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Which Energy Security Union? An experiment on public preferences for energy union alternatives in 5 western European countries

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ABSTRACT

The Russian invasion of Ukraine caught the European Union (EU) off-balance, leading some to propose a relaunch of the EU's Energy Union. However, the political feasibility of such programmes remains disputed, and any such policy design is inherently multidimensional with respect to scope, governance, source of financing and other dimensions. To determine public support for energy security cooperation, we conduct a (first ever) conjoint experiment on public support for alternative energy union designs, fielded among a highly representative sample of the French, German, Italian, Dutch and Spanish populations in November 2022. This multidimensional conjoint experiment allows us to determine the causal link between (hypothetical) policy features of potential energy solidarity pacts, and public support or opposition to such policy. Our results show that policy packages receiving the most support have higher levels of ambition, joint EU-level governance, joint purchases and procurement. All-in-all our results reveal considerable cross-border support for energy solidarity, indicating that a compromise policy is feasible and publicly supported. Furthermore, our results suggest that European citizens are willing to support the creation of joint institutions to face issues of common concern, suggesting that major crises open windows of opportunity to re-shape European integration.

1. Introduction

The Russian invasion of Ukraine caught the European Union (EU) off-balance. Many European member-states were, on the onset of the war, heavily reliant on energy supplies provided by Russia; the war, therefore, generated the conditions for a fundamental rethinking of long-term energy strategies for Europe, while bringing to public attention the true extent of Europe's dependency on Russia for fossil fuels (Kuzemko et al., 2022). As of 2021, some European countries, like Austria and Bulgaria, imported around 80% of their gas supplies from Russia (ACER, 2021). Large western European countries were also heavily dependent on gas supplies from Russia on the onset of the invasion: Germany had nearly 50% of its gas provisions supplied by Moscow, Italy approximately 40%, and France about 15%. In fact,

among major Western European Union countries, only the Netherlands and Spain were not reliant on Russian gas supplies to support their energy mix prior to the Russian invasion of Ukraine, although Spain was importing small quantities of Russian Liquefied Natural Gas (LNG) prior to the war and increased its imports afterwards.

The vulnerability of Europe due to its dependency on Russian fossil fuels revamped the discussions over a genuine Energy Union. First proposed by the former president of the European Commission Jacques Delors (Delors, 2010; Andoura et al., 2010) and by the then-Prime Minister of Poland Donald Tusk (Andoura and Vinois, 2015; Bloomberg, 2014), a genuine energy union was originally meant to include a wide range of joint tools to counter energy crises, such as joint purchases, joint natural gas reserves, and a renewed infrastructural effort. Yet, in the following years, the European energy union plan remained

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“mostly an empty box in which every stakeholder tries to put whatever is on the top of their priority list” (Szulecki et al., 2016: 1); even though the member states of the EU shared fears about the security of gas supply, they held fundamentally different perceptions about the impact of energy supply for security, and the consequences to be drawn for the construction of an energy union (Judge and Maltby, 2017).

Confronted with the Russian invasion of Ukraine, some policymakers have returned to consider the original design, proposing a unified approach for the expansion and coordination of EU-wide strategic reserves of fossil fuels and joint natural gas purchases, which would ensure a buffer against future energy shocks, improve collective security of supply for oil and gas, and provide temporary relief to the participating countries should some of them experience temporary issues with their energy supply. This approach would further expand the already-existing ‘solidarity and burden-sharing’ mechanisms under art. 13 of EU Regulation 2017/1938, to achieve collective energy security, and follow up on other proposed designs for a comprehensive energy union (see, for instance, Andoura and Vinois, 2015). As discussed below, many specific proposals for such an enhanced burden-sharing mechanism have by now been made (Egenhofer and Kustova, 2021; European Commission, 2015; Goldthau and Boersma, 2014; Goldthau and Sitter, 2015; Spanish Government, 2021), and different designs are currently on the table.

To further explore the political feasibility of such designs, and to determine public support for energy security cooperation generally, we conduct a randomized conjoint experiment¹ on a representative sample of the French, German, Italian, Dutch and Spanish population in November 2022. We survey 1500 individuals in each of these countries, administering to half of those respondents (750) a repeated multifactorial conjoint experiment on energy unions testing, overall, nearly 200 different energy security union designs focusing on strategic reserves of oil and gas. This multidimensional conjoint experiment allows us to determine the causal link between specific policy features of potential collective energy security designs, and public support or opposition to such policies.²

While such a research design by necessity simplifies a very rich policy debate so as to allow testing within a representative sample, our results reveal important patterns with respect to the level and kinds of energy cooperation the European publics embrace or eschew. The survey experiment reveals that policy packages meeting the most public support entail higher levels of ambition, joint EU-level governance, joint purchases and procurement, and progressive taxation as the preferred form of financing. All in all, our results not only reveal considerable cross-border support for collective energy security, but also show that citizens in different western European countries have generally convergent preferences regarding the actual design of such policy, indicating that a compromise policy is feasible and publicly supported. Furthermore, our results support ongoing research on European collective action in times of crisis,³ suggesting that European citizens are willing to support the creation of joint institutions and policies to face issues of common concern, and therefore indicating that major crises

open important windows of opportunity to re-shape EU-level policies and institutions.

While this indicates strong current political momentum for an European Energy Union among both the public and policymakers, joint gas purchases were already suggested by the then-Prime Minister of Poland Donald Tusk in 2014 as a part of his call to establish such a policy as a reaction to the Russian invasion of Crimea, not last through energy markets regulations (Goldthau and Boersma, 2014; Goldthau and Sitter, 2015). The Commission first proposed joint gas purchases at EU level in 2015 (European Commission, 2015); more recently, the Spanish Government proposed to establish an EU-wide gas reserve in its 2021 ‘non-paper’ on electricity markets (Spanish Government, 2021; Egenhofer and Kustova, 2021). While most EU countries maintain gas storages, the approach followed by European countries prior to the war to both security of supply as well as strategic storage has been highly fragmented (Tagliapietra and Zachmann, 2016; McWilliams et al., 2022), exposing the EU to foreign policy blackmail. In the wake of the Russian invasion of Ukraine the EU has undertaken steps aimed at decreasing this fragmentation by coordinating national action over restocking of strategic reserves, under the supervision of the European Commission. However, this coordinated approach still falls short of truly addressing the vulnerability of Europe to energy blackmail in a comprehensive fashion, since other gas providers might also provide a geopolitical challenge (Bouckaert and Dupont, 2022). The political feasibility of more ambitious programmes remains disputed, as any EU-wide approach to energy will entail both additional financial costs in infrastructure and purchases, as well as the sharing of responsibilities and sovereignty among European partners, requiring therefore a grand bargain balancing diverse national interests and joint governance (McWilliams et al., 2022). As argued by Osicka and Černoch (2022, p. 1), failing to appropriately re-design the EU’s energy union in response to the Russian invasion of Ukraine might “trigger a political crisis and eventually a crisis of legitimacy”.

To prevent this, understanding public preferences and the impact of different policy designs on public support or opposition is critical. However, this is a challenging exercise as any such policy design is inherently multidimensional, differing, amongst others, over scope, governance and source of financing. Finally, the establishment of more ambitious programmes is potentially contentious, since at times of crisis, public worries over energy costs have topped the major worries among European populations, and given that energy supply is a scarce resource, many have been concerned that EU countries would engage in a price war bidding each other out. Hence, even though past crises have consistently shown an increase in solidarity among Europeans as the situation deteriorates, the direct impact energy costs have on the population at large could mean that this crisis is different.

