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## Environmental Politics in Authoritarian Regimes: Waste Management in the Russian Regions

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### Abstract

Russian regions display a significant variation in terms of waste management efforts. This is puzzling considering the importance of waste management for all regional governments and the urgency of the problem for the Russian public as reflected in opinion polls. We study whether more authoritarian regional governments in Russia are better able to solve the problem of waste management. Using a regional panel data set for the period of 2012-2019, we find that our measure of the degree of authoritarianism – the share of votes for the United Russia party in parliamentary elections – has a strong positive effect on the share of recycled waste in the Russian regions. This result indicates that more authoritarian regions tend to recycle more household waste than less authoritarian regions. This finding is consistent with the theory of environmental authoritarianism that suggests that authoritarian governments are better able to tackle environmental challenges.

### Keywords

environmental authoritarianism, waste recycling, Russia, subnational politics

### JEL Classifications

Q53; Q58; R58

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## 1. Introduction

Unambiguous evidence suggests that the environmental challenges that the world now faces can have catastrophic consequences for national economies, political systems and people's livelihoods. There is an ongoing debate in scientific and policy circles about whether democratic or authoritarian systems can provide a more comprehensive and effective solution to ecological problems. A number of scholars proposed a theory of environmental authoritarianism (Beeson 2010; Gilley 2012; Shearman and Smith 2007). It emphasizes certain intrinsic characteristics of authoritarianism that arguably make it easier to tackle the problem of mobilization and organization that is inherent in democracies, and thus to more successfully mitigate the impacts of environmental degradation. In turn, authoritarian environmentalism is argued to further entrench and spread authoritarian practices. The magnitude of the environmental crisis is becoming more and more apparent, and the successes of authoritarian China in its environmental governance in the past two decades are eye-catching and might appear an attractive alternative to existing democratic approaches to fighting climate change. The concept of authoritarian environmentalism has been so far applied mostly to the Chinese context, with studies mostly offering a qualitative perspective. We study the case of Russia, an electoral authoritarian regime, to test the theory of environmental authoritarianism. Taking advantage of the variation in the degree of authoritarianism across Russia's regions as measured by a vote share for the ruling party United Russia (*Edinaya Rossiya*) in parliamentary elections, we study subnational environmental performance and a particular environmental risk – household waste management.

The problem of waste accumulation and disposal is among the major environmental challenges today. The world generates more than two billion tons of municipal solid waste (MSW) every year, with at least 33% of that not managed in an environmentally safe manner (World Bank 2018). It is a major threat to public health and the environment as poorly controlled waste disposal has negative impacts on air, soil, groundwater, and the marine environment. Countries vary greatly in their approaches to waste management, having to consider different environmental, economic, regulatory, technical, and other social factors (Barton, Dalley, and Patel 1996). In general, waste management consists of a multitude of connected processes, such as collection, transportation, treatment, recycling, and disposal of waste (Allesch and Brunner 2014). Depending on how the waste is disposed of, waste management strategies can be categorized into four areas: minimization or prevention of waste generation, recycling of waste, thermal treatment with energy recovery and land filling (Demirbas 2011). Most advanced approaches move the focus beyond waste disposal and start promoting the idea of 'resource management' when 'waste' is thought of as 'resources' and the problem of waste is addressed at its source.

Russia lags behind most developed and many developing countries with regards to waste management. In 2019 only up to 7% of municipal solid waste was recycled while the rest was transported to landfill sites, many of which are unauthorized open dumps (in the EU 48% of municipal waste was recycled on average in 2019<sup>1</sup>). Russia ranked 122nd in the 2020 Environmental Performance Index on its controlled solid waste metric that refers to the percentage of household and commercial waste that is collected and treated in an environmentally safe manner (Wendling et al. 2020). While certain environmental problems are more urgent in some regions than in others (e.g. recurrent forest fires in Siberia and the thawing permafrost in the Russian North), the problem of accumulation and disposal of MSW has become particularly pertinent to all Russian regions in recent years. In the last decade generation of MSW in Russia increased by 25% (Russian Statistics Service – Rosstat), and this trend is unlikely to reverse. According to a report of the Russian Accounts Chamber (2020), in 32 out of Russia’s 85 regions existing landfill capacities will be exhausted by 2024 (in 17 of them – by 2022) with no capabilities of building new ones. Besides, overflowing landfills often do not meet the requirements of environmental legislation<sup>2</sup> that raises concern over contamination of groundwater and pollution of air and soil with poisonous decomposition gases.

The issue of waste disposal has become a widely discussed and politically charged topic in Russia. The problem has been repeatedly addressed during the annual Q&A television broadcast Direct Line with President Vladimir Putin. Russian regional top executives (governors) are also assessed by the federal center according to how well they are able to deal with the problem of waste management.<sup>3</sup> A number of nation-wide opinion surveys showed much public concern over the issue of garbage disposal: respondents name it as the second most urgent environmental problem after air pollution, with more than a third of them voicing dissatisfaction with the waste management system in their region.<sup>4</sup> A 2020 survey by the Levada Center, a Russian independent polling organization, showed that the number of people who thought waste disposal to be one of the biggest environmental challenges increased from 8% in 2010 to 17% in 2019.<sup>5</sup> Public dissatisfaction with it spilled into many protests across the country in recent years, since people are seriously concerned about environmental safety of existing landfills, plans to create new landfill sites and incineration facilities and illegal dumping. On February 3, 2019, protests under the slogan “Russia is not a dump” were held in about 26 regions across Russia.<sup>6</sup>

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<sup>1</sup> European Environment Agency, <https://www.eea.europa.eu/ims/waste-recycling-in-europe>

