations	3,378	3,382	1,975	1,173
Adjusted R ²	0.858	0.820	0.549	0.809
F Statistic	624.31***	373.33***	88.64***	654.03***

Note: ***/**/* denotes significance at 1%/5%/10%; heteroskedasticity-robust standard errors in parentheses.

Table 3: Public health and diversity in democracies and non-democracies

likely to move to regions with a high provision of public goods, which implies a positive correlation between ethnic diversity and public good provision. In this case, our results would likely underestimate the effect of ethnic diversity.

5 Robustness checks

Since most of the previous literature that focuses on the effect of diversity on the provision of public goods uses alternative measures, we provide two additional robustness checks to ensure that our results in Section 4 are not driven by the use of the novel Historical Index of Ethnic Fractionalization (Dražanová, 2020). First, we test the separate effects of the political regime and diversity on the provision of public goods (without the interaction

term) to see whether we can confirm previous results in the literature. Second, we repeat our main regressions using the index of ethnic fractionalization provided by Fearon (2003). All detailed results from the robustness checks are presented in Appx. C.

Previous literature has applied cross-country and within-country analyses and provides general evidence that the provision of public goods is larger in democracies (for an overview, see Deacon and Saha (2006)) and that greater diversity is associated with lower public good provision (e.g., Alesina et al., 1999; La Porta et al., 1999; Ahlerup, 2009). Tables C.1 and C.2 confirm these results for the public good proxies that are the main focus of our baseline analysis in Section 4, that is, for government expenses, expenditures on health, and life expectancy, and additionally for infant mortality. Regarding the political regime, we do not find a significant association for expenditures on education, and we obtain a negative association for military expenditure¹⁸ and for the remaining quantity proxies, that is, hospital beds and safe water. Regarding the relationship between diversity and the provision of public goods, the picture is clearer. For all proxies but safe water we find that an increase in diversity is associated with a decrease in the provision of public goods.

In a second step, we use the ethnic fractionalization index, provided by Fearon (2003), as an alternative measure of diversity. In contrast to the Historical Index of Ethnic Fractionalization, the Fearon index is time-invariant, that is, ethnic fractionalization does not vary over time but only across countries. The index has been frequently employed in the literature (e.g., Blimes, 2006; Fagerberg et al., 2007; Besley and Persson, 2014; Gorodnichenko and Roland, 2017). Detailed regression results are reported in Tables C.3 and C.4. Our findings are in large part robust to the use of this alternative diversity measure. In particular, the regression results for government expenses, expenditures on health, and life expectancy do not differ qualitatively.

In general, both robustness checks offer confirmation that the association between ethnic diversity and the provision of public goods in democracies and non-democracies that we established in Section 4 is not driven by the novel measure of ethnic fractionalization.

6 Conclusion

Previous literature widely agrees on the fact that greater diversity is associated with a lower provision of public goods. Moreover, it has been shown that non-democratic regimes generally provide a lower level of public goods. What is missing in the literature is whether the political regime determines how diversity affects the provision of public goods. Our study contributes to answering this question in two ways: First, we provide a

¹⁸Albalade et al. (2012) discuss in detail how institutions determine military spending. Lott (1999) argues that non-democratic regimes use school education to influence individuals' ideologies in a way favored by regime leaders.

theoretical framework that allows us to analyze the effect of diversity on the provision of public goods in democracies and non-democracies. The model leads us to the prediction that diversity has a negative effect on the provision of public goods in countries with a democratic regime but has no similar impact in non-democratic regimes. Second, we test this hypothesis using two sets of proxies for public good provision – expenditure measures and quantity measures – and a novel index of ethnic fractionalization. While we find evidence for our hypothesis based on the majority of expenditure measures, the evidence is less clear if quantity measures for public good provision are used.