Unfortunately, survey evidence on support and opposition for an EU energy union is limited, and to our knowledge no other survey experiment has been fielded to date to explore preferences for alternative energy-union designs. Prior to the crisis, in a 2019 Eurobarometer, the European Commission finds that more than 80% of surveyed respondents agree that European countries should cooperate more in the energy domain, especially to guarantee energy solidarity, to ‘speak with one voice’ towards suppliers. However, when asked to choose up to 3 actions to prioritize in the domain of energy, the great majority of respondents focused on climate-related action, with only 22% of respondents prioritizing actions targeting solidarity and security (European Commission, 2019). In two studies, Escribano et al. (2023) find evidence of limited public knowledge about the importance of cross-border interconnections, emphasizing the importance of individual experiences; and Hoffmann and De Vries (2022) find that support for energy security with potentially higher prices is on a descending trend, although support for energy independence remains above 60% in every single member state. These studies provide important information on the (modesty) of public support for energy-related cooperation, but they provide little leverage to understand support for alternative policy

¹ As discussed in the methods section, conjoint experiments allow one to test the causal effect of hypothetical policy characteristics on public support. They do so by randomly constructing policy packages, assigning a random policy feature for each dimension. The dimensions, presented as a question, and the possible values they can take are summarized in Table 1. Appendix 2 shows how the experiment looks for the survey respondents.

² While, in principle, most of the policy characteristics tested in this experiment are horizontally applicable in the context of energy unions covering different energy sources, the energy union alternatives described in this paper make the most sense in the context of natural oil and gas security. In the introduction to the experiment, this is indicated to survey respondents.

³ See among many others, Bechtel et al., 2017; Beetsma et al., (2021) on medical solidarity; Goldberg et al., 2021 for evidence from media debates; Katsianidou et al., (2022) on Covid-19 solidarity; Bremer et al., 2023 on Eurobonds; Kyriazi et al., 2023 comparing ‘normal’ and ‘crisis’ times.

designs for such cooperation.

As such, our original, representative survey experiment makes both a theoretical and an empirical contribution. Theoretically, we show that public support for ‘emergency policies’ remains high in certain EU countries at times of crisis, providing further evidence that some crises may defuse the ‘constraining dissensus’ of mass politics (Hooghe and Marks, 2009) towards European integration. Empirically, we identify how several independent policy characteristics affect such public support and we show that high levels of support exist for a broad range of energy union designs in the surveyed countries, although, importantly, Central-Eastern European and Nordic countries are currently missing from the dataset, preventing a generalization of our findings to the entirety of the EU.

Against this background, this paper proceeds as follows. Section 2 discusses joint action at times of crisis in general, and more in particular, collective energy security, reviewing public opinion literature. Section 3 discusses the fundamental features of potential energy security union designs. Section 4 and 5 discuss our results: first, we set out to assess whether the general support for EU-level action during the Russian invasion of Ukraine (and the ensuing energy crisis) is high. Second, we investigate which types of packages encounter public support, and which instead fail to find support among the population. Finally, we assess how preferences vary across countries, determining which compromises are likely to meet the highest approval across all countries surveyed. The conclusions draw main theoretical and policy implications of this original experiment, and discuss the limitations of this setup.

2. Public support for collective action at times of crisis

International crises are fertile grounds to understand collective security, solidarity, and their effects on EU-level policymaking. Over the past decade, Europe has seen no lack of crises, moving from the Euro-crisis of the early 2010s, to the migration crisis of the mid-2010s, to the Covid-19 crisis of the early 2020s, to the ongoing Russian invasion of Ukraine. Each of these crises has resulted in calls for policy-makers to act ‘in name of European solidarity’. While solidarity implies in some situations a degree of asymmetry between a recipient (in need) and a contributor (with resources), political economists have often emphasized the long-term, self-serving nature of many acts of solidarity, either implicitly by adopting a forward-looking notion of reciprocity, or by design, as forms of institutionalized risk-sharing which, through claw-back clauses, works as a de-facto long-term insurance mechanism for all participating entities (Carnot et al., 2017; Vandenbroucke et al., 2018). Collective security challenges respond to this logic of risk-sharing.

In this respect, a rich experimental literature considering varying European crises has shown that public support for collective risk-sharing at times of crisis is often high, but inherently multidimensional, and therefore conditional on the policy characteristics and the actual institutional features adopted to implement risk-sharing (among many, see Betsch et al., 2017; Vandenbroucke et al., 2018; Hahm et al., 2020; Beetsma et al., 2021; Beetsma et al., 2022; Burgoon et al., 2022; Bremer et al., 2023). Among these, a fundamental study on unemployment risk-sharing (Vandenbroucke et al., 2018; Burgoon et al., 2022) has shown that public support for unemployment risk-sharing in most EU countries surveyed scales up as both generosity and conditionality of EU-level instruments increase. Beetsma et al. (2021) show that on the onset of the Covid-19 pandemic, the support for joint European procurement, EU level governance, and cross-national redistribution of medicines was extremely high, not least to increase EU bargaining power vis à vis pharmaceutical companies, and to avoid that EU countries out-bid each other in the rush to procure vaccines. Similarly, Beetsma et al. (2021) have shown that in the same period, there was a very strong support for EU-level fiscal capacity to counter the economic effects of the pandemic, attributing a particularly strong role to the

supervisory role of the European Commission. In a follow-up experiment, Bremer et al., 2023 show that risk-sharing in times of crisis is often aligned with the content of the political debate: the public preferences over the details of a pandemic recovery fund were very closely aligned with the actual design approved by leaders in July 2020.

Overall, this wide range of experimental studies use conjoint experiments to elicit the multidimensional nature of risk-sharing through joint action, and generally agree on a few general aspects: respondents support ambitious, forward-looking problem solving; they prefer inter-governmental decision-making processes without veto powers; they prefer progressive taxation increases over other forms of financing; they assign a strong supervisory role to the Commission; and they approve special support for countries in particular need. These results also suggest that political feasibility is strongly associated with particular policy designs and not with others, not least because important differences in policy preferences persist between citizens in different countries. In other words, classical (non-experimental) survey items are a very poor proxy to understand support or opposition to EU-level policies, and cannot be used to infer political support for joint solutions even when the salience of a policy is very – high like energy security at the time of this survey, the RRF design in July 2020, or the joint procurement of medicines in March 2020. Yet, to the best of our knowledge, no experimental evidence on public support for alternative energy union designs exist. With this in mind, we design a conjoint experiment that aims to address this gap, as discussed in the next section.

3. Design of a energy security union

Conjoint experiments allow to test the effect of certain policy features on public support or opposition. To do so, we need first to ‘deconstruct’ the main features of a policy package into its constituent dimensions, and then determine alternative variants (or options) for each of the dimensions.