<sup>2</sup> <https://www.vedomosti.ru/economics/articles/2019/07/23/807161-okolo-polovini-musornih-poligonov>

<sup>3</sup> <https://rg.ru/2021/02/04/putin-utverdil-kriterii-ocenki-gubernatorov.html>

<sup>4</sup> <https://www.rbc.ru/politics/06/02/2019/5c59b1709a79478082250bcb>

<sup>5</sup> <https://www.levada.ru/2020/01/23/problemy-okruzhayushhej-sredy/>

<sup>6</sup> <https://www.rbc.ru/society/03/02/2019/5c56fe4c9a7947c0698465c2>

The logical solution to this mounting problem is promotion of waste sorting and recycling as well as reduction of landfill use, which has been a common practice in most developed countries. This is a declared objective of the waste management reform that started in 2019 and must be implemented in all Russian regions. While some regional governments have tried to improve their waste management systems, others have failed to do so. This is puzzling considering the importance of waste management for all regional governments and the urgency of the problem for the Russian population as reflected in public opinion polls.

While most empirical papers that concentrate on determinants of environmental protection use measures like air or water pollution or deforestation level as their dependent variable (Apergis and Ozturk 2015; Buitenzorgy and Mol 2011; Povitkina 2018), we study environmental performance of regional governments in Russia by focusing on their efforts to mitigate the waste problem. We use regional-level data for the period of 2012-2019 and a share of recycled MSW in the region as our measure of environmental performance. Drawing on the literature on environmental authoritarianism, we examine *whether more authoritarian regional governments in Russia are better able to solve the problem of waste management*.

We indeed find that the share of votes for the ruling party United Russia in the parliamentary elections significantly and positively affects the share of recycled waste in the region. On the one hand, this result suggests that, in line with the concept of environmental authoritarianism, more authoritarian regions can more quickly mobilize different actors and enforce decisions to provide an effective response to environmental challenges. However, we also acknowledge that the regions with a higher share of votes for United Russia may more often indulge in electoral fraud and might as well fiddle environmental statistics.

The paper is structured as follows. The next section introduces the theory of environmental authoritarianism and our main hypothesis. In Section 3 we provide an overview of environmental and waste management politics in the Russian regions. Section 4 describes our data and methodology, section 5 presents and discusses the results. The final section concludes.

## 2. Theorizing environmental authoritarianism

A very large body of empirical and theoretical literature has focused on the relationship between environmental performance and various economic indicators, such as economic growth (GDP per capita – see, for example, Apergis and Ozturk 2015; Apergis and Payne 2009; Buitenzorgy and Mol 2011; Grossman and Krueger 1995; Lean and Smyth 2010; Orubu and Omotor 2011; Panayotou 1997) and trade openness (FDI and export volumes – see, for example, Bokpin 2017; Ibrahim and Law 2016; Lau,

Choong, and Eng 2014). Many studies highlight, however, the importance of political and institutional factors when discussing environmental performance (Barrett and Graddy 2000; Bernauer and Koubi 2009; Bhattarai and Hammig 2001; Leitão 2010; Povitkina 2018). The question whether democratic or authoritarian systems perform better in terms of environmental protection has been heavily debated.

There are several mechanisms through which attributes of democracy are argued to affect environmental quality (Li and Reuveny 2006). Free information flows and political rights allow citizens in a democracy to be better informed about ecological problems and support the environmental cause (Farzin and Bond 2006; Payne 1995). By contrast, in autocracies, where the media is closely monitored by the elite, citizens might not be aware of the extent of environmental degradation in the country. Second, elites in democracies are more responsive to environmental demands of the public because of electoral accountability and the ability of citizens to influence policy-making. Besides, freedom of association and competitive elections allow environmental NGOs and green parties to participate in political processes. Democracies also tend to have well-performing institutions – secure property and contract rights and an established rule of law – that are found to affect the ability to monitor and mitigate environmental degradation (Ibrahim and Law 2016; Lau, Choong, and Eng 2014; Panayotou 1997).

On the other hand, some scholars point out certain aspects of democratic governance that could be detrimental to environmental quality. It is argued that decision-making in democracies is influenced by special interest groups. When such distributional coalitions with non-encompassing interests gain the upper hand, the provision of public goods, including environmental quality, might suffer (Olson 2008). Dryzek (1987), for example, maintains that profit-oriented corporate interests in capitalist democracies support democratic leaders in their ascent to power and then can influence policies, not necessarily to the betterment of the environment. Another argument is that democratic politicians are compelled to be sensitive to different concerns of their voters, and are sometimes pressured to respond first to economic concerns of the public rather than to environmental imperatives (Midlarsky 1998). As a result, democracies are believed to be unable to respond quickly to environmental problems and implement unpleasant but necessary policies because of the resistance of different stakeholders and veto players (Wurster 2013). Finally, it has been pointed out that wealthier countries that are mostly more democratic in fact contribute more to environmental degradation – they improve their environment domestically by outsourcing their polluting industries and concomitant ecological problems to poorer countries (Beeson 2018).

The concept of authoritarian environmentalism was proposed as an alternative approach to policy-making in the face of major environmental crises (Beeson 2010, 2018; Gilley 2012). It is both a prescriptive and descriptive public policy model that has two dimensions. First, it is a policy process that is dominated by an autonomous central state and is of non-participatory nature. The environmental decision-making process is

concentrated within a few government agencies, and only a limited number of social actors are allowed to participate in state-led policies and their implementation. The second aspect is the restriction of individual liberties when environmentally unsustainable forms of behavior are outlawed. Advocates of authoritarian environmentalism stress its ability to quickly mobilize and organize different actors and provide an effective and concerted response to environmental problems, especially those that are politically challenging.