A Appendix to the theoretical analysis

A.1 Detailed derivation of Equ. (4)

The government's objective leads to the following Lagrangian

$$\mathcal{L} = \sum_k \pi_k F_k (U_{kj}^A - U_{kj}^B) - \lambda \left(\sum_k n_k c_k^A + \alpha \sum_j G_j^A - \sum_k n_k \omega \right) + \sum_k \mu_k (c_k^A - \hat{c}), \quad (\text{A.1})$$

where λ and μ_k are the Lagrangian multipliers for the budget constraint and the constraints related to the subsistence minimum, respectively. The first-order conditions are

$$\mathcal{L}_c : \quad \pi_k F'_k (U_{kj}^A - U_{kj}^B) U_{ck}^A - \lambda n_k + \mu_k = 0, \quad \forall k \quad (\text{A.2})$$

$$\mathcal{L}_G : \quad \sum_{k \in S_j} \pi_k F'_k (U_{kj}^A - U_{kj}^B) U_{Gj}^A - \lambda \alpha = 0, \quad \forall j \quad (\text{A.3})$$

$$\mathcal{L}_\lambda : \quad \sum_k n_k c_k^A + \alpha \sum_j G_j^A - \sum_k n_k \omega = 0 \quad (\text{A.4})$$

$$\mathcal{L}_\mu : \quad c_k^A - \hat{c} = 0, \quad \forall k \quad (\text{A.5})$$

where U_{ck} and U_{Gj} denote marginal utilities regarding private and public consumption, respectively.

Assume a symmetric equilibrium and that the subsistence level is not binding, that is, $\mu_k = 0$. We can rewrite the first-order condition for the private consumption of group k , that is, Equ. (A.2), as

$$\lambda = \frac{\pi_k F'_k (0)}{n_k} U_{ck}^A = \gamma_k U_{ck}^A. \quad (\text{A.6})$$

Combining the first-order conditions for two different groups k and \tilde{k} yields

$$\gamma_k U_{ck}^A = \gamma_{\tilde{k}} U_{c\tilde{k}}^A \quad (\text{A.7})$$

and thus Equ. (4). □

A.2 Detailed derivation of Equ. (5)

Assume a symmetric equilibrium and that the subsistence level is not binding, that is, $\mu_k = 0$. We can rewrite the first-order condition for the private consumption of group k as

$$\lambda = \frac{\pi_k F'_k(0)}{n_k} U_{ck}^A = \gamma_k U_{ck}^A \quad (\text{A.8})$$

and the first-order condition for the public consumption of group k benefitting from public good G_j as

$$\lambda = \sum_{k \in S_j} \frac{\pi_k F'_k(0)}{\alpha} U_{Gj}^A = \sum_{k \in S_j} \frac{n_k \gamma_k}{\alpha} U_{Gj}^A. \quad (\text{A.9})$$

Combining conditions (A.8) and (A.9) yields

$$\frac{\sum_{k \in S_j} n_k \gamma_k U_{Gj}^A}{\gamma_k U_{ck}^A} = \alpha. \quad (\text{A.10})$$

□

A.3 Proof of Proposition 1

According to our definition of diversity, there is one group that splits into two groups. Without loss of generality, we assume that group J splits into groups J^d and \hat{J} with $m_J = m_{J^d} + m_{\hat{J}}$. While group \hat{J} realizes utility from the consumption of a new public good, that is, a public good that was not initially offered, group J^d still prefers the same public good as the initial group J . Since $m_{J^d} < m_J$, Equ. (6), that is,

$$\frac{U_{Gj}^A}{U_{ck}^A} = \frac{\alpha}{m_j} \quad (\text{A.11})$$

implies that less of public good G_J is offered. □

A.4 Subsistence minimum for non-elites in non-democracies

The first-order condition of private consumption, that is, Equ. (A.2), for non-elite groups with $\gamma_k = \pi_k = 0$ implies

$$-\lambda n_k + \mu_k = 0, \quad \forall k \in D. \quad (\text{A.12})$$

Thus, for the non-elite groups, $\mu_k > 0$, which implies a binding subsistence minimum for private consumption, that is, $c_k = \hat{c}$ for all $k \in D$. \square

A.5 Proof of Proposition 2

Since the non-elite groups do not have any political power, it is $\pi_k = 0$ for all $k \in D$. The first-order conditions for the public goods preferred by these groups imply $-\lambda\alpha = 0$. Thus, public goods preferred by non-elites are not provided, and a change in preferences for these groups does not affect the provision of public goods. \square