A key challenge in designing policy-relevant survey experiments is to strike a balance between fidelity to the actual policy design, responsiveness to theoretical priors and existing knowledge on the distribution of preferences, and, most importantly, feasibility of the task for the respondents. This often leads to simplifying very complex policy debates in a number of dimensions modeling ideal-types of policy options, which have a connection with actual policy debates, without however perfectly representing them. In other words, even though multidimensional conjoint experiments are substantially more sophisticated than single-item survey questions (in this experiment, we test nearly 200 possible energy security union designs, each marginally different from any other), they still need to simplify the actual policy debate to a certain extent, and avoid producing combinations of designs that would be impossible in real life.⁴ To ensure that the experiment remains cognitively manageable for respondents, the number of possible policy dimensions is therefore limited. Research on policy conjoint experiments rarely makes use of more than six policy dimensions. The majority of recent policy conjoint experiments on EU issues have used between three (Beetsma et al., 2021) and six dimensions (Vandenbroucke et al., 2018; Burgoon et al., 2022; Beetsma et al., 2021). By necessity, this restricts the focus of the experiment itself. The European debate on the reform of the energy sector has been very rich in the aftermath of the Russian invasion of Ukraine, ranging from considerations over price caps or import bans, electricity and gas market decoupling, management

⁴ Importantly, for this experiment, this means that we do not include a dimension where we vary between the presence and absence of additional cross-border energy infrastructure, as an absence of such investment is not consistent with an energy union. We consider that the additional costs (which are part of dimension 2 in the experiment discussed below) also cover additional infrastructural investment in cross border connections as well as storage facilities.

and refilling of strategic reserves of oil and gas, joint purchases, and infrastructural considerations on storage capacity and cross-border interconnections. Some of these characteristics are necessarily situational and tailored to the specificities of the ongoing conflict, such as price caps on energy supplies originating in the Russian Federation, and import bans. Others have been recently explored in other surveys (see, for instance, [Escribano et al., 2023](#) on cross-border connections). We focus the experiment on those elements of European collective energy security where variations in design produce long-term implications, and refer to the institutional design, its financing and its governance mechanisms. Importantly, most of experimental dimensions are phrased in a way to be generally applicable across different energy sources, and not just fossil fuels. However, given the nature of the ongoing Russian crisis and the consequent policy debate at EU level, the results are best interpreted in the context of fossil fuel reserves and gas reserves in particular, although we do not make this explicit in our design.

The **scope dimension** models the European ambition of the programme. The goal is to determine how much the ambition of constructing an EU-level instrument, as opposed to simply supporting national instruments, affects preferences. Even though many alternatives are potentially available here, we opt to keep the experiment manageable, administering packages to respondents that contain one of two alternatives for this dimension: either putting together parts of the national strategic reserves of oil and gas into a European reserve ([Palacio et al., 2022](#)), or co-financing the filling of national reserves. These dimensions do not exactly reproduce the content of the policy debate, but rather simplify it into two clear ‘ideal-typical’ alternatives. In fact, the EU did make progress in this domain throughout 2022. In spring 2022, the policy response of the EU started to set the stage for a reform of European regulation of gas markets affecting and supporting storage facilities. Rather than taking the form of centralizing gas reserves under European management, the agreement reached in the Council in June 2022 regulated the filling quotas for national gas storages, delegating to a separate agreement the possibility of introducing financial support for acquisitions, in the form of endowments under the REPowerEU initiative amending the Resilience and Recovery Facility (RRF), and potentially joint purchases, discussed below.

Next, we introduce a **financing dimension**. Since additional or joint gas purchases need to be financed, preferences might vary substantially with respect to which instrument is best to finance the programme. Policy proposals in this regard have flourished. Already in February 2022, [Palacio et al. \(2022\)](#) had proposed to establish a European Security Facility, inspired by the RRF, to support, among other goals, energy security for the duration of the crisis through joint bond emissions. Other proposals have focused instead on taxing windfall profits of energy corporations ([Council of the European Union, 2022](#)) or shifting national spending away from other areas to support energy markets. We model the financing dimensions of the experiment to cover a large palette of ideal-typical sources of financing, using a language that has proven as easily understood in previous experiments (see, for instance, [Beetsma et al., 2021](#); [Burgoon et al., 2022](#)). The goal is not only to represent the plurality of opinions in the debate, but also to test horizontal as well as inter-temporal redistributive preferences of respondents, by analysing which financing option gathers the most support. The dimension has four levels: a progressive taxation increase, whereby extra expenses are paid for by the rich with a 1% tax increase; a flat taxation increase, whereby extra expenses are paid for by a 0.5% tax increase for everyone; a resources reallocation, whereby resources are re-allocated from other public spending areas; and an increase in debt to be paid for in the future. These dimensions are designed to test different attitudes towards self-interest and redistribution. One option clearly

produces costs for all respondents (flat tax increases). One option produces no cost for respondents (re-allocation). One option formally introduces inter-class redistribution (progressive taxation); while one option introduces inter-country distributions, by means of joint EU debt.

Next, we model a **decision-making dimension** into the experiment. While most proposals for EU-level instruments are relatively silent on the specific governance of the instruments, some have explicitly called for an intergovernmental instrument modeled over the European Stability Mechanism (ESM) ([Zuleeg, 2022](#)). While such facility would allow the contracting parties to avoid vetoes on the creation of the mechanism, their purely intergovernmental structure would guarantee veto powers *within* the mechanism, like in the ESM. As a part of the emergency gas regulation package approved in October 2022, the Commission proposed instead a governing mechanism for joint gas purchases led by the Commission itself in consultation with a steering board composed of appointed national delegates, deciding by qualified majority (COM 14065/22, article 4). Governance questions are not secondary in survey experiments, because they speak to the fundamental understanding that respondents have over who should ‘have the last word’ on European affairs. When modeling governance options, particular care is to be given in striking a balance between respondents’ comprehension, fidelity to the public debate, and responsiveness to the different ideal-typical understandings about who should ultimately decide. To do so, we assign to each package one among three stylized modes of governance representing, in a simplified way, the key ways the European Union works as it has been modeled by theorists. The dimension displays three different levels, corresponding to ideal-typical governance modes. A pure intergovernmental governance mode requires the unanimous consent of states to take a decision. A confederal model requires a majority of the member states to take a decision; a federal model requires both a majority of states, and a majority of the European Parliament.

Fourth, we include in the possible design the opportunity for participating countries **to opt out from common decisions**. Opt-outs have a long history in EU policy design, both at constitutional level (like with Schengen, the Eurozone, or Foreign and Security Policy) and within specific policies. In the case of collective European energy security, opt-outs have appeared in the policy debate in different forms, from ‘exemptions’ to the gas price cap for Hungary ([Strupczewski, 2022](#)) to voluntary participation in the joint purchase mechanisms beyond the initial compulsory quota of 15% of gas storage refill (COM 14065/22). To model this, we include a broadly-worded dimension which focuses not on the institutional-level participation in the initiative, but whether a country has the right to opt out from specific decisions within the policy framework. This dimension includes two alternative levels: either countries are allowed to opt out from specific common decisions, or they are not, and must therefore follow the common framework every time a decision is taken.

Fifth, we include a key dimension: whether the packages **should or should not include joint purchases**. In the case of procurement and purchase of gas reserves, substantial gains could be obtained by joint procurement, through monopsony power, reduction of inefficiencies, and prevention of races to the bottom among market participants. They also make energy price capping substantially easier, empowering foreign policy decisions. On the other hand, joint procurement might produce costs for countries, since energy markets are characterized by low competition, high concentration, and presence of strong national ‘champions’ (see [Eberlein, 2008](#), for a discussion of European energy markets governance). This issue has been a recurrent element of discussion on the reform of the EU energy security framework. The Commission first proposed such mechanism in 2015, but discussions

continued at the Council level without agreement until the beginning of the war. The success with joint procurement of vaccines in 2020, and its popularity among EU publics (Beetsma et al., 2021), coupled with the Russian invasion of Ukraine, likely convinced EU policy-makers that joint procurement could be reconsidered. The Commission, for its part, launched a platform for centralizing gas, hydrogen and LNG contracts in spring 2022 (European Commission, 2022). This platform acted as a building block towards joint gas purchases, even though decisions over actual EU-level public procurement were postponed to the winter. As the policy debate evolved, the possibilities opened by joint purchases (on its own as well as an element of a broader policy aimed at capping energy costs) became clearer. Among many, Boltz et al. (2022) provide a comprehensive assessment of the pros and cons of joint energy purchases on the EU energy platform; the platform was finally used to that end starting in winter 2022, when the Commission created the legal basis for implementing joint purchases (COM 14065/22) aiming at beginning EU level procurement by February 2023 at latest. While joint energy procurement is in itself a multidimensional policy, many of its fundamental features (scope, governance, financing, size) are already part of the experiment. In the experiment, we therefore simply maintain a binary version of this dimension, with two levels: one including joint procurement, and one leaving procurement to countries, each separately.