The model of authoritarian environmentalism represents an ideal type (Lo 2015; Martus 2021). It does not exist in a pure form but the model has often been applied to China that has arguably achieved much progress in terms of environmental quality and has often been presented as the most vivid example of authoritarian environmentalism. China is indeed characterized by a mono-centric, top-down and non-participatory environmental policy process that fits the model of authoritarian environmentalism. The central government started administrative reforms in 2018 to increase state capacity in environmental policy and improve environmental bureaucracy, and consolidated power under the roof of the new Ministry of Ecology and Environment (Kostka and Zhang 2018). Under Xi Jinping the involvement of environmental NGOs in policy processes and high-profile campaigns became more limited, especially after the 2017 Chinese Foreign NGO Law (Demchuk et al. 2021; Plantan 2018). Moreover, harsher punishments were introduced for violations of environmental protection regulations and for nonfulfillment of environmental targets by local officials (Kostka and Zhang 2018). Still, observers point out certain limitations of China's authoritarian environmentalism (Beeson 2018; Eaton and Kostka 2014; Gilley 2012; Lo 2015). Despite the concentrated executive authority, policy implementation is dispersed and is often distorted and undermined at the local level. The central authorities often fail to enforce implementation and control local officials that results in a major gap between stated policy goals and outcomes. Besides, even though civil activism is reined in, mid-level environmental activism is still present and tolerated by the authorities.

On the whole, China has undoubtedly made progress in fighting its domestic 'war on pollution' and going green, and at least part of this success could be attributed to the authoritarian nature of the Chinese state. It has also been argued that this success contributed to the popularity of the Chinese Communist Party and made a powerful impression on other Asian countries battling with environmental degradation (Gilley 2012). Could we expect that authoritarian regimes can indeed produce an optimal response to environmental problems? Does the degree of authoritarianism matter? How easily can the model of authoritarian environmentalism travel to other contexts? In this paper we apply the concept of authoritarian environmentalism to another authoritarian country, Russia, and thus expect that *more authoritarian regions in Russia are more likely to better tackle the problem of waste management by having a higher share of recycled waste.*

### 3. Waste Management in the Russian Regions

The Russian case is particularly appropriate to test such a hypothesis. First, Russia displays a large regional variation in terms of waste management efforts as will be discussed below. Furthermore, Russia is an electoral authoritarian regime (Gel'man 2012; Golosov 2011; Kailitz and Stockemer 2017), meaning that it combines some elements of democracy and outright authoritarian practices. The country is what Richard Sakwa (2010) calls a 'dual state' – a confluence of a constitutional state with formal institutions (multiple parties, elections) and an administrative regime with its informal practices and personalized networks. In contrast to China, Russia regularly holds national elections for executive offices and legislative bodies, and although elections are not free, we can observe considerable diversity of the subnational political landscape, i.e. the extent of authoritarianism. This is evident in the varying level of support for the ruling party United Russia. For example, in the 2016 State Duma elections United Russia received 85% of votes in the Republic of Mordovia while its vote share was only 38% in Khabarovsk Krai. Electoral results at the regional level can allow us to tease out the effect of political regime – or the degree of authoritarianism – on regional environmental performance, i.e. waste management efforts in Russia's regions.

With a few exceptions (Martus 2021; Wu and Martus 2021), the model of authoritarian environmentalism has not been used when discussing environmental governance in Russia. Martus (2021) argues that environmental authoritarianism implies "a much higher level of state engagement with environmental governance than currently exists in Russia" and more tangible policy outcomes. Indeed, the environmental protection in Russia has never been given priority it warranted. In the Soviet Union industrialization and militarization of the economy with often wasteful use of seemingly abundant resources contributed to declining environmental quality (Henry and Douhovnikoff 2008). The poor system of waste management, where over 90% of household waste today is disposed of on landfills or open dumps, is also a legacy of the Soviet Union. From the mid-1990s there was a further systematic eroding of national environmental institutions and their authority known as environmental deinstitutionalization or "de-ecologization" (Henry and Douhovnikoff 2008; Mol 2009; Poberezhskaya 2015). During Dmitry Medvedev's term in office (2008-2012) with his focus on "modernization", there seemed to have been an increase in interest in environmental topics. In May 2008 the Ministry of Natural Resources was renamed the Ministry of Natural Resources and Environment, and best available technologies were promoted to encourage industry to embrace clean and energy-saving technologies (Martus 2017). In contrast, during his presidency, Vladimir Putin has not been involved in substantive environmental policy development, but rather used the environment as a tool and a source of regime legitimacy (Martus 2021). What corresponds to the idea of authoritarian environmentalism is the top-down and non-participatory nature of environmental policy-making in Russia. There is indeed little cooperation between the authorities and environmental activist groups, and the environmental movement in

Russia has found it difficult to organize collectively and engage in the policy process (Wu and Martus 2021). The NGO laws passed by the Russian state between 2006 and 2015 significantly restricted the outreach of environmental activists and complicated their operations. Besides, many Russian civil society organizations rely on financial support from the state – despite the crackdown on the civil society, the state provides funding to NGOs, thus buying their loyalty (Bederson and Semenov 2021).

In spite of the general low engagement of the Russian state with environmental issues, the magnitude of the household waste problem became so apparent in recent years that the federal authorities finally decided to offer a large-scale response by launching a full-fledged country-wide waste management reform in 2017<sup>7</sup>. However, the start of the reform was delayed until January 2019 because of a slow development of accompanying regulatory acts on the federal level, and then the regions were unable to make necessary preparations in time. It has been three years since the start of the reform but most commentators agree that the reform is stalling and has not yet produced expected results (Russian Accounts Chamber 2020). The Accounts Chamber stressed in its report that it was a lack of efficiency and coordination of both federal and regional authorities that has so far hampered the implementation of the reform. However, policy implementation is decentralized and regions have some discretion in setting and acting on their environmental agenda. It is regional and local governments that are responsible for ‘on the ground’ implementation of federal environmental policies and management of the whole waste disposal system (Martus 2020).

