Green Transition versus the Environment?: The Politics of Mining for Critical Minerals^{*}

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Abstract

The energy transition has created a global rush for critical minerals that are indispensable for the manufacturing of "green" technology, such as electric vehicles, solar panels, and wind turbines. Critical minerals are predominantly mined, however, on land that is proximate to vulnerable communities, and in developing countries. The environmental toll imposed by mining thus incurs locally and immediately to such communities, while the benefits of the green transition are long-term and global. How do citizens in those mineral-rich countries evaluate the complicated trade-offs of mining for critical minerals? Mining projects for green technology inputs have in many instances stalled over public protests related to local environmental damages. We ask to what extent do the global environmental benefits of mining's contribution to decarbonization offset some of these concerns? Are citizens willing to compensate the (indigenous) communities where mining takes place with a share of the government mining revenue? How do nationalism and geopolitical competition between the U.S. and China affect support for mining projects? We answer these questions using a pre-registered conjoint survey experiment in Argentina, which is rich in lithium. We find that concerns over local environmental damages are by far the most important attribute that determines preferences, although a mine's utility for green technology modestly increases support. Argentine citizens with stronger pro-environmentalist attitudes are more opposed to lithium mining, but respondents are less willing to redistribute tax revenues to local communities when they are informed that the community is indigenous. Argentines consistently prefer mine ownership by the national state-owned company (YPF), although preferences for national, Chinese or North American ownership vary with partisanship.

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1 Introduction

Resource extraction has long been a terrain over which fierce conflicts have been waged between and within countries. Although such conflicts are as old as colonialism itself, they have taken on a new and more urgent concern with the intertwining of vast new mining projects in service of the green transition. This unlikely coupling emerges from the fact that minerals such as lithium, cobalt, copper, manganese and rare earth elements are essential for 'green' technologies such as solar panels, electric vehicle batteries, and wind turbines. Those technologies, and particularly electric vehicles, are vital to global and national decarbonization goals in the green transition. The stakes in mining for critical minerals, however, range from local concerns over job creation, revenue allocation, environmental impacts, and indigenous land rights, to geopolitical rivalry between China and Western countries to secure domestic markets and supply chains for green technology and end-user products. Along with the race to secure critical minerals, such rivalries have spurred vast new government initiatives in industrial policies and protectionist tariffs, such as the Inflation Reduction Act in the U.S. Decisions about whether and how to develop extractive mineral projects, including who will be granted rights, under what conditions, and how local communities or the broader public will be compensated, are fundamentally political, and the focus of this research.

While there is an extensive literature on the development of green industrial policies (e.g. Allan, Lewis, and Oatley 2021; Allan and Nahm 2024; Rodrik 2014) and on citizen support for such policies in advanced industrialized democracies (e.g. Bergquist et al. 2022; Kallbekken 2023), we know less about public support for new mining projects for critical minerals in the Global South democracies, where most of this mining is taking place (see however, Riofrancos 2017; Díaz Paz et al. 2023; Arce and Nieto-Matiz 2024; Arce 2014; Babidge and Bolados 2018; Vivoda et al. 2024; Arellano-Yanguas 2011). This matters not just for understanding whether the public will support mining projects, but also for how the domestic distributional issues will be resolved. Do publics in the main capital area care about the global environmental benefits and/or local environmental pollution in remote and often indigenous areas? Are they willing to redistribute a portion of state mining revenue to communities affected by the negative consequences of such operations? These are key questions that affect the prospects for a *just* green transition. They are important because a failure to account for the impacts of the transition on local communities may render critical minerals vulnerable to conflict, stalling, and even reversals of this essential part of the green transition's efforts to combat global climate change (United Nations Department of Economic and Social Affairs 2022). How do citizens in Global South democracies navigate these political, economic, social and environmental tensions?

Within the complex set of questions raised by mining for the green transition are both inter-temporal and territorial trade-offs. In the former, we see immediate and often-enduring local environmental impacts, as well as governmental costs to incentivize mining production, pitted against the longer-term, global and national economic and environmental benefits of mining for critical minerals. In the latter, geographical variation in environmental costs and economic benefits arises as mining operations directly impact nearby communities, while both tax revenue and mining profits could be allocated elsewhere. The result is a potentially stark temporal and geographic gap between the winners and losers of mining. Even as mining concessions and technological innovations have multiplied in recent years on surging demand for critical minerals, less is known about how individuals, whose 'social license' is sought to develop a mining project navigate these complex trade-offs. We explore these questions in the context of a Global South democracy, *viz.*, Argentina, where in recent years citizens' protests have at times slowed or halted mining production, often on environmental grounds (Díaz Paz et al. 2023; Ciftci and Lemaire 2023). Ranking fourth in the world in reserves of lithium (IEA 2024), Argentina forms part of the "Lithium Triangle" along with Bolivia and Chile, which together account for more than half of the global reserves of lithium, and a rising number of mobilizations and legal actions surrounding the proliferating mining industry (Arce and Nieto-Matiz 2024; Ciftci and Lemaire 2023; Riofrancos 2017).

We conduct a pre-registered conjoint survey experiment in Argentina to test how different characteristics of mining projects are weighed by citizens from across the nation. We ask whether the environmental damage inflicted on local communities, the potential for job creation, the local community's identity as indigenous or agricultural, the nationality of the mine operator, governmental tax incentives, and the importance of the mining project for green technologies, affect public support for new mining projects. We also conduct a separate experiment that asks whether people are more or less willing to redistribute tax revenues to local communities when they learn that the community is indigenous and that the compensation is for environmental damage.