Finally, we include a dimension capturing the **size of the joint energy security facility**. The size of the commitments should capture a respondent's overall interest in the presence of an energy security pact between European countries. Hence, we expect that the scale of the ambition of the project is deemed to be a key driver of respondents' preferences. We derive the levels of common storage that would be constructed under the security agreement from existing national gas storage levels. The total storage capacity among European countries is currently 25% of the yearly demand, when fully filled. The current regulatory framework for joint purchases mandates a compulsory joint purchase to refill 15% of the existing storage capacity (approximately 4% of the yearly demand, or about 14.85 billion cubic meters of natural gas); this corresponds to about 2 weeks of the average weekly gas consumption of the European Union in 2021. Joint purchases beyond the 15% threshold are currently not mandatory under existing schemes, but might be in a potential plan to re-shape the collective energy security of the Union. We formulate two variants of such plan, aiming to capture a fundamental tension between marginal improvements over existing plans, and more fundamental, ambitious changes. The first option is an incremental improvement over the existing plan, where joint purchases would be scaled up from 2 to 5 weeks of the average weekly consumption of natural gas in the EU, slightly below 10% of yearly demand. Alternatively, respondents are administered a much more ambitious version the pact which would instead cover the total EU demand for a much longer period of 6 months, de-facto creating a truly Europeanised energy reserve facility.⁵

4. Empirical strategy

The conjoint experiment. We test preferences on alternative designs of the energy security union with a conjoint experiment administered to a

representative sample of 1500 respondents each in France, Germany, Italy, the Netherlands and Spain, 750 of which were randomly assigned this survey experiment.⁶

This survey is the third fielded as a part of a multi-annual individual-level panel study launched in summer 2019 to assess public attitudes towards a variety of EU-level policies in western Europe. Country selection, therefore, had to reflect a number of different policy areas and debates, including fiscal union designs, medicines procurement, Eurobonds, and security and energy unions. Therefore, countries were selected to cover a number of aspects that transcend specific policy questions. The selected countries represented, according to Eurostat, 81% of the total Euro Area economy by GDP at the moment of selection, and 73% of its population. Given this coverage, they were selected to primarily represent the distribution along the net contributor/recipient position towards EU-level financial instruments⁷ (France, Germany and the Netherlands as net contributors, and Italy and Spain as net recipients) as well as a degree of geographical variety, with two southern EU countries, two Western EU countries, and one central EU country. Furthermore, these countries provide a good variety of positions across a key energy-related metric of reference, namely energy dependency from Russia (high for Germany, medium for Italy, moderate for France and Spain, and low for the Netherlands). All in all, the criteria behind country selection cut across the two fundamental dimensions of the crisis, namely exposure to risk and exposure to costs (Nicoli, 2023), providing a good depiction of a range of possible positions in western Europe.

The experimental survey was financed by Ghent University and fielded by IPSOS and administered through their online survey platform. A representative sample of individuals in each country is drawn by using six quotas: gender (two categories), education level (three categories), income level (three categories, derived from equivalised household income), NUTS-1 population distribution, age (three categories), and profession (ten categories). The sample is initially drawn among individuals who already responded to previous similar surveys in March 2020 and July 2020.

Each respondent is first given an introductory text that describes the policy, and then is confronted with a pair of policy packages side by side. Each policy package is formed by the dimensions discussed above. For each dimension or attribute, different values (or levels) are possible. Table 1 below provides an overview of the dimensions.

Every time a policy package is assigned to a respondent, for each dimension a level is chosen at random. The respondents are therefore confronted with two randomly combined policy packages, side by side. Respondents are asked to complete three tasks: first, they need to indicate which of the two options they prefer; next, they must indicate how much they are in favour or against each of them, on a 5-point Likert scale. This experiment is repeated three times, and therefore respondents see a total of 6 packages. Annex 2a-c provide screenshots of how such tasks look in practice in 3 of the 6 languages of the survey. The order of the dimensions is randomized at the respondent level to avoid ordering biases; every respondent sees a different order, but such order

⁵ Note that this would require an expansion of about 10% of the existing storage capacity at 2022 levels of gas consumption, and of about 40% at 2021 levels of gas consumption. In designing the experiment, we discussed whether to explicitly include a dimension targeting infrastructural investment in storage or interconnectors (Thaler and Hofmann, 2022; Escribano et al., 2023). However, infrastructural investment would anyway be needed both for interconnectors and for new storage capacity. We therefore decided not to include two novel dimensions in the experiment to avoid over-burdening the respondents, indicating instead that the financing of the programme (dimension 2) would also cover related expenses.

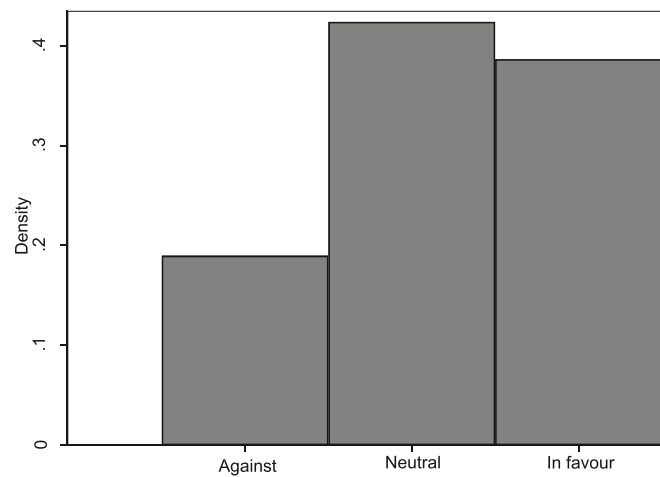
⁶ The sample is in fact 1500 individuals per country. However, individuals are randomly assigned to either the energy security conjoint presented here, or an alternative military security conjoint, whose design is maintained as parallel as possible to the energy security design presented here. Hence, 750 individuals per country are randomly assigned to this experiment, for a total for 3750 individual respondents. However, each individual is confronted with 6 packages, which they evaluate. In conjoint experiments, the unit of observation and analysis is the package, rather than the individual, so the effective N used in the regression models in this study is equal to 22500 assessed packages.

⁷ While Italy is nominally a net contributor to the standard EU budget, it is also a net recipient of grants under the RRF. Furthermore, it receives a relatively larger share of covert financial support through a palette of various ECB asset purchase programmes, which all in all qualify the country still as a net recipient despite its nominal position vis à vis the standard EU budget.

Table 1

The dimensions of the conjoint experiment.