In fact, there have been some sporadic regional efforts to tackle the problem of MSW across the country since the early 2010s. While at the national level the authorities have often failed to effectively organize and mobilize actors and resources, a number of regional governments over the past years have developed various approaches and strategies to solve the waste problem. Some regions, for example, Kamchatka, Zabaikalsk and Krasnodar Krai, are particularly under time pressure to act as their landfill capacities are almost exhausted. A number of regions perform well in terms of coverage of the population with recycling bins (for example, the Republic of Mordovia) but have no

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<sup>7</sup> The reform is carried out within the scope of two Federal projects (FP), “Clean country” and “Integrated system for municipal waste management”, that are part of the National project “Ecology”<sup>7</sup> 2018-2024. “Clean country” is designed to mitigate accumulated environmental damage, including closure and recultivation of landfills. The main objective of the federal project “Integrated system for municipal waste management” is to create a high-tech well-functioning infrastructure for recycling and utilization of household waste, to increase the share of recycled (‘utilized’) waste up to 36% by 2024 and to limit the use of landfills to disposal of unrecyclable waste. The executor of the FP “Integrated system for municipal waste management” is a public company, Russian Environmental Operator, created in 2019 and charged with overseeing the reform. To start the reform, all regions were expected to develop a regional program and a territorial plan for waste management, to choose one or several regional operators responsible for the whole cycle of waste collection and disposal, as well as to determine a tariff (fee) that the population in the region would pay for waste collection.



or limited recycling facilities while others (for example, Krasnodar Krai) have a waste recycling plant but hardly any waste sorting. Regions with a relatively small population, like the Komi Republic, do not generate much household waste to make recycling an attractive investment project and instead transport their MSW to other regions for recycling.

For instance, in Kamchatka Krai a recycling plant was built by local businessmen before the start of the reform in 2018. However, there was no organized system of waste sorting in the region, so all waste had to be separated by workers at the plant. Since it is not possible to recycle everything at the plant, 350 tons of paper are sent to a neighboring region each month. In addition, 100 tons of plastic are sent to Moscow Oblast, which is more than 6,000 kilometers away.<sup>8</sup> In 2019, waste sorting was launched in the region and several dozens of yellow containers for plastic first appeared there.<sup>9</sup> The first waste recycling plant in Krasnodar Krai was built in Sochi, as a requirement for hosting the 2014 Olympics.<sup>10</sup> Its operation was inefficient because household waste was not separated but instead transported to a landfill site located 300 kilometers away from the city.<sup>11</sup> A similar situation could be found in Zabaikalsk Krai. A waste recycling plant was built there in 2012, but because of the lack of financing it was opened only in 2015 and closed nine months later.<sup>12</sup> In Belgorod Oblast located in the central part of Russia the regional government started installing recycling containers in 2019. However, people complain that garbage trucks pick up garbage from different containers and mix it up.<sup>13</sup> In October 2019, a fully automatic waste sorting complex was opened in the region with a sorting capacity of 150,000 tons per year (the region produces around 500,000 tons of waste per year).<sup>14</sup>

The Komi Republic and the Republic of Mordovia have made waste sorting widely available. In Saransk, the capital of Mordovia, every household has access to nearby recycling bins – the local waste operator Remondis (a German company) introduced first containers in the city in 2012.<sup>15</sup> In Komi there are around 1300 containers for plastic and paper in different parts of the republic. However, both regions do not have any recycling plants, so all collected recyclable household waste is transported to other regions, like Nizhny Novgorod and Penza, while the rest goes to local landfills. There have been plans to build a recycling facility in Mordovia and two waste sorting plants and four incinerators

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<sup>8</sup> <https://mir24.tv/news/16374469/vtoraya-zhizn-musora-na-kamchatke-iz-othodov-delayut-trotuarnuyu-plitku>

<sup>9</sup> <https://www.kamchatinfo.com/epicentre/detail/33843/>

<sup>10</sup> <https://www.kommersant.ru/doc/2208568>

<sup>11</sup> <https://www.kommersant.ru/doc/4680992>

<sup>12</sup> <https://www.chita.ru/news/153108/>

<sup>13</sup> <https://fonar.tv/news/2019/03/18/vrio-mera-belgoroda-pozhalovalsya-cto-vo-dvorah-gedolzhen-byt-razdelnyi-sbor-musora-ves-musor-sobiraet-odna-mashina>

<sup>14</sup> <https://oskol-kray.ru/1869.html>

<sup>15</sup> <https://www.idelreal.org/a/28504423.html>

in Komi but the implementation is very slow because of the lack of investment and disagreements with local authorities and activists.<sup>16</sup> Both regions have a relatively small population and therefore do not generate much household waste to make recycling an attractive investment project. Although some of these regional efforts might seem haphazard, we can still observe that some regions perform better than others and were in fact taking measures to solve the waste problem even before the official start of the reform in 2019 (see Appendix Figure 1).

Given the significant cross-regional variation in both political regimes and waste management performance, Russia offers an excellent opportunity to test the theory of environmental authoritarianism within one country, at the same time allowing us to hold constant certain national-level parameters. The following section will discuss our analytical approach.