We find that citizens in Argentina are highly sensitive to the environmental impacts of lithium mining. When citizens are informed that a project will result in much damage to water and soil, they become significantly less likely to support the project. This effect dwarfs that of all other attributes, including job creation. Information about a mineral's utility for green technology, however, marginally increases support for mining projects. We also find strong support for national control over the mining project, as the national energy company, YPF (Yacimientos Petrolíferos Fiscales), is preferred as mine operator strongly over a Chinese (and less so) North American corporation. Regardless of the firm, citizens are not discouraged from supporting the project due to fiscal concessions granted by the government to these companies. Nevertheless, preferences over control are conditional on political allegiance: those who approve of Argentinean President Javier Milei are relatively more favorable towards North American mine operators compared to opponents of Milei, who mostly prefer YPF. When asked about compensation for local communities from mining revenue, we find considerably lower support for redistribution of revenues when the affected community is indigenous. Finally, overall support for more lithium mining in Argentina is strongly conditional on demographic characteristics, political preferences, and pre-existing attitudes over the priority of the environment over economic development.

These findings are important for several reasons. First, whilst mining for critical minerals promises significant long-term benefits for global decarbonization efforts, in the short term, citizens in the countries where mining occurs - and not just the proximate communities - oppose mining projects that incur significant environmental damage. The strength of this result may caution governments to move more slowly in approving permits for mining projects, particularly with foreign mining companies and on or near fragile ecosystems. Symbolic justification for mining based on its 'green' purpose does invoke more support; however, it does

not sway public opinion in a way that compares to the overwhelmingly negative effect of environmental damage. Instead, concrete benefits like job creation seem to be more relevant for citizens. We also find strong support for national control of mining, and that domestic politics and its effect on anti-China sentiment shapes citizens' support for who should mine for critical minerals in their country. In this sense, we add to a literature that examines how foreign direct investment, especially that by Chinese firms, has provoked conflict opposition in receiving countries (e.g. Rhee and Yang 2023; Robertson and Teitelbaum 2011; Tingley et al. 2015).

2 Lithium and the Green Transition

Within the global ambitions to address climate change, the prominent role of transportation in carbon emissions means that decarbonization of the transportation sector has taken a prominent role in most countries' green transition strategies. While many facets of green technology have set off a race to secure critical minerals, one of the most urgent has been for lithium, which is both indispensable and intensely utilized in the batteries for electric vehicles (EVs). The International Energy Agency (IEA) reports that consumer demand for EVs accounts for 95 percent of the market demand for lithium globally (IEA 2024), and thus this element is closely linked to the green transition. In the clean energy market, therefore, lithium is the mineral facing the fastest growth in demand - by more than forty percent in the Sustainable Development Scenario (IEA 2024). Argentina has become a particularly attractive source to meet this demand, given its extensive and high-quality lithium reserves, and its 2024 critical minerals partnership agreement with the United States. The latter became increasingly important with the passage of the Inflation Reduction Act in 2022, under which tax credits for EV batteries depend on the percentage of the value of the applicable critical minerals were mined or processed in the United States or in a country with which the United States has free trade agreements (including mineral partnership agreements). Based on announced projects, Argentina has attracted 80 percent of future capital investment for Lithium in Latin America, particularly from U.S., European, Chinese, and Australian firms. While such projects have the prospect of bringing considerable capital investment, jobs, and economic development to Argentina, the vast majority of lithium mining is located on or proximate to ecologically, economically, and ethnically vulnerable people and land, who have historically gained little from resource extraction projects. How and where the costs and benefits of this investment will be located may thus be vastly different across the country.

These tensions motivate our main questions for research: 1) To what extent is support for mining dampened by the local environmental and economic costs of the project; 2) to what extent are citizens willing to accept the immediate environmental and economic impacts in service of longer-term global and national environmental and economic goals; 3) does this support depend on the nature of the local community; and 4) are citizens more supportive of mining if the owner of the project is Argentine, Chinese, or a Western entity?

2.1 Local Pollution and Long Term Global Environmental Benefits

Lithium's importance for the green transition cannot be overstated. The transport sector is responsible for one quarter of the energy-related CO2 emissions globally, and thus the transition to electric vehicles is fundamental to national and global efforts to achieve longterm decarbonzation and net-zero emissions targets. As an essential element in EV batteries, the IEA estimates that global demand for lithium will rise from 101 kt in 2021 to over 1326 kt in 2040 (IEA 2024).

The crux of the environmentalists' dilemma is thus the following: Just as mining for lithium may be indispensable for long-term global decarbonization efforts, in the short and medium term, it exacts an adverse toll on the *local* environment and surrounding community (Kaunda 2020). These impacts are especially harmful to local water tables where lithium is extracted via brine evaporation methods, as in Argentina. This is because the extraction of lithium from brine requires a large amount of water to be pumped from freshwater aquifers. In the arid and hyper-arid regions of the Lithium Triangle where lithium is mined in large salt flats, or *salares*, a decline in the water table has direct and lasting negative impacts on the plants, animals, and communities whose lives depend upon that water (Rentier, Hoorn, and Seijmonsbergen 2024).