Policy dimensions	Levels
SCOPE: What is the goal of the energy security pact?	Jointly finance the improvement of the national strategic energy reserves of the member states, each separately Put together some parts of national strategic energy reserves, into a novel European strategic energy reserve
FINANCING: How is the energy security pact financed?	By increasing taxes by 0.5%, for everyone in the EU By increasing taxes by 1%, only for the rich in the EU By increasing EU public debt, to be repaid in the future By reallocating spending from other areas
GOVERNANCE: How are decisions on common energy security taken?	All countries must agree, i.e. one country can block any decision on its own A majority of countries must agree: no country can block a decision on its own Both the majority of countries and a majority of members of the European Parliament must agree
OPTOUTS: Is it possible for one country to opt out from certain decisions?	No – all countries must participate if this is the common decision Yes – a country can always refuse to participate if it so wishes
JOINT PURCHASES: Are there joint purchases as part of the energy security pact?	Yes, the EU countries procure and jointly purchase common energy reserves No, every country procures and purchases energy reserves on its own
SIZE: What is the size of the energy security pact?	Enough to support energy needs for a short period of about 5 weeks Enough to support energy needs for a long period of about 6 months

**Fig. 1.** Levels of support: share of packages supported or opposed.

remains constant for each respondent across the three iterations of the experiment.

Methods of analysis. The experiment provides data where the unit of observation is the individual response to a specific package. Each individual sees and independently rates six packages, and chooses between pairs of them. Considering that non-experimental characteristics of the individuals are constant for each package evaluation, we control for individual-level homogeneity by clustering the standard error by respondent. The purely experimental nature of the data allows us to draw robust causal inference on the effect that policy characteristics have on preferences.

Empirically, we first look at the levels of support and opposition in a descriptive way (Figs. 1 and 2). Subsequently, we proceed by analyzing aggregate results; we then move to determine country-specific patterns; and finally we conclude by comparing specific packages.

We proceed by testing a regression model to determine the causal effect of the dimensions. Our baseline model is a purely experimental model with an OLS estimator, and package choice (whether a package has been chosen or not) as the dependent variable. The independent variables are the dimensions of the experiment, allowing us to estimate the causal effect of having or not having a certain policy feature on package preferences, while (i, j, k) indexes the k th package ($k = 1, \dots, 6$) presented to individual i of country j , and ε is the error term (equation 1).

(1) - *baseline model.*

$$\begin{aligned} OUTCOME_{ijk} = & \beta_1 SCOPE_{ijk} + \beta_2 FINANCING_{ijk} \\ & + \beta_3 GOVERNANCE_{ijk} + \beta_4 OPTOUT_{ijk} \\ & + \beta_5 JOINTPROCUREMENT_{ijk} + \beta_6 SIZE_{ijk} + \varepsilon_{ijk} \end{aligned}$$

All results presented below are based on this model. In addition, we test additional models that augment this initial specification by adding non-experimental demographic controls (age, education, income) and country fixed effects. In addition, we test models that alternatively use package rating rather than package choice as the dependent variable. The results of these additional models are substantively similar to our baseline estimations and can be found in table A3a and A3b in appendix 3.⁸

Fig. 3 reports the Average Marginal Component Effects (AMCEs) of the main experimental regression, which concisely shows the causal

⁸ In addition, we carry out a large variety of robustness checks by testing many alternatives to this baseline specification, for instance by adding / removing controls for respondents attention (measured using an attention check during survey participation), by controlling for package ordering, by changing model specifications using logit or random effects panel models, and others. These are available upon request. Appendices A5-A8 provide subgroup analysis by certain demographics. Appendix table A4 reports the baseline model estimates, by country.

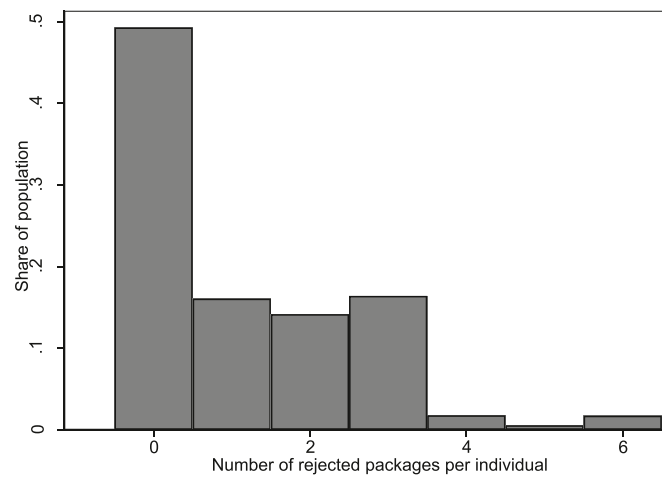


Fig. 2. Share of rejected packages per individual.

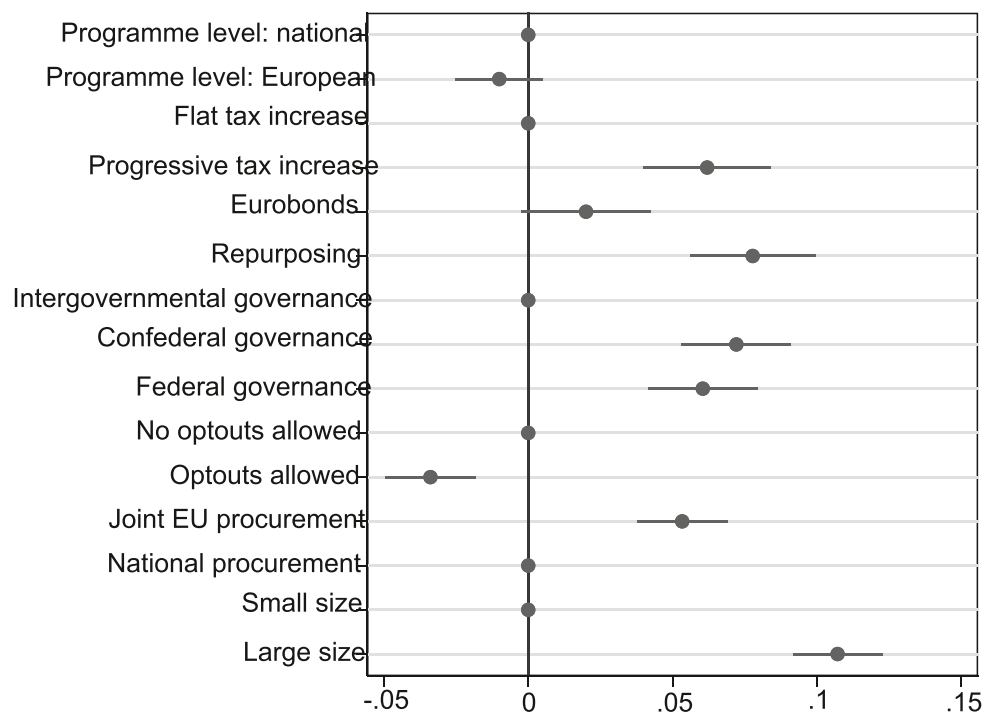


Fig. 3. Effects of dimensions on choice for package.

Note: estimates are plotted with 95% confidence intervals.

effect of each dimensional level on package choice. Next, we select our main model specification, and we carry out separate estimates for each country. The resulting country-specific AMCEs are reported in Fig. 5, while the full results can be found in table A3a in the appendix. Finally, we test levels of support for specific packages containing certain policy feature combinations of interest. In particular, we analyse a ‘minimalist’ package, which contains all dimensional levels with lower levels of European ambition; a ‘maximalist’ package, which reports the levels of support for the most ambitious policy combination; and the ‘current agreement’ package, which approximates the status quo as agreed in December 2022, as closely as possible. These are reported in Fig. 4.