## 4. Method and data

### 4.1. Dependent and explanatory variables

As mentioned earlier, we are interested in teasing out the effect of authoritarianism on the environmental performance of regional governments in the field of waste management. Our dependent variable is the percentage of municipal solid waste in the total amount of generated waste that has been transported to recycling facilities (*share of recycled MSW*). We calculate it using official data from government statistics (Rosstat), i.e. yearly regional data on the generation of municipal solid waste and on the amount of MSW transported to recycling plants (in thousands of m<sup>3</sup>). Since waste recycling was declared a key to solving the waste disposal problem in Russia and is one of the main indicators in the National project “Ecology”, we use this measure as a proxy for regional waste management performance.

Our main explanatory variable is political regime type, a variable that has been widely used in empirical research to explain variation in environmental degradation across countries (Buitenzorgy and Mol 2011; Farzin and Bond 2006). All of Russia’s regions are electoral authoritarian regimes but there are still different levels of regime competitiveness, with some regions being more competitive and others more hegemonic (Buckley and Reuter 2019; Panov and Ross 2013; Ross and Panov 2019). There are regimes with a higher level of political competition, such as Sverdlovsk Oblast and Perm Krai, regions with quasi-authoritarian regimes, like Kemerovo and Tatarstan, and also personalistic dictatorships in the republics of the North Caucasus (Rochlitz, Mitrokhina,

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<sup>16</sup>[https://komi.aif.ru/society/jkh/destruktivnyy\\_element\\_horosha\\_li\\_novaya\\_shema\\_utilizacii\\_musora](https://komi.aif.ru/society/jkh/destruktivnyy_element_horosha_li_novaya_shema_utilizacii_musora)

and Nizovkina 2021). To measure the degree of authoritarianism in the regions, we use the regional-level election results for the United Russia party in the State Duma elections (*UR Duma vote share*) that show the level of political support for the ruling party. It is a commonly used measure for political competitiveness of Russian regions (see, for example, Rochlitz, Mitrokhina, and Nizovkina 2021).

There are many additional factors that can potentially influence environmental performance. To isolate the effect of our main variable of interest from other possible explanations, we include a number of controls in our analysis. Building on existing research, we add a measure of the wealth of the region, gross regional product per capita (*GRP per capita*), taken from the Rosstat data. As mentioned above, the level of economic development is often used to explain environmental performance, and many empirical studies found a negative relationship between GDP per capita and environmental degradation when income reaches a certain level, i.e. the Environmental Kuznets Curve. In addition, higher income is also associated with post-material values when people start “to prioritize climate change mitigation among other public policy issues and demand it from the elected leaders” (Povitkina 2018, 419). There is a significant variation in the income level across Russia’s regions. For example, gross regional product (GRP) per capita in the Republic of Khakassia in 2019 was more than 15 times lower than that of Khanty-Mansijsk Autonomous Okrug, and its territory is one tenth of the size of Khanty-Mansijsk Okrug (Rosstat 2019).

Since it has also been argued that the quality of institutions matters greatly in mitigation of environmental risks and benefits of democracy can be limited in the presence of poor governance (Bhattarai and Hammig 2001; Culas 2007; Povitkina 2018), we also control for the quality of regional institutions by using the rating of regions’ *investment attractiveness* by the Rating Agency Expert.<sup>17</sup> The RA Expert rating covers all Russian regions and is available for the whole period that we consider. The rating combines two components, investment risk and investment potential, and covers factors like quality of public administration and political and legal risks. The index rates all regions along the maximum potential/minimum risk-low potential/extreme risk scale.

When it comes to environmental performance at the regional level, we also need to consider measures relating to governors’ characteristics. The stability of a regime can be the basis for successful long-term environmental policy. Eaton and Kostka (2014) find, for example, that in China the frequent cadre turnover disincentivizes local officials to implement long-term complex environmental policies, especially when their outcomes are not easily visible. Thus, we expect that longer-serving governors should be more likely to be concerned about environmental risks that their regions face. On the other hand, a high degree of turnover may also lead to disruption and even a complete remaking of policies. Our measure of regional political stability is governors’ turnover

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<sup>17</sup> [https://raex-rr.com/pro/regions/investment\\_appeal/investment\\_potential\\_of\\_regions/2019/](https://raex-rr.com/pro/regions/investment_appeal/investment_potential_of_regions/2019/)

(*number of governors* in the period of 2012-2019). The same is true for governors with strong ties to the region – when a governor has a personal connection to the region, they should be more likely to take an interest in the region and implement environmentally friendly policies. Our regional ties measures are two dummy variables: whether *the governor was born in the region* and whether *the governor worked in the region* prior to assuming office in the last five years.

Besides, we control for the level of urbanization (Rosstat data), *urban share*, since it is associated with higher levels of waste accumulation. Moscow alone, with its population of over 12 million people, produced 14% of all household waste generated in Russia in 2019. Besides, we include a measure of a regional government's environmental bureaucratic capacity – regional spending on environmental protection as a share of the consolidated regional budget (*share of environmental spending*; the Federal Treasury data). *Environmental spending* as well as our dependent variable *share of recycled MSW*<sup>18</sup> and the measures of regime type and income are log-transformed due to positive skewness. We considered other possible confounding factors (for example, the activity of the civil society in the region) but we could not include them in our analysis because of the unavailability of data.

### 3.2. Methodological approach

In our analysis we focus on the period of 2012-2019. We chose 2012 as our starting point because the problem of waste disposal was first addressed in the State Program “Protection of environment” in 2012. Since the data for a number of our indicators is not yet available for 2020, we limit our analysis to 2019. The data we use is regional-level and covers 83 Russian regions (excluding Crimea and the federal city of Sevastopol). Our baseline sample, however, includes 78 regions since we excluded Russian atypical regions – autonomous okrugs – that are remote and have a very small population. Table 1 presents the descriptive statistics of the variables included in the analysis.