B Appendix to the empirical analysis

	N	Mean	St. Dev.	Min	Max
Government expenditures					
Government expenses	1,966	23.830	12.083	3.426	210.205
Expenditures on health	2,611	3.153	2.256	0.062	24.113
Expenditures on education	2,308	4.412	2.058	0.000	44.334
Military expenditures	3,476	2.377	3.186	0.000	117.350
Public health					
Life expectancy	4,782	67.760	9.868	26.172	85.417
Infant mortality	4,632	36.559	32.948	1.900	176.500
Hospital beds	2,468	4.353	3.228	0.100	21.679
Safe water	1,489	74.242	27.676	4.529	100.000
Diversity					
Ethnic fractionalization	3,694	0.450	0.257	0.003	0.890
Political regime					
Democracy	4,914	0.593	0.491	0.000	1.000
Controls					
GDP per capita	4,381	16,996.530	19,715.180	436.720	161,938.700
Population (million)	5,195	28.681	117.117	0.009	1,357.380
Population 65up	4,654	6.988	4.744	0.686	24.626
Natural resources	4,705	7.038	11.475	0.000	86.252

Table B.1: Descriptive Statistics

	Democracy	Diversity	Democracy × Diversity	Log GDP per capita	Log population	Population 65up	Natural resources
Democracy	1	-0.279	0.727	0.345	-0.006	0.503	-0.428
Diversity	-0.279	1	0.284	-0.391	0.011	-0.477	0.289
Democracy × Diversity	0.727	0.284	1	0.043	0.048	0.100	-0.219
Log GDP per capita	0.345	-0.391	0.043	1	-0.016	0.653	-0.112
Log population	-0.006	0.011	0.048	-0.016	1	0.100	-0.038
Population 65up	0.503	-0.477	0.100	0.653	0.100	1	-0.405
Natural resources	-0.428	0.289	-0.219	-0.112	-0.038	-0.405	1

Table B.2: Correlation Matrix

C Appendix to the robustness checks

	Government expenses	Expenditures on health	Expenditures on education	Military expenditures
Democracy	3.396*** (0.520)	0.331*** (0.071)	0.070 (0.143)	-0.239*** (0.066)
Diversity	-2.024** (0.952)	-0.859*** (0.134)	-0.655*** (0.242)	-0.657*** (0.133)
Log GDP per capita	2.797*** (0.323)	0.415*** (0.045)	0.491*** (0.068)	0.352*** (0.047)
Log population	-1.586*** (0.141)	-0.070*** (0.021)	-0.169*** (0.031)	0.003 (0.018)
Population 65up	0.108 (0.074)	0.213*** (0.011)	0.013 (0.016)	-0.045*** (0.011)
Natural resources	-0.019 (0.021)	-0.010*** (0.002)	-0.013*** (0.005)	0.030*** (0.005)
Constant	17.067*** (4.861)	-1.408** (0.639)	2.026** (0.947)	0.221 (0.582)
Region Dummies	YES	YES	YES	YES
Year Dummies	YES	YES	YES	YES
Countries	115	148	141	143
Years	1990–2013	2000–2013	1990–2013	1990–2013
Observations	1,600	2,028	1,907	3,041
Adjusted R ²	0.391	0.683	0.144	0.367
F Statistic	42.06***	252.48***	22.95***	23.14***

Note: ***/**/* denotes significance at 1%/5%/10%; heteroskedasticity-robust standard errors in parentheses.

Table C.1: Government expenditures in democracies and non-democracies

	Life expectancy	Infant mortality	Hospital beds	Safe water
Democracy	1.753*** (0.217)	-3.823*** (0.777)	-1.026*** (0.164)	-4.021*** (1.189)
Diversity	-2.539*** (0.372)	11.635*** (1.178)	-0.507** (0.234)	0.233 (2.382)
Log GDP per capita	3.479*** (0.106)	-14.743*** (0.376)	-0.118* (0.068)	16.902*** (0.536)
Log population	0.063 (0.051)	0.732*** (0.177)	-0.064* (0.034)	0.476 (0.338)
Population 65up	0.195*** (0.025)	0.036 (0.094)	0.270*** (0.025)	0.952*** (0.129)
Natural resources	-0.067*** (0.007)	0.335*** (0.026)	0.034*** (0.005)	-0.023 (0.040)
Constant	35.578*** (1.383)	154.184*** (5.446)	5.129*** (0.905)	-109.842*** (9.061)
Region Dummies	YES	YES	YES	YES
Year Dummies	YES	YES	YES	YES
Countries	148	148	147	85
Observations	3,378	3,382	1,975	1,173
Years	1990–2013	1990–2013	1990–2013	2000–2013
Adjusted R ²	0.856	0.820	0.549	0.809
F Statistic	627.89***	383.15***	90.69***	669.46***

Note: ***/**/* denotes significance at 1%/5%/10%; heteroskedasticity-robust standard errors in parentheses.