5. Results

5.1. Support and opposition in general

Which collective energy security union do Europeans support, after all? Before analyzing specific research designs, it is useful to have look at overall levels of support and opposition, on average across all packages, and therefore regardless of the specific policy dimensions. Fig. 1 below shows these overall levels of support and opposition. Overall, respondents are against or very much against about 19% of the administered packages, while they support or strongly support about 39% of the administered packages; about 42% of the administered packages are evaluated in a neutral way. This, in general, strongly suggests that creating an EU-wide energy security union would not lead to any strong opposition to the plan nor would it empower Eurosceptic politicians,

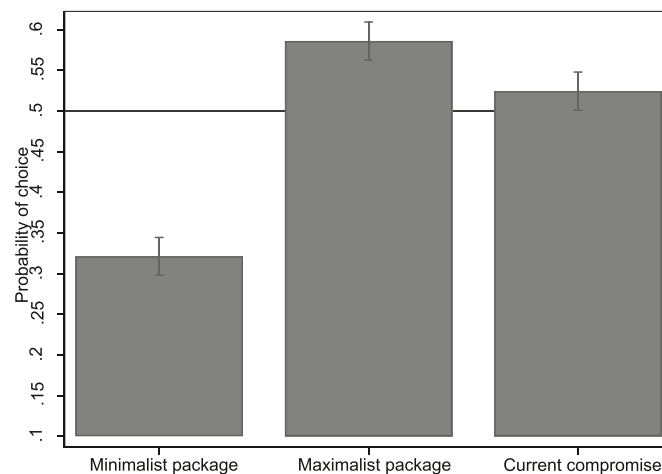


Fig. 4. Probability of choice for selected packages.

since more than 80% of the respondents are neutral or in favour of an energy security union.

But what is the fundamental level of opposition to an energy security union? Simply looking at the share of rejected packages is not sufficient to assess to what extent a fundamental opposition to these plans exists, since many respondents who are generally in favour might occasionally reject some packages, and many respondents who are mostly opposed might find one or two packages they still like or feel neutral about. To explore this, we analyse respondent-specific patterns. In Fig. 2, we plot the share of respondents (y-axis) who reject a certain number of packages among the 6 they see (x-axis). The larger the number of rejected packages for respondents, the more fundamental is the opposition to the idea of an energy security union, regardless of the specific policy characteristics it includes. In other words, the number of rejected packages measures how ‘constraining’ and unconditional is dissensus (Hooghe and Marks, 2009) towards EU-level policymaking. Conversely, the smaller the number of packages which are not rejected, the less constraining and more permissive is the public attitude towards EU-level action.

As shown in Fig. 2, fundamental opposition to an energy security union was, in Winter (2022), extremely limited. Less than 4% of all respondents are against 5 or 6 packages, suggesting that the overwhelming majority of respondents was somewhat satisfied with at least 50% of the packages they were assigned. While this might be a consequence of the specific historical moment the survey took place in (with historically high energy prices across Europe, energy-induced inflation, high public salience of energy security issues, and a possibly widespread social anxiety over energy security), these results are in fact highly consistent with previous figures over policy-specific opposition patterns. For instance, Vandenbroucke et al. (2018) as well as Burgoon et al. (2022) show that even when respondents are somewhat ‘cold’ to the idea of EU-level social policy *in general* when asked about it in single-item survey items, they are much more open to specific solutions when they can actually pick and choose which alternative social policy designs they prefer. The 2018 EURS study showed that even though about 20% of the sample responded that they preferred national level social policy over multilevel social policy with an EU role in it, only about 6% of respondents displayed fundamental opposition to specific variants of European unemployment policy. Results displayed in Fig. 2 are highly consistent with that literature, suggesting that policy-oriented Euroscepticism (conditional to policy design) is much stronger, than polity-oriented Euroscepticism (i.e., independent of policy design).

5.2. Support or opposition for specific energy security union characteristics

We now move to analyse support or opposition for specific energy union designs. We use a linear regression model (eq. 1 above) to estimate the causal effect of the policy dimensions on the probability of a package being chosen or rejected in a given pair, controlling for individual-level patterns through clustering of the standard errors. Appendix 3 provides detailed estimates for the baseline experimental models, for robustness variants using different experimental dependent variables (such as the level of support), and for baseline estimates augmented with demographic controls. Fig. 3 below provides a visual representation of the purely experimental, baseline model, which allows us to draw solid causal inference on the effects of the various policy variants.

The experiment randomly assigns one specific variant for each dimension, which are therefore perfectly independent of each other by construction. Hence, the coefficient values displayed on the horizontal axis can be interpreted as the change in probability of choosing a policy package containing the specific value of a specific dimension, in respect to the baseline alternative, controlling for all other characteristics of the policy at hand (Hainmuller et al., 2014; Bansak et al., 2022).

Overall, respondents in the sample prefer ambitious packages, larger in size, with joint gas procurement, council-level or even federal governance, and financed either by repurposing existing expenditure (like REPowerEU proposes) or increasing taxation following a progressive tax increase formula. Respondents are quite negative when it comes to allowing country opt-outs, and are slightly in favour of expanding the EU borrowing capacity, although public opinion on Eurobonds is quite divergent between countries (see below) which in turn means that Eurobonds increase public support for the package only within a 90% confidence interval. Finally, respondents are generally indifferent between energy security programmes that centralize the strategic reserves at EU-level, as opposed to programmes that simply support existing strategic energy reserves at national level.

Before moving to assess the level of support for specific package combinations in general and within countries, we briefly discuss how different demographic groups vary in their preferences. We discuss, in particular, age, education, gender and income groups, the results of which are shown in appendix 5-8 (note that particular care needs to go into the interpretation of results coming from subgroup analysis of the experimental outcomes (Leeper et al., 2020)). Among these groups, age differentials seem to matter the least (appendix 5). We note a slightly lower level of support for redistributive taxation as age increases, and a slightly higher support for confederal governance and larger programme

sizes, but none of these effects are statistically significant enough to draw conclusive statements. Second, we look at education (appendix 6). Differently from age, education differentials matter more, as highly educated people are significantly more supportive than lower-educated people of combinations including federal governance. Interestingly, these education effects are stronger in Germany, Italy and the Netherlands, but not significant in France or Spain (appendix table A6). Similar effects are found for packages prohibiting optouts (towards which low-educated people are indifferent), and to a small extent, programme size. Next, appendix 7 looks at gender differentials. Interestingly, gender seems to matter only for the scope dimension of the programme, where males are more supportive of national-level programmes, while females are more supportive of EU-level programmes. While the differences remain limited across all other policy dimensions, males seem in general to be marginally less supportive of ambitious programmes than females, although the differences in this case are so small that they are never statistically significant. Finally, we look at income classes, where important differences can be observed between high and low income respondents. Simply put, high income respondents are much more supportive of ambitious, EU-level solutions, while low income respondents, even though they generally share the same preferences, are much less enthusiastic about these. All in all, subgroup analysis suggests that, even though different demographics are associated with diverse effect sizes (which can be interpreted as more or less support for the policy feature in question), the main preferred option within each dimension very seldom varies across groups. Simply put, preferences remain generally coherent across groups (with some exceptions), but the intensity of these preferences is affected by the demographics of the respondents.

5.3. Support for specific policy combinations

Next, we move to assess support patterns for selected policy packages. While nearly 200 discrete policy combinations are possible, it is useful to focus the analysis on specific policy-relevant combinations, or combinations of theoretical interest. In particular, we identify three packages for which we determine public support: a ‘minimalist’ package, in which countries would agree to the minimal possible improvements to the policy; a ‘maximalist’ package, which includes the most ambitious attributes of each dimension; and the ‘compromise’ package, which contains the policy dimensions that are closest to the content of the actual agreements reached under REPowerEU as well as the joint procurement agreement of December 2022. The policy content of these packages is described in Fig. 4 below.