Mining in general has long been associated with negative environmental impacts, whether they be chemical run-off poisoning local waterways, or large-scale disasters such as the failure of Brazilian miner Vale's Brumadinho tailing dam in 2019 that killed 292 people in Southern Brazil. Mining for the green transition thus forces environmentalists, and everyday citizens, to face a sharp inter-temporal trade-off between long-term, global benefits for the energy transition, and immediate local environmental costs for surrounding communities. Given the long and negative history of resource extraction in the Global South, often to the benefit solely of Northern countries, it is reasonable to anticipate that citizens would be wary of new mining projects - particularly those operated by foreign corporations (Spalding 2023). Governments and mining companies thus have increasingly provided both symbolic and material justifications for mining projects as crucial to sustainability and climate transition goals (Dorn, Hafner, and Plank 2022). Whether justifications for mining based on its importance for green technologies are sufficient to overcome potential opposition is a key question for our research.

Specifically, we expect that to the extent that citizens weigh losses more heavily than potential gains (Rozin and Royzman 2001), the immediate and local environmental impacts of lithium mining are likely to outweigh justifications for such projects on the basis of longer-term benefits, even if they redound to the benefit of the earth. Yet, it could be that Argentinians still attach some importance to the relevance of lithium mining for green technologies. After all, developing countries have been among the worst-affected by the impacts of climate change in the world (Campbell-Lendrum and Corvalán 2007). Indeed, Argentina relies heavily on its natural capital for its economic prosperity, and thus is highly vulnerable to weather-related impacts of climate change. Thus we expect that all else being equal, support for mining will be higher for a mineral that is critical for the green transition compared to other types of mining that are less or not at all important to the green transition. To probe this question more deeply, we must understand the extent to which citizens perceive climate change to be an urgent problem and one for which they bear some responsibility for action. A recent study shows that the overwhelming majority of people in Latin America, including in Argentina, perceive that climate change is happening but that people differ in their beliefs about the severity and the need for mitigation (Spektor, Fasolin, and Camargo 2023). We separately measure whether respondents believe local environmental conditions are more important than economics and fighting global climate change. In addition, we ask people about the common but differentiated responsibilities that Argentina has to fight climate change, compared to more advanced industrial nations. Those who believe that Argentina bears little responsibility for climate change and mitigation should be less likely to be swayed by the association of a mine with the green transition. We also anticipate that people who have more pro-climate attitudes will be more favorable to a mining project that is associated with the green transition, while the extent of local environmental damage should more severely dampen support for mining among this population.

The literature also identifies gender and age as key determinants for policy support related to climate and environmental pollution. In wealthier countries, women tend to express greater concerns over climate change and environmental issues more generally but this is not so in poorer countries (Bush and Clayton 2023). We thus examine whether women weigh the environmental attributes of mining projects more strongly than men. This could depend upon whether mining is perceived as an environmental harm or a key to the green transition. Moreover, younger people are typically more supportive of climate change mitigation (Bergquist et al. 2022). We thus examine whether younger people weigh the benefits of mining for green technologies more strongly than older people.

2.2 Local communities and territorial conflicts

Conflicts over mining likewise involve sharp disparities in the allocation of up-front costs across territories, ethnicities, and the socioeconomic class of affected communities (Arce 2014; Spalding 2023; Smart 2020). There is considerable literature documenting the socioeconomic and environmental conflicts that have been waged in recent years over mining and extractive industries in Latin America (Bidwell and Sovacool 2023; Ciftci and Lemaire 2023; Escosteguy et al. 2024; Dorn and Ruiz Peyré 2020; Dunlap and Riquito 2023; Wolters and Brusselaers 2024; Canelas and Carvalho 2023; Hira and Tomaselli 2024; Lorca et al. 2022). Overwhelmingly it is poorer and indigenous communities in rural areas of the Global South who bear the brunt of disruptions caused by mining projects, and often with little of the profit or compensation returning to them (Arce and Nieto-Matiz 2024; Babidge and Bolados 2018; Arellano-Yanguas 2011). Moreover, the large tracts of land required to construct brine evaporation pools, service roads, and other infrastructure imply a considerable loss of ancestral land for indigenous people in highland provinces (Dorn and Ruiz Peyré 2020). Given these direct impacts on local communities, we anticipate that respondents in a mining province should be less likely to support projects with greater local environmental damage. compared to citizens in the urban center of Buenos Aires.

Given the stark territorial, class, and ethnic disparities in the costs of mining, stakeholders at the local, national, and international levels have developed the concept of a *just* green transition that, *inter alia*, seeks to avoid leaving behind the most vulnerable people affected by measures to address climate change, often through compensatory or restorative efforts (United Nations Department of Economic and Social Affairs 2022). In addition to various concepts of justice, there are pragmatic reasons for governments to consider compensation for local communities whose land may suffer environmental or geological damage or even loss of rights, viz., to avoid protests and conflict that may threaten the viability or profitability of the mine (Bidwell and Sovacool 2023). Indeed, there is extensive literature on the politics of economic reform that suggests that compensating those who suffer the costs of transition, such as job loss in the case of trade liberalization, can be crucial for maintaining the viability of the policy change (e.g., Ruggie 1982; Rodrik 1998). We anticipate that support for such compensation should be greatest among those who would be its recipients, namely, residents in the mining provinces of Salta, Jujuy and Catamarca. Of course, not every citizen may believe that the whole population (including those who live outside mining districts) is responsible for the regulation of mining. Accordingly, we ask respondents where they believe that responsibility for such regulation should be allocated: to the federal government, or the provinces.