Table C.2: Public health in democracies and non-democracies

	Government expenses	Expenditures on health	Expenditures on education	Military expenditures
Democracy	6.235*** (1.364)	0.973*** (0.146)	-1.516*** (0.385)	-0.109 (0.143)
Diversity (Fearon, 2003)	-1.994 (2.215)	-0.279* (0.150)	-2.861*** (0.572)	-0.193 (0.213)
Democracy × Diversity (Fearon, 2003)	-4.238* (2.463)	-1.288*** (0.216)	2.714*** (0.526)	-0.269 (0.220)
Log GDP per capita	2.313*** (0.327)	0.448*** (0.042)	0.669*** (0.074)	0.410*** (0.046)
Log population	-1.655*** (0.127)	-0.029 (0.018)	-0.121*** (0.029)	-0.004 (0.018)
Population 65up	0.046 (0.076)	0.201*** (0.011)	0.005 (0.015)	-0.048*** (0.010)
Natural resources	0.013 (0.022)	-0.011*** (0.002)	-0.013*** (0.005)	0.027*** (0.005)
Constant	22.743*** (4.741)	-2.790*** (0.487)	0.706 (0.816)	-0.478 (0.568)
Diversity (Fearon, 2003) + Democracy × Diversity (Fearon, 2003)	-6.233*** (1.277)	-1.568*** (0.182)	-0.148 (0.208)	-0.462*** (0.134)
Region Dummies	YES	YES	YES	YES
Year Dummies	YES	YES	YES	YES
Countries	112	142	136	140
Years	1990–2013	2000–2013	1990–2013	1990–2013
Observations	1,651	2,027	1,912	3,111
Adjusted R ²	0.400	0.721	0.185	0.376
F Statistic	44.00***	278.78***	24.39***	23.73***

Note: ***/**/* denotes significance at 1%/5%/10%; heteroskedasticity-robust standard errors in parentheses.

Table C.3: Government expenditures and diversity (Fearon, 2003) in democracies and non-democracies

	Life expectancy	Infant mortality	Hospital beds	Safe water
Democracy	3.643*** (0.484)	-4.616*** (1.458)	-0.851*** (0.313)	-7.615*** (2.603)
Diversity (Fearon, 2003)	1.297* (0.719)	2.691 (1.952)	1.090*** (0.414)	-4.652 (4.298)
Democracy × Diversity (Fearon, 2003)	-4.385*** (0.751)	2.373 (2.371)	-0.078 (0.510)	6.793 (4.182)
Log GDP per capita	3.376*** (0.110)	-15.240*** (0.396)	-0.141* (0.076)	17.394*** (0.572)
Log population	0.241*** (0.049)	0.423** (0.170)	-0.033 (0.033)	0.393 (0.333)
Population 65up	0.212*** (0.025)	0.003 (0.096)	0.281*** (0.026)	0.926*** (0.127)
Natural resources	-0.074*** (0.006)	0.358*** (0.026)	0.032*** (0.005)	-0.016 (0.040)
Constant	31.372*** (1.344)	168.358*** (5.313)	4.845*** (0.923)	-110.231*** (9.057)
Diversity (Fearon, 2003) + Democracy × Diversity (Fearon, 2003)	-3.088 (0.383)	5.064*** (0.313)	1.012*** (0.305)	2.142 2.352
Region Dummies	YES	YES	YES	YES
Year Dummies	YES	YES	YES	YES
Countries	142	142	142	83
Years	1990–2013	1990–2013	1990–2013	2000–2013
Observations	3,409	3,409	1,999	1,159
Adjusted R ²	0.870	0.828	0.558	0.810
F Statistic	732.36***	396.72***	97.01***	629.08***

Note: ***/**/* denotes significance at 1%/5%/10%; heteroskedasticity-robust standard errors in parentheses.

Table C.4: Public health and diversity (Fearon, 2003) in democracies and non-democracies

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