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<sup>18</sup> Since some of the values of *Share of Recycled MSW* are equal to 0, we added 1 before performing a log transformation

Table 1: Descriptive statistics, N=624.

Variable	Min.	Max.	Median	Mean	Std. dev.
Share of Recycled MSW, %	0	100.00	0.10	9.07	17.72
UR Duma Vote Share, %	29.5	99.54	46.09	50.96	15.63
GRP per capita, million rubles	77877.2	2407929	311819.8	374750.1	257529.5
Investment attractiveness	1	12	6	6.14	2.71
Urban Share, %	28.79	100	71	69.64	13.11
Share of Environmental Spending, %	0.01	3.68	0.17	0.22	0.27
Number of Governors, 2012-2019	1	4	1	1.31	0.55
Governor Born in Region	0	1	0	0.49	0.5
Governor Worked in Region	0	1	1	0.56	0.5

As we have panel data and want to account for region-specific unobserved heterogeneity, the ordinary least squares (OLS) method is not a viable option as it provides biased estimates. To assess the appropriateness of fixed and random effects models, we ran the Hausman specification test. Since the p value in the Hausman test is smaller than 0.05, we reject the null hypothesis that the random effect model is more appropriate than the fixed effect model (Wooldridge 2012). The results of the pooled OLS and random effects models are displayed in Model 1 and Model 2 in Table 2 below. We thus chose the fixed effects within model as our estimator, clustering standard errors by region. The benefit of the fixed effects model is that it takes care of unobserved time-invariant variables. The empirical model builds on the following equation:

$$\ln(\text{MSWShare})_{it} = \beta_0 + \beta_1 \ln(\text{URShare})_{it} + \beta_2 X_{it} + \varepsilon_{it} + \lambda_i$$

where  $i$  stands for region,  $t$  - for year,  $\ln(\text{MSWShare})$  is a natural logarithm of our dependent variable *Share of Recycled MSW*,  $\beta_0$  is an intercept,  $\ln(\text{URShare})$  is log-transformed *UR Duma Vote Share*,  $X$  is a vector of the control variables,  $\varepsilon$  is an error term and  $\lambda_i$  is region-specific effects.

## 5. Results and discussion

Our main results are displayed in fixed effects Models 3 and 4 in Table 2. Graphical representation of Model 3 results can be seen on the coefficient plot on Figure 2 in the Appendix. Each column in Table 2 presents the estimates of an association between our dependent variable, the share of recycled waste, and our main explanatory variable, the degree of authoritarianism, controlling for a number of confounding factors.

In Model 3 we have our baseline sample of 78 regions in the period of 2012-2019. Since the waste management reform started in 2019 and the regions thus received an extra incentive to promote recycling, in Model 4 we exclude the year 2019 as a potential external shock to ensure that our results remain robust.

*Table 2: Relationship between authoritarianism and waste recycling.*

Variables	Model 1	Model 2	Model 3	Model 4
ln UR Duma Vote Share	0.289 (0.250)	0.823* (0.364)	1.791* (0.739)	1.629* (0.707)
ln GRP per capita	-0.091 (0.162)	-0.072 (0.289)	-0.969 (1.042)	-0.889 (0.992)
Investment Attractiveness	-0.172*** (0.023)	-0.098** (0.038)	-0.008 (0.060)	0.054 (0.064)
Urban Share	-0.005 (0.008)	0.012 (0.012)	0.128** (0.042)	0.127* (0.052)
ln Share of Environmental Spending	0.586 (0.370)	0.616 <sup>†</sup> (0.355)	0.187 (0.495)	0.328 (0.704)
Number of Governors, 2012-2019	-0.284* (0.124)	-0.058 (0.120)	-0.018 (0.172)	-0.128 (0.179)
Governor Born in Region	-0.076 (0.132)	0.031 (0.159)	0.051 (0.231)	-0.025 (0.257)
Governor Worked in Region	-0.002 (0.127)	0.109 (0.162)	0.259 (0.189)	0.174 (0.222)
Constant	2.352 (2.014)	-1.909 (3.795)		
Year FE	No	No	Yes	Yes
Region FE	No	No	Yes	Yes
Time controls	Yes	Yes	No	No
Number of regions	78	78	78	78
Observations	624	624	624	546
R2	0.133	0.077	0.045	0.046
Clustered standard errors in parentheses, *** p < 0.001, ** p < 0.01, * p < 0.05, † p < 0.1. Dependent variable: a share of recycled MSW (ln), ln: natural logarithm; FE: fixed effects.				

In Models 3 and 4 we observe a positive and statistically significant effect of *UR Duma Vote Share*. It indicates that regions with a higher share of votes for the United Russia party in the State Duma elections are more likely to recycle more of their municipal solid waste. In Models 3 the *UR Duma Vote Share* coefficient estimate is 1.79, so we can expect that with a one percent increase in the share of votes for UR the share of recycled waste will increase by 1.79%. This result supports our hypothesis that regions with a higher share of votes cast for UR in the parliamentary elections would have a higher recycling share. This in turn gives some ground to suggest that environmental governance in Russia, at least in the area of waste management, connects to the concept of environmental authoritarianism. If we view our results through the prism of

environmental environmentalism, one possible interpretation of our finding is that more authoritarian regions might have more will power, i.e. administrative and coercive capacities, to implement policies if they choose to do so. That is, if they decide to promote waste recycling in the region, they may find it easier to impose decisions on local actors than more democratic regions where regional authorities might have to balance different interests and can be more susceptible to lobbying by landfill owners, for example. Besides, because of the non-participatory nature of policy making and implementation in authoritarian regions, with little public deliberation, these regions could produce a quicker response to the waste management crisis.