An additional expectation is that the effect of environmental damage on support for mining should be smaller when the local community is indigenous than when it is agricultural. This is because Argentina has been an agricultural country since its origins, so people are expected to care more for the agricultural sector, besides the existence of mere subtle discrimination. There are also political reasons. After a greater inclusion of indigenous populations in national programs and public bodies by the Kirchnerist governments (2003-2015), which were marked by increasing social and political polarization, many conflicts arose during Macri's government (2015-2019) with groups self-identifying as indigenous over territorial control in different parts of the country, including acts of terrorism and violence. This alone could have been enough to worsen the already low baseline views on indigenous communities. However, the Peronist government that followed also made numerous concessions to indigenous groups, including territorial cessions.

We anticipate that compared to left-wing voters, supporters of libertarian president Javier Milei and other right-wing voters ¹ may be less willing to compensate local communities when those communities are indigenous. This is because Milei has announced several measures against these groups, including the annulment of territorial concessions decreed by the Peronist government, the dissolution of the National Institute of Indigenous Affairs (INAI), and the renaming of the Hall of Indigenous Peoples in the Government House. Meanwhile, the vice president dissolved the Indigenous People Commission in the Senate. ²

¹Patricia Bullrich (PRO), Minister of Security under Macri and now Minister of Security under Milei (and therefore the face of the fight against indigenous uprisings), was the other right-wing candidate in the election, which is why a similar reaction is expected from her voters and those of Milei.

²As demonstrated by this and other journalistic reports: https://www.infobae.com/politica/2024/05/11/el-gobierno-anulo-el-plan-del-kirchnerismo-para-ceder-tierras-a-grupos-mapuches-planea-desalojar-los-predios-fiscales-usurpados/.

2.3 Ownership and Geopolitics

While territorial economic and environmental conflicts over lithium are being fought at a local and national level, mining for lithium is at once situated within a larger geopolitical contest between China and Western nations to control access to critical minerals (Dorn and Ruiz Peyré 2020). To date, China dominates by far the production and export of green technology, including solar panels, wind turbines, and EVs (Gielen and Lyons 2022). China also dominates the refining of critical minerals that are vital for these technologies. The result is that Western countries are reliant on China for the import of critical minerals - an uncomfortable position in the context of geopolitical rivalries. Well ahead of the West, China has been actively acquiring mines worldwide to secure access to critical minerals, although both the European Union and the United States have taken measures in recent years to "de-risk" mineral supply chains from China, resulting in a veritable race to acquire and bring new mines into operation at home and abroad.

Whereas only two major companies are operating lithium mines in Chile due to federal regulation of lithium as a strategic resource (Chilean company SQM, and US firm Albemarle), Argentina hosts a wider variety of firms from North America, Europe, Korea and China, alongside the Argentine national energy firm, YPF, and other provincial firms (e.g., JEMSE). Chinese, Korean, and Western companies run various large lithium mines often acquired by actively courting provincial governments, which make key decisions about licensing and regulation (Ellis 2024).

In many post-colonial settings, there is a strong nationalist sentiment toward preserving control over natural resources. Many Latin American countries have experienced cycles of resource nationalism during which control over the extraction of natural resources is brought under increased national control (Monaldi 2020). Although in Argentina, the national petroleum company, YPF, was established as the first such company on the continent in 1922 under the Radical government of Yrigoven, it was not until the 1949 Peronist Constitution that natural resources were centralized under the national State control. With ups and downs in the policy of natural resource exploitation, this remained fairly stable until the 1990s, when the 1994 constitutional reform decentralized the ownership of natural resources (unchanged to this day) and privatized YPF, which was renationalized in 2013 by the Peronist government of Cristina Fernández de Kirchner, in a revival of the original Peronist energy nationalism. We expect that Argentine citizens will favor national control over new mining (i.e., YPF), compared to foreign corporations, but that there should be a partisan divide between supporters of the right-wing anti-State President Milei and others who may be more sympathetic to the Peronist movement and the left-wing parties who value the legacy of state-owned enterprises.

There may also be differential preferences for North American over Chinese control over mines. Chinese FDI projects in Latin America and Africa have been met variously with suspicion based on negative public perceptions of China (Feng and Zeng 2022; Rhee and Yang 2023; Ratigan 2021). This is especially the case for Chinese extractive projects such as mining (Ratigan 2021; Helwege 2015; Arce and Nieto-Matiz 2024). We expect such themes to pervade public attitudes toward lithium mining in Argentina as well, wherein citizens support for mining projects should be higher where either YPF or a North American firm is operating the mine, compared to a Chinese firm.

Ownership over natural resources has also become politicized within Argentina and in other Latin American countries. Libertarian and populist president Javier Milei actively campaigned against Chinese interests in Argentina, and at one point vowed that he would not make pacts with Communists (Ellis 2024). Similarly, during the 2018 Brazilian election, farright candidate Jair Bolsonaro repeatedly criticized Chinese influence over natural resources and he gained electorally in areas with higher levels of Chinese acquisitions (Urdinez 2023). Milei also announced his intention to privatize YPF, although he later backtracked from this plan in order to gain Congressional support for other policy initiatives.³ Our expectation thus is that supporters of (right-wing) President Milei will be less supportive of Chinese firms operating mines, compared to other citizens. Similarly, we expect Milei supporters to be less supportive of mines operated by YPF, whereas other respondents should be more supportive of YPF control, all else being equal.