Importantly, respondents are much more likely to select ambitious packages than non-ambitious ones. On average, the minimalist package has a likelihood of being chosen over the alternatives of only about 30%, while both the maximalist package and the compromise agreement are above 50% of probability of support. All in all, these results suggest that, even though the current compromise meets public support, there are opportunities for further expansion of EU-wide instruments without generating a public backlash, and actually even increase the public appreciation of EU actions in guaranteeing collective security of supply of oil and gas. Of course, different countries might display different preferences: in the next section we discuss how these preferences hold between countries.

5.4. Country analysis

To what extent do these findings hold across the five countries pooled in the survey? In each country, we have a representative sample of 750 individuals, and therefore 4500 assessed policy packages per country. We can therefore replicate the results discussed in sections 5.2 and 5.3 in each of the countries separately. In fact, respondents display generally consistent preferences across countries. We first look at dimension-specific effects (Fig. 5), and then we discuss preferred

packages (Fig. 6).

On some dimensions, there is no disagreement between countries. All countries uncontroversially agree on larger size rather than smaller size, and on progressive tax increases as a way of financing the programme. They also generally agree on joint EU procurement and on repurposing (with the exception of German respondents, who are less clear-cut in their preference) and on federal or confederal governance, with the exception of France, which is largely indifferent between modes of governance.

Germany is also the only country to certainly reject EU-level action as opposed to national action, while Italy is the only country that certainly prefers Eurobonds over flat tax increases. The only countries displaying a negative (but statistically non-significant) attitude towards EU-level borrowing are France and the Netherlands, while Spanish and even German respondents are somewhat in favour of novel EU-level borrowing, although these estimates are statistically indifferent from the baseline alternative of flat tax increases. While French opposition to EU-level borrowing, and the German relative approval of the measure (both statistically non-significant) may seem to counter well-known patterns of public support for EU level borrowing, these are in fact consistent with a rational, forward-looking collective insurance logic. The two countries are very differently placed in front of a future energy crisis requiring activation of strategic gas and oil reserves: while France’s extensive electrification, coupled with nuclear power probably decreases the average respondent’s interest in programme variants which comport financial mutualisation, Germany’s historical reliance on gas and its reliance on gas imports implies a much higher expected future risk, which is probably enough to off-set part of the traditional opposition of the country towards instruments comporting a degree of financial risk-sharing.

Conversely, Italy and the Netherlands – both of which have secured gas supplies via domestic production or partnerships which appear, in the short term, geopolitically less risky – reproduce the classical north-south divide on the Eurobonds question. All in all, these preferences are in fact consistent with the different nature of this crisis as compared with previous ones: a similar survey fielded in July 2020 in a panel containing largely the same individual respondents (Bremer et al., 2023), German respondents were considerably more negative towards Eurobonds, while Spanish respondents somewhat more positive (while the French, Italian, and Dutch position was largely the same as in this experiment).

Finally, it is important to consider that while there is a generalized convergence of preferences between different countries, these do not start from the same level, since they somewhat differ on their “base” (dimension-agnostic) level of support. For instance, France has a base level of 0.39, Germany of 0.40, Italy of 0.31, the Netherlands of 0.35, and Spain of 0.34 (see appendix 4). On these grounds, we can determine the absolute preferred package across countries, displayed in Table 2 below. Furthermore, we observe some cross-country heterogeneity (appendix 9) when it comes to the moderating effects of characteristics like income and education: in Italy and the Netherlands higher income is associated with higher support for joint procurement, while in Germany, with lower support; in Germany and the Netherlands, higher education associates with stronger support for federal governance, while in Spain, for repurposing public spending; in Italy, higher income associates with lower preference for progressive taxation, the only country where such attitude is strong enough to be statistically significant.

Finally, we move to analyse how the three ideal-type packages discussed in the previous section perform across countries. While the minimalist package is strongly rejected in all polled countries and the maximalist package has equally fairly high chances of support in all surveyed countries, the compromise package gathers sufficient consensus in all surveyed countries but Germany (and even there, it is very close to reaching 50% of probability of selection).

Given that we only polled 5 countries out of 27, it is likely that the compromise package, which delivers the original goal but with limited

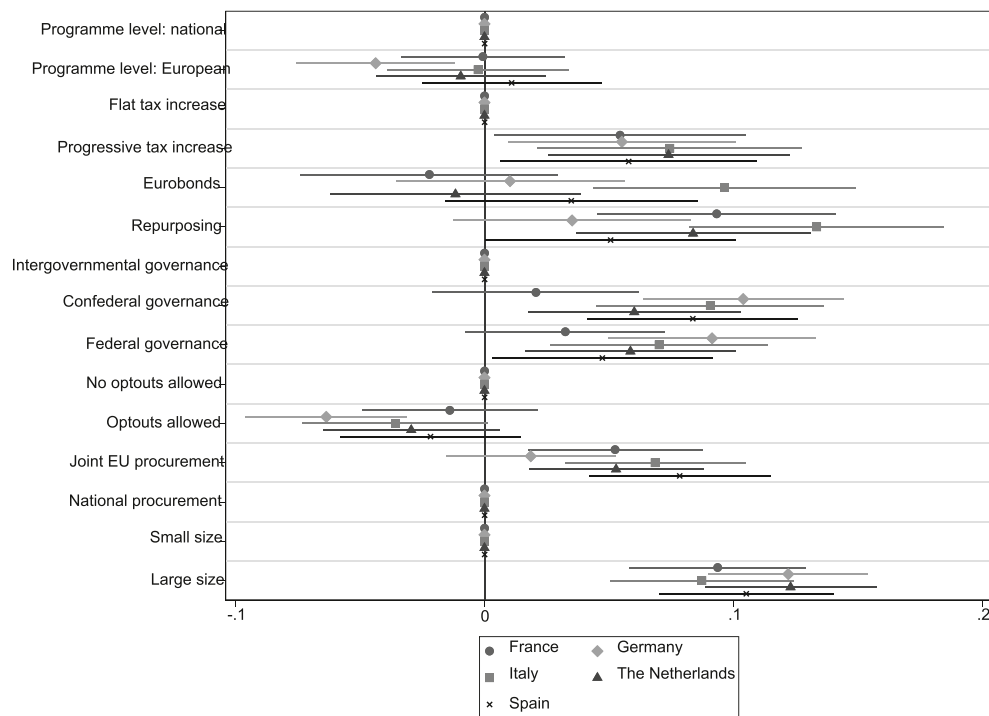


Fig. 5. Country-specific policy effects.

concessions in terms of sovereignty and institutional design, was the only one acceptable for all countries, including these surveyed here. Yet, these results clearly show that policy-makers should not shy away from more ambitious and far-reaching reforms at times of crisis, since voters are likely to favour ambitious solutions over patchwork ones.

6. Conclusion and policy implications

In the aftermath of the Russian invasion of Ukraine, the European Union has found its energy security dangerously exposed to the vagaries of contemporary geopolitics. Among many proposals to re-shape European energy security, some have advanced the idea of creating a truly European strategic energy reserve. Such policy is inherently multidimensional in policy features: from governance, to scope, to financing, to solidarity, to the presence or absence of opt-outs – many alternative policy designs are possible. To explore the political feasibility of such designs, we fielded a pre-registered conjoint survey experiment among a highly representative sample of 750 respondents in France, Germany, Italy, the Netherlands and Spain in November 2022.