To further check the robustness of our results, we ran a regression with our full sample of 83 regions (Model 3 in Appendix Table 1). *UR Duma Vote Share* is still positive and statistically significant. Our data shows that there have been noticeable fluctuations in both generation and recycling of MSW with spikes and drops in a few Russian regions across the years (see Figure 1 in the Appendix). Although there might be some logical explanations of these sudden changes (like closure and reopening of recycling plants), we decided to run another robustness check by excluding the regions where the fluctuations were impossible to explain, that left us with 62 regions (Model 4 in the Appendix). We still see the effect of *UR Duma Vote Share* although it is less pronounced.

Turning to the results on the control variables, we see a positive and statistically significant effect of *Urban share* in Model 3 and 4. It indicates that more urbanized regions are more likely to recycle their household waste. Indeed, urban centers generate a higher amount of waste than rural areas. Besides, existing landfill capacities can be limited in densely populated regions while procuring land for treatment and disposal is becoming more difficult and expensive. This was the case in Arkhangelsk oblast where people protested heavily against the authorities' plans to build a new landfill for Moscow solid waste near the local village of Shiyes in 2018-2019.<sup>19</sup>

We do not find any significant effect of our other control variables on the recycling share. Contrary to our expectations, personal ties that the governor has to the region and political stability do not result in a better environmental performance, at least with regards to recycling. *GRP per capita*, *Investment attractiveness* and *Environmental spending* are also not statistically significant. In Model 2 in Appendix Table 1 we used another indicator of bureaucratic capacity, namely the share of bureaucrats relative to the regions' total population. As an alternative measure of institutional quality, we used the crime rate in the region, i.e. the number of crimes per capita, in Model 1 in Appendix Table 1. These alternatives did not yield any significant results either.

Summarizing the results briefly, we find a positive and statistically significant effect of UR regional level results in the Duma elections on the share of MSW that is

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<sup>19</sup> <https://www.nytimes.com/2019/02/19/world/europe/russia-putin-landfill.html>

transported to recycling facilities. This supports the idea of environmental authoritarianism but we are aware that there could be other possible mechanisms that would explain this relationship. For example, more authoritarian regions might be more prone to manipulate their official statistics and show better performance in their environmental data. To check if this was the case, we looked at the propensity of electoral fraud in the region to see whether regions with more vote rigging might also manipulate their recycling data. Since we had electoral fraud data only for the 2016 parliamentary elections<sup>20</sup>, we ran an OLS regression for 2016 (Table 2 in the Appendix). We found no effect of electoral fraud but the result is of course inconclusive due to the lack of data.

## 6. Conclusion

The problem of accumulating and poorly managed MSW has significant economic and ecological implications, and efficient waste management, especially in urban areas, becomes essential to ensure sustainable development. Russia is heavily affected by this problem – its landfills and open dumps cover the area of 4 million hectares – which is comparable to the territory of Switzerland or the Netherlands.<sup>21</sup> In this paper we focused on the issue of waste management and examined the ability of regional governments in Russia to address this particular environmental challenge. Building on the existing literature and the model of environmental authoritarianism we hypothesized that more authoritarian Russian regions will be likely to have a higher share of recycled household waste.

The concept of environmental authoritarianism has been so far mostly applied to China. Its top-down and non-participatory approach to environmental governance has arguably been responsible for many improvements in domestic environmental quality in the past decade. We take advantage of the variety of authoritarianism across Russia's regions and regular national elections to empirically test the theory of environmental authoritarianism. Supporting our predictions, the results show that more authoritarian regions (regions where the ruling party United Russia scored better in the Duma elections) are likely to transport a larger share of their municipal solid waste to recycling plants. A number of robustness checks proved our findings to be solid. The results suggest that more authoritarian governments, on average, are better able to tackle ecological problems than less authoritarian regimes. Due to their ability to quickly organize and mobilize actors and resources, they might provide a more effective response to environmental challenges. However, we acknowledge that there could be other possible explanations of the relationship that we find (for example, faked environmental statistics). Still, applying the concept of environmental authoritarianism to

<sup>20</sup> Calculated by Sergey Shpilkin, <https://liberal.ru/lm-ekspertiza/anomalnye-i-normalnye-statisticheskij-analiz-itogov-dumskih-vyborov>

<sup>21</sup> <https://www.vedomosti.ru/economics/articles/2020/09/22/840840-trudom-pererabativaem>



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the Russian context is an interesting avenue to explore when we study factors that might influence environmental performance of regional authorities.

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## Appendix

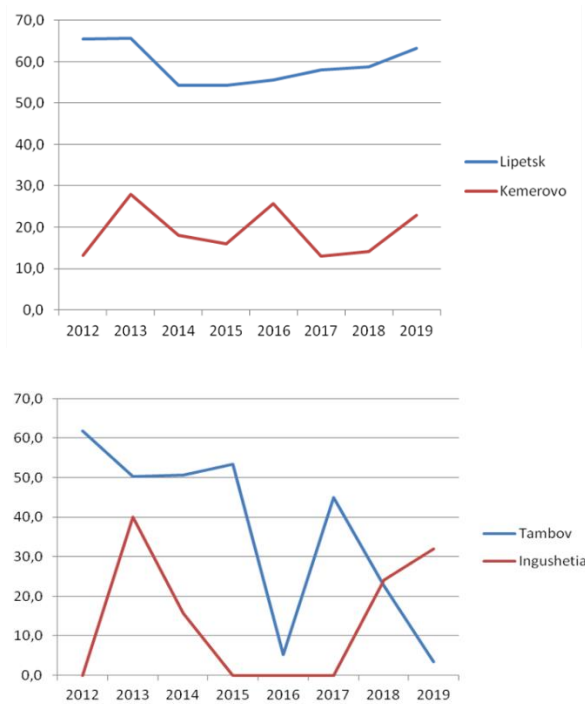


Figure A1: Share of recycled waste in Russian regions, 2012-2019.