2.4 Jobs and Tax Incentives

Attracting firms to a country such as Argentina, which has long been beset with economic instability, inflation, and capital controls often entails generous tax and regulatory incentives, which may exact a heavy fiscal toll on government coffers. How and whether those costs - and the benefits accruing from royalties, taxes, and local employment - are distributed, raises the specter of conflict across regions and levels of government. Although the federal government in Argentina provides the basic regulations and laws governing lithium mining and environmental protection, Article 124 of the 1994 Constitution dictates that resources are owned by the provinces, which can also enact laws that go beyond the national ones and are also the ones granting operation licenses and enforcing regulations.

The tax and royalty scheme is complex. Mining royalties are collected by the provinces, which establish the rate up to a limit set by national law (since the 90's the limit was 3%, but a law recently enacted by Milei updated it to 5% for new projects). Depending on the project, the provinces may negotiate lower rates with the mining companies in exchange for certain investments, hiring, or industrialization targets within their territory. On the other hand, the federal government levies a tax on mineral exports (4.5% for lithium), which is not shared with the provinces. Other general taxes, such as Income tax and VAT are also levied by the federal government on mining companies but redistributed (at least partially) to the provinces.

Differences in provincial governments and their negotiations with mining firms thus only widen the disparities in citizens' capacity to gain or lose from the concession of a mining project in their province. Thus it is reasonable to expect that attitudes toward mining should vary considerably across regions of the country, and according to the expected gains in revenue and employment from the mine.

These hypotheses are grounded in the pocketbook economic logic that we expect, all else

 $^{^{3}} https://www.argusmedia.com/en/news-and-insights/latest-market-news/2530202-argentina-backs-off-plan-to-privatize-ypf$

being equal, citizens will be more supportive of a project that yields higher employment and that involves lower government tax incentives to private corporations. The issue of tax incentives has been highly salient in Argentina in 2024, since during the first semester Law 27742 (Law Bases and Starting Points for the Freedom of Argentines) was debated in Congress and the media, and finally enacted. It includes a new Incentive Regime for Large Investments (RIGI is its acronym in Spanish), a tax, customs, and currency exchange flexibility scheme, which also grants tax stability for 30 years to companies that invest more than US\$ 200 million in the country, mainly intended for the oil, gas, and mining industries, among others.

Due to the enduring legacy of protectionist policies (Magaloni and Romero, 2008), which made Argentina one of the most closed economies to date (Heritage Foundation Index of Economic Freedom, 2024), including strong capital controls and high taxes, a strong resistance to concessions to multinational corporations is expected, especially among supporters of Peronism, the labor-based party that promoted (originally and recently) this type of policies.

3 Research design

We pre-registered a conjoint survey experiment in Argentina that asks respondents to evaluate two alternative mining projects.⁴ Conjoint experiments are especially suitable for examining what attributes of products, policies or projects shape citizen preferences. They are thus useful for examining settings where people face trade-offs between multiple aspects of projects that could pull them in different directions; such as short-term environmental damage, long-term climate benefits, and economic benefits.

Each respondent received four tasks, which are side-by-side tables of projects with different features: ownership, the degree to which it benefits the green transition, job gains, local environmental damage, financial incentives, and the nature of the local community. After each task, respondents were asked which project they prefer and how strong their support is for each project.⁵ Table 1 presents the attributes and levels of the conjoint experiment as well as the pre-registered expectations. We randomly varied the order of the attributes.

We based our range for new jobs on figures from Argentina's mining secretariat. ⁶ The mining industry as a whole directly employs almost 40,000 people although many more people rely on it indirectly. Lithium alone has 36 different projects and added nearly 15,000 jobs in 2022. Thus, a project that promises 4000 new jobs would be very large. We focused on water and soil damage given that these are the most salient for lithium mining but they also matter for other common minerals and metals mined in Argentina, such as silver and copper. We chose "North American" because both Canadian and U.S. firms are active in

⁴https://osf.io/vruqj/

⁵The prompt before the experiment is: "Mining projects have variable benefits and costs for Argentina and local mining communities. We are going to present 4 comparisons of alternative mining projects with different characteristics. We ask you to choose which project you think is the best and rate each project from 1 star (bad) to 5 stars (good)"

⁶https://tinyurl.com/bdh8c9n8

 Table 1. Attributes and levels of alternative mining projects in conjoint experiment and preregistered expectations

Attributes	Levels	Expectations
Damage to water and soil	None, some, much	Support lower as environmen- tal damage increases
Importance for green technol-	Not important, somewhat im-	Support higher for green min-
ogy	portant, critical	erals
Community	Indigenous, agricultural	Support higher when local
		community is indigenous
Ownership	Chinese, North American,	Support highest for YPF, low-
	YPF	est for Chinese company
New jobs	250, 1000, 4000	Support higher as job creation
		increases
Tax incentives from the gov- ernment	None,some, large	Support lower as the gov-
		ernment investment cost in-
		creases

Argentine mining. Figure 1 gives an example of what the choice might look like for survey respondents.