The results of the study suggest that creating an EU-wide energy security union would be welcomed by Europeans, and most likely would not meet significant ‘constraining dissensus’ from the public. Such public support would pave the way to the expansion of existing measures undertaken as a part of REPowerEU and the December 2022 compromise on joint gas purchases. The level of fundamental opposition to an energy security union was also found to be extremely limited, with less than 4% of respondents in fundamental disagreement with the idea of such policy shift, regardless of its design. In detail, the experiment shows that respondents do in fact prefer relatively more ambitious policy packages, inclusive of joint gas procurement, without veto rights, without opt-outs, financed through repurposing existing expenditure or through increasing progressive taxation. On the other hand, the survey details suggest that respondents are indifferent as to whether collective energy security is achieved by supporting national reserves of oil and gas, or by constructing genuinely European reserves.

While these findings amount to significant clarification of citizen support for energy cooperation, this experimental study does have important limitations that urge caution in interpreting its results. First,

we survey a small number of European countries, all of which are located in western Europe. Even though we have good reasons for the country selection, and faced budgetary constraints, the study would have benefitted from the inclusion of a central-eastern European country in the sample. Second, even though we test nearly 200 alternative designs, this is still a simplification of a very rich policy debate. This means that we cannot cover other meaningful and debated dimensions of policy design, and that the dimensions of the policy we do cover needed to be presented in a simplified way to ensure that the cognitive load remained manageable for respondents. Third, the survey was fielded at a political moment when energy policy concerns were particularly high among the population due to the very tangible effects of the war on energy bills. Our study may therefore be seen as an empirical corroboration of the idea that crises open opportunities for integration by depowering the ‘constraining dissensus’ towards European integration. But it remains unclear whether these effects can be interpreted as permanent shifts in public preferences, or as temporary fluctuations of support, where the embrace of cooperation reverts back to something less or different once the crisis is over. While evidence seems to suggest that these effects last over time, policy design needs to carefully account for the possibility that support is indeed temporary and crisis-driven, or risk undermining the long-term legitimacy of the novel institutions. Relatedly, the results are most meaningful when it comes to natural gas and other fossil fuels as sources of energy, because the introduction to the experiment explicitly refers to those energy sources, and because the debate on energy security in the context of the Russian aggression of Ukraine has focused on oil and natural gas markets, both of which were very salient in the public opinion at the moment of the fielding of the experiment. For similar concerns over cognitive overload, we also did not include a dimension on the presence or absence of investment on cross-border infrastructure, since all variants of EU-level energy unions require some investment. In our experiment we consider such investment as covered by the ‘costs’ dimension, though cross-border infrastructure should be an object of future research, since such infrastructure comes with its own regulatory and public acceptance challenges. Finally, while this experiment clarifies the design of an energy union aimed at improving energy solidarity and security in Europe, energy security can also be improved by reductions on the demand side or changes in the

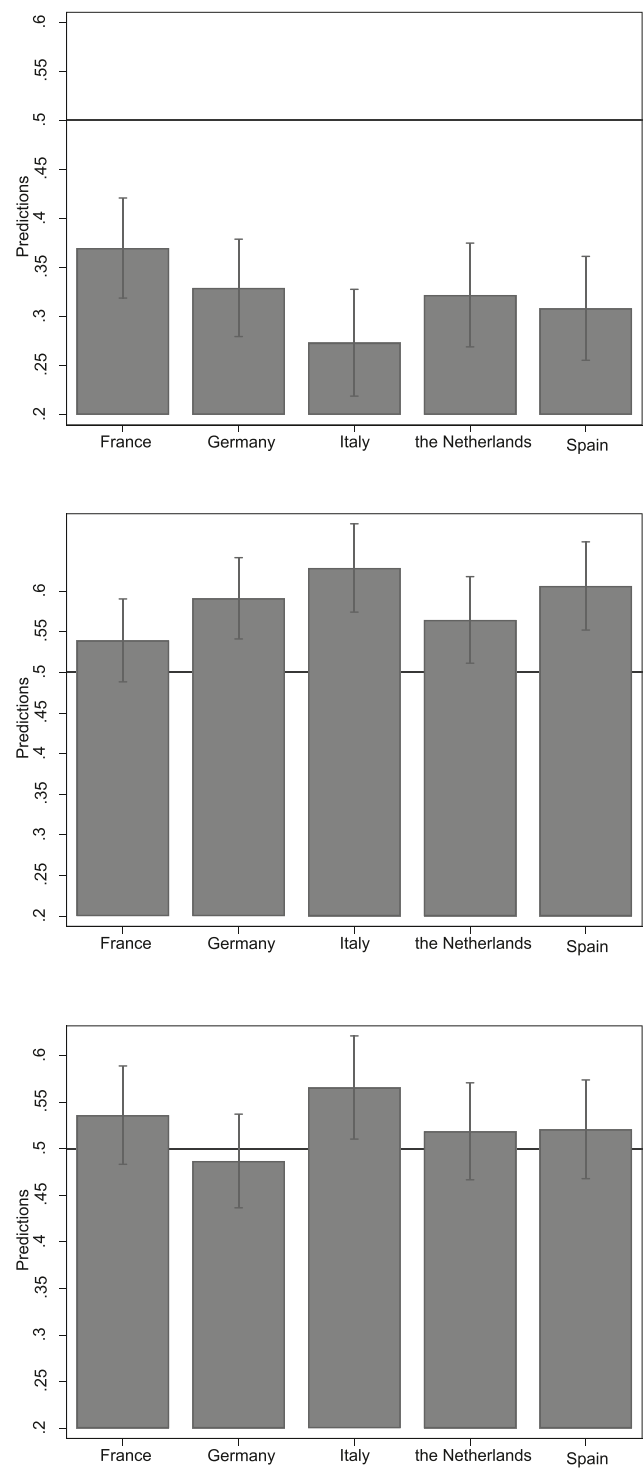


Fig. 6. Selected packages by country.

Table 2

Most supported combinations in each country.

Dimensions	France	Germany	Italy	The Netherlands	Spain
Scope	- National	- National	- National	- National	- European
Financing	- Repurposing	- Progressive taxation	- Repurposing	- Repurposing	- Progressive taxation
Governance	- Federal	- Confederal	- Confederal	- Confederal	- Confederal
Optouts	- No optouts	- No optouts	- No optouts	- No optouts	- No optouts
Procurement	- Joint procurement	- Joint procurement	- Joint procurement	- Joint procurement	- Joint procurement
Size	- Large	- Large	- Large	- Large	- Large

Note: the table displays the preferred policy characteristics in every country for every dimension. Characteristics whose coefficient is statistically different at 95% CI from the baseline alternative are shown in bold.

energy mix – neither of which is accounted for in the experiment. We take these limitations as reasons to contextualize our study's key findings and to guide further research to test and further such findings. Keeping such context and longer research agenda in mind, our results provide the first experimental evidence regarding public support for energy union designs, and strongly point towards a public preference for more ambitious EU level action to guarantee Europe's long term energy security.

CRedit authorship contribution statement

Francesco Nicoli: Conceptualization, Methodology, Investigation, Formal analysis, Writing – original draft, Writing – review & editing, Visualization, Project administration, Funding acquisition. **David van der Duin:** Methodology, Conceptualization, Formal analysis, Writing – review & editing, Project administration, Data curation, Visualization. **Brian Burgoon:** Supervision, Conceptualization, Methodology, Project administration, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.enpol.2023.113734>.

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