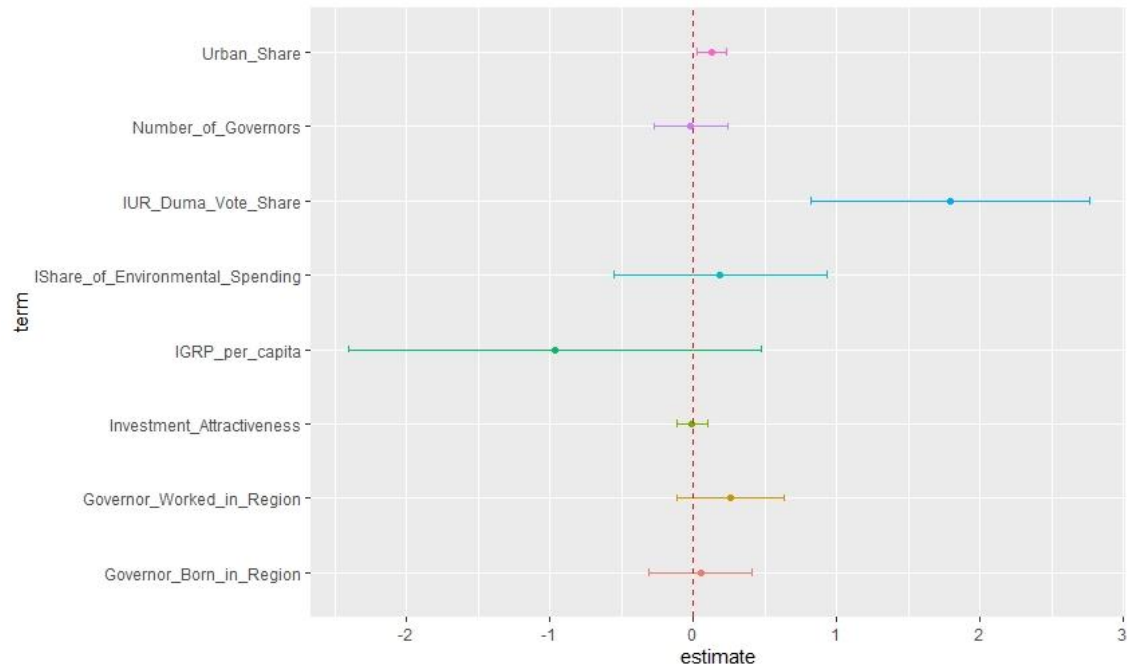


Figure A2. Coefficient plot: Model 3. *Note:* Dependent variable: a share of recycled MSW (I), I: natural logarithm.

Table A1: Relationship between authoritarianism and waste recycling.

Variables	Model 1	Model 2	Model 3	Model 4
ln UR Duma Vote Share	1.787* (0.729)	1.774* (0.757)	1.476* (0.744)	1.032† (0.601)
ln GRP per capita	-0.954 (1.032)	-0.961 (1.051)	-0.608 (1.021)	-0.780 (0.895)
Investment Attractiveness		-0.008 (0.059)	-0.007 (0.059)	-0.082† (0.049)
Crime number	0.160 (0.228)			
Urban Share	0.126** (0.042)	0.128** (0.041)	0.118** (0.042)	0.097 (0.134)
ln Share of Environmental Spending	0.189 (0.479)		0.018 (0.467)	0.413 (0.498)
Number of Governors, 2012-2019	-0.010 (0.172)	-0.017 (0.169)	-0.090 (0.163)	-0.132 (0.185)
Governor Born in Region	0.063 (0.229)	0.053 (0.229)	0.1726 (0.217)	0.0798 (0.256)
Governor Worked in Region	0.253 (0.186)	0.261 (0.189)	0.153 (0.184)	0.086 (0.220)
Bureaucratic capacity		-28.479 (49.889)		
Year FE	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Number of regions	78	78	83	62
Observations	624	624	664	496
R2	0.046	0.046	0.034	0.032
Clustered standard errors in parentheses, *** p < 0.001, ** p < 0.01, * p < 0.05, † p < 0.1. Dependent variable: share of recycled MSW (ln), ln: natural logarithm; FE: fixed effects.				



Table A2: Relationship between electoral fraud and waste recycling.

<b>Variables</b>	<b>Model 1</b>	<b>Model 2</b>
Electoral Fraud	-0.113 (0.131)	-0.200 (0.206)
ln UR Duma Vote Share		0.636 (1.379)
ln GRP per capita	0.283 (0.488)	0.256 (0.505)
Investment Attractiveness	-0.174** (0.052)	-0.179** (0.055)
Urban Share	-0.039 <sup>†</sup> (0.022)	-0.039 <sup>†</sup> (0.023)
ln Share of Environmental Spending	-0.302 (1.644)	-0.053 (1.745)
Number of Governors, 2012-2019	-0.474 <sup>†</sup> (0.282)	-0.465 (0.284)
Governor Born in Region	-0.565 (0.342)	-0.584 (0.356)
Governor Worked in Region	0.088 (0.349)	0.093 (0.352)
Constant	2.661 (5.636)	0.745 (6.569)
Number of regions	78	78
Observations	78	78
R <sup>2</sup>	0.185	0.188
Robust standard errors in parentheses. *** p < 0.001, ** p < 0.01, * p < 0.05, <sup>†</sup> p < 0.1. Dependent variable: a share of recycled MSW (ln), ln: natural logarithm.		

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