Proyecto A	Proyecto B	
Propietario: YPF	Proprietario: Chino	
Crítico para las tecnologías verdes	Nada importante para las tecnologías verdes	
Ningún daño al agua y al suelo	Mucho daño al agua y al suelo	
Ningún incentivo del gobierno	Algún incentivo fiscal del gobierno	
1000 nuevos empleos	250 nuevos empleos	
Comunidad agrícola	Comunidad agrícola	
¿Qué proyecto es mejor?		
O Proyecto A		
O Proyecto B		

Figure 1. Example choice between mining projects

After the conjoint experiment, we conducted a separate experiment to examine what factors shape support for the redistribution of tax revenues to local communities. The question is: "Generally when mining projects are approved, what percentage of the annual tax revenue should go to the local [indigenous] community [to offset local environmental damage]?" There are thus two informational treatments: some respondents are told that the local community is indigenous and some are randomly informed that redistribution is about compensating for local environmental damage. We asked respondents specifically

about how strongly they support lithium mining (on a six-point scale). Finally, we then asked respondents how important various factors are in determining their opinions: global climate benefits, local pollution, as well as national and local economic benefits.

We collected data between August 5 and August 13, 2024 using quota sampling on gender, age, and region with an online panel administered by IPSOS, a global leader in survey and market research. We excluded 151 respondents who took less than 200 seconds to complete the survey. The final sample includes 2207 respondents and closely matches the targeted quota. The appendix includes more details about the sample and the descriptive statistics.

We included an open-ended knowledge check that stated: "Argentina is rich in natural resources that are critical for "green technologies" such as batteries for electric vehicles. Can you name one or more of those?" About 37 percent mentioned lithium and about 3 percent mentioned copper. This suggests that this issue was salient in Argentina at the time of the survey. Yet, it could be that people who are aware of lithium mining and its purpose for the green transition evaluate projects differently than people who are not. This question is examined in our analysis and presented in the Appendix. We also included an attention check that asked respondents to check two inconsistent response options to show that they were carefully reading the survey.⁷ This check may have been too difficult as only about a quarter of respondents checked both options.⁸

We also examine heterogeneous effects based on demographics (gender, age, province, and education), political opinions (vote choice, approval of President Milei, and preferred levels of intervention in the economy), and views about climate, the environment, and mining. We asked respondents whether they believe that climate/ local environment should be prioritized over the economy, whether mining should be primarily regulated at the local or national level, to what extent they support lithium mining in Argentina, and how important combating climate change, local pollution, and economic benefits for Argentina and local communities are for determining their views about lithium mining.⁹ The primary purpose of these questions is to examine whether people who already prioritize environmental and climate concerns weigh the various attributes of mining projects differently. We pre-registered a number of expectations about heterogeneous effects that we discussed in the theory section and we mention in the results section whether our findings match our expectations.

We estimate Average Marginal Component Effects (AMCEs) for the main effects (Hainmueller, Hopkins, and Yamamoto 2014) and marginal means for the subgroup analyses. Marginal means are less sensitive to the choice of a baseline category and are thus recommended for subgroup analysis (Leeper, Hobolt, and Tilley 2020), although our main results also hold when estimating conditional AMCEs. The online appendix reports detailed results for all subgroup analyses and contains descriptive statistics on the sample.

⁷We'd like to get an idea of your political news consumption. Regardless of how much you follow the news, select both "every day" and "never" to show that you are carefully reading the survey questions.

 $^{^8\}mathrm{More}$ detailed information and analysis is in the online appendix

⁹These latter questions were asked after the conjoint experiment whereas demographic questions and political views were asked before.

4 Results

Figure 2 shows the AMCEs and 95 percent confidence intervals of each attribute level (for example, North American ownership) relative to the respective baseline category (for example, YPF) in the conjoint experiment. A positive coefficient indicates that the respective attribute level increases the likelihood of the preference for a project. The standard errors are clustered by respondents. We discuss the findings about the main effects and subgroup analysis by attribute groupings.



Figure 2. Effect of Mining Project Attributes on Preference in Argentina

4.1 Local Pollution and Global Environmental Benefits

Damage to water and soil is by far the most important attribute determining public preference for mining projects. A project that is expected to cause much damage is about 40 percentage points less likely to be preferred than a project that causes no damage. The effect sizes for local pollution were the largest among the attributes for every subgroup we analyzed. For example, figure 3 shows that among respondents who mentioned lithium in our open-ended questions about minerals critical for green technologies, the difference between a project that causes no damage over a project that causes much damage is 7 percentage points larger than for individuals who did not express this knowledge. We find similar (and larger) differences among people who did and did not pass the attention check. The global benefits of green technology play a more modest role in determining preferences over mining projects. Respondents were about 8 percentage points more likely to support a project that is somewhat important for green technology over a project that is not important for green technology. Figure 3 shows that this effect is not larger among the subgroup of respondents who know that lithium is an example of a mineral for green technologies.

Respondents did not value mining projects more that are "critical" for green technology. We used the term critical because it is often used in debates over the mining of lithium and other minerals. Our interpretation of this finding is that despite the wide usage of this word in expert circles, the term "critical" does not have the same connotation in the wider public. Even subgroups that express strong pro-climate views did not value projects that were critical for green technology even as they placed more weight on projects that are "somewhat important" for green technology. One potential conclusion is that advocates should refrain from framing minerals as critical and instead use more everyday language to describe the importance of a project to the green transition.



Figure 3. Subgroup analysis for whether respondents identified lithium as a mineral critical for green technologies

The importance of local pollution and green technology benefits did not vary significantly based on the demographic characteristics of respondents. Contrary to our expectations, we did not find that women weigh environmental or climate concerns more strongly or that younger people weigh the climate benefits of mines more heavily. We also found no evidence that people from Buenos Aires care less about local environmental pollution than people who live in mining provinces. This latter non-finding may be important. It demonstrates that water and soil damage matters not just to the people who live in the sparsely populated mining provinces; it may be seen as damage to the nation even for citizens residing far from the mining project.

As expected, we do find some evidence that pre-existing beliefs about the importance of the environment and climate affect how people weigh the attributes. For example, individuals who believed that "damage to water and soil" rather than economic growth should have the highest priority have about a 10 percentage point larger probability of choosing the "no damage" project over the "much damage" project than people who prioritize the economy.¹⁰ However, even while Argentina is experiencing a severe economic crisis, the people who prioritize local environmental damage outnumber the people who choose the economy by 4:1. Moreover, damage to water and soil was the most influential attribute even among people who prioritize the economy, who were also discouraged to choose projects that produced much damage to water and soil.

When we asked the same question about global climate change, we find a smaller (three percentage points) and only borderline statistically significant difference in the extent to which those who prioritize climate change over the economy favor projects that are somewhat important for green technology over projects that are not important. ¹¹ We also asked Argentinians who has responsibility for fighting climate change: only rich countries, mostly rich countries, all countries equally, or "climate change is unimportant". Perhaps surprisingly, two-thirds of the sample answered that all countries have equal responsibility and only 2 percent answered that climate change is unimportant. The people who found climate change unimportant or only the responsibility of rich countries placed slightly less weight on a project's importance for green technology but the differences were modest. Thus, there is little evidence that Argentinians believe that fighting climate change is not their responsibility; rather they may simply find other factors, especially local pollution, more important. Overall the key conclusion is that damage to the local environment strongly shapes preferences over mining projects among all subgroups of the population.

4.2 Local communities and territorial conflicts

We expected that individuals would be more likely to support mining in indigenous communities, due to the expectation of environmental damage, but less willing to redistribute tax revenues to these communities. We also expected that Milei supporters would be even less sympathetic to indigenous communities and that people may weigh local environmental damage less heavily for indigenous communities. Contrary to our expectations, figure 2

¹⁰Based on a contrast between individuals who answered 1 or 2 and 5 or 6 on a 6-point scale to the question: "Some people believe we should prioritize environmental concerns over economic growth. Where would you be located?" The survey asked respondents to answer this question for both "damage to water and soil" and "global climate change"

¹¹See previous footnote for question wording and grouping.

shows that respondents are slightly less likely (3 percentage points) to prefer mining projects in indigenous versus agricultural communities. Given the generally less sympathetic view of indigenous populations in public opinion, it is possible that this result was conditional on whether citizens considered a project with high environmental costs. We estimated the interaction effects between the community and local environmental damage attributes The differences are statistically significant¹² in the expected direction. That is: when there is much environmental damage people do not have a statistically different preference in favor of agricultural communities but when there is no damage (2.6 percentage points) and some damage (4.9 percentage points) they prefer the project in an agricultural community.

Nevertheless, We do find that the Indigenous community effect is about double among those who approve of Milei's presidency (about half of our sample) and it is insignificant among those who disapprove of Milei (see 5). We thus suspect that the community finding reflects that Milei supporters believe that mining projects are beneficial and that they prefer that these benefits go to agricultural communities over explicitly indigenous communities, especially when there is no or little local environmental damage. However, the local community effects are substantively small compared to some of the other attributes of mining projects.

Our second experiment asked respondents what percentage of tax revenues should go to the local community. Figure 4 shows that simply adding the word "indigenous" between local and community lowered the preferred levels of redistribution to the local community by 11.4 percentage points, which aligns with our hypothesis. This is a very sizeable effect. Mentioning that the redistribution is to compensate for local pollution increases the willingness to redistribute tax revenues by about 5 percentage points. There is no significant interaction between the two. Living in the Northwest area of the country (where lithium is), increases the willingness to distribute resources to the local community by almost 3 points, as predicted, although only at 90% significance level. ¹³

The indigenous community effect is about 3 percentage points higher among those who approve of Milei's presidency, although the interaction is not statistically significant at conventional levels. Milei supporters prefer that about 5 percentage points fewer tax revenues be redistributed to local communities. We do not find evidence that an overall preference for national or local authority over mines correlates with redistribution preferences.

4.3 Ownership and Geopolitics

Overall, Argentine citizens prefer mining projects that are owned by the national company, YPF. Compared to this baseline, North American projects are about 9 percentage points and Chinese-owned projects about 15 percentage points *less* likely to be preferred. This is consistent with our pre-registered expectations.

As we hypothesized and figure 5 shows, political views do factor strongly into these

 $^{^{12}\}mathrm{This}$ based on an ANOVA (Cregg package in R), F=5.9, p<.001.

¹³This may be due to the fact that the region is made up of six provinces (Catamarca, Jujuy, La Rioja, Tucumán, Salta, and Santiago del Estero), although only three of them are lithium producers. Moreover, being relatively small provinces, the regional sample is also relatively small.



Figure 4. Effect of indigenous community and local pollution treatments on willingness to redistribute tax revenues to local communities

preferences. Argentinians who disapprove of Milei do not have a strong preference for North American over Chinese ownership. But they have a much stronger leaning towards the national company, YPF, than Milei supporters. Among Milei supporters, the difference between a North American owner and YPF is just 5 percentage points as compared to 14 percentage points among those who disapprove of Milei. Similar results are obtained when we look at vote choice rather than approval. This is not surprising, as we expected that Milei supporters would be less favorable to YPF, which Milei sought to privatize. Nevertheless, all Argentine respondents preferred YPF to a foreign corporation operating the mine.

4.4 Jobs and Tax Incentives

As expected, Figure 2 there are clear positive effects to increasing the number of new jobs associated with a mining project. Mining projects do not typically generate more than at most a few thousand jobs so we think these numbers reflect reasonable scenarios. There are no strong subgroup effects based on political views, attention, views about the environment, or demographics, except that men appear to have slightly larger effect sizes than women.

Contrary to our expectations, tax incentives from the government appear to have small but positive effects on the public's preference for projects. Compared to a baseline of no incentives, projects that have some incentives have a two percentage point larger probability of being chosen, and projects with large incentives three percentage points. We found no



Figure 5. Subgroup analysis of ownership, local community, and tax incentives attributes among those who approve and disapprove of President Javier Milei

evidence that Milei supporters differ in terms of how they evaluate tax incentives for mining projects (see figure 5).

These effects are minor but it suggests that Argentinians are not concerned that projects with large tax incentives take away government resources, which is a bit surprising given that this issue was heavily discussed in the media at the time of the survey experiment. One possibility is that a project without tax incentives would seem less likely to succeed and have broader positive implications. More broadly, though, government tax incentives are not a major contributor to preferences over mining projects.

4.5 Overall support for lithium mining

Post-experiment, we asked respondents to place themselves on a six-point scale whether they support lithium mining: "Argentina is rich in lithium reserves. To what extent do you support the expansion of lithium mining in Argentina?" The mean on this scale was 4.1 with a standard deviation of 1.5, reflecting a public that leans favorable but also remains divided.

Figure 6 has a coefficient plot of a linear regression model with some of the covariates discussed earlier in this paper. Men and older people are more favorably disposed toward lithium mining. Moreover, the people who displayed awareness by mentioning lithium in an open-ended question about mining for minerals that are important for the green transition are also more likely to support mining. Political allegiance is also relevant, as the more



Correlates Support More Lithium Mining

Figure 6. Subgroup analysis of ownership, local community, and tax incentives attributes among those who approve and disapprove of President Javier Milei

individuals approve of Milei, the more they support lithium mining: a person who fully disapproves of Milei is on average about 1.3 points lower (on a six-point scale) in support of mining.

The model also includes two questions about environmental attitudes. People who prioritize the economy over the environment are more likely to support mining. Climate attitudes have no effect. Indeed, people who believe that climate change is unimportant are more supportive of lithium mining than people who believe fighting climate change is the equal responsibility of all countries (the reference category in figure 6).

We then asked on a six-point scale how important 4 factors were for determining lithium mining support: contributions to global climate change, damage to the local environment, economic benefits to Argentina, and economic benefits to local communities. The national economy was by far the most important stated reason among supporters of more lithium mining (5.4 on the 6-point scale) followed at some distance by the local economy (5.1).¹⁴ By contrast, among opponents, local pollution is by far the most frequently stated reason for their negative opinion.

 $^{^{14}}$ Here we define supporters as those who are at 4, 5, or 6 on the support scale

Climate change benefits scored the lowest among the four factors shaping lithium mining support. We ran the same regression model as in figure 6 while mentioning climate change as an important reason for supporting lithium mining. Here we do find strong negative coefficients for people who believe that climate change is unimportant or only the responsibility of rich countries. There are no significant correlations with support for Milei or mentioning lithium in our open-ended question. Overall, the observational analysis is consistent with the core conclusions from the experimental study: support for lithium mining depends strongly on the local environmental damages as well as national politics and economic consequences.

5 Conclusion

The Argentine government, like many governments and mining companies around the world, has advanced symbolic and material justifications in order to legitimate natural resource extraction as necessary for the energy and sustainability transition and to solve the climate crisis. Whether it is "saving the planet" or advancing economic development through mining, our study finds that these longer-term, global interests pale in comparison to national and immediate concerns such as environmental damage, job creation, and national control.

Contrary to this global trend, whether it be called "green-washing" or simply providing global justification for local burdens borne in service of the green transition, we find that citizens in Argentina, with one of the largest lithium reserves in the world that is poised to be a global supplier of this critical mineral, care most about the local environmental impacts of such mining projects. They also care about job creation domestically, strongly prefer national control of the mines' regulations, and are more opposed to mining ownership by Chinese companies.

Domestic politics also play a part, as supporters of libertarian right-wing President Javier Milei are less likely to support compensation to indigenous communities, and Argentine citizens generally are less supportive of mining in, and less willing to compensate, indigenous communities. Fiscal incentives, which can be highly salient in any large mining project around the globe, and especially in developing countries, do not seem to deter people from supporting a project, and they may even prefer incentives if the projects justify them (in terms of job creation or low environmental impact, for example). This study suggests a productive agenda for research in the politics of the energy transition, as decarbonization relies fundamentally on, and cannot proceed without, mining.

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