



Universiteit
Leiden
The Netherlands

How to finance green investments? The role of public debt

Kantorowicz, J.J.; Collewet, M.M.F.; Giuseppe, M.R. di; Vrijburg, H.

Citation

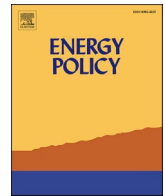
Kantorowicz, J. J., Collewet, M. M. F., Giuseppe, M. R. di, & Vrijburg, H. (2023). How to finance green investments?: The role of public debt. *Energy Policy*, 184.
doi:10.1016/j.enpol.2023.113899

Version: Publisher's Version

License: [Creative Commons CC BY 4.0 license](https://creativecommons.org/licenses/by/4.0/)

Downloaded from: <https://hdl.handle.net/1887/3717855>

Note: To cite this publication please use the final published version (if applicable).



How to finance green investments? The role of public debt

Jaroslav Kantorowicz^{a,*}, Marion Collewet^b, Matthew DiGiuseppe^c, Hendrik Vrijburg^b

^a Institute of Security and Global Affairs, Faculty of Governance and Global Affairs, Leiden University, Turfmarkt 99, 2511DP, The Hague, the Netherlands

^b Department of Economics, Institute of Tax Law and Economics, Leiden Law School, Universiteit Leiden, the Netherlands

^c Institute of Political Science, Leiden University, the Netherlands

ARTICLE INFO

Keywords:

Green investments
Public debt
Public support
Conjoint experiment

ABSTRACT

Economic costs are a central political obstacle to investing in climate change mitigation and adaptation measures. Several studies now demonstrate that as costs increase, voters are less likely to support green initiatives. In this paper we argue that opposition to government green investments is conditional on the method of financing. Notably, because public debt shifts the burden of investments into the future, it may face less public opposition than broad based taxes that require an immediate sacrifice. To test this proposition, we fielded a preregistered conjoint survey experiment on nationally representative samples in one highly indebted (Italy) and one fiscally sound country (The Netherlands). We find debt financing increases voter support for green financing by up to 10 percentage points relative to broad-based taxes. However, we find carbon taxes and wealth taxes are most preferred. These findings demonstrate that credit market tools, like green bonds and debt for climate swaps, are likely politically efficient and not just economically efficient. Where investments are already financed with debt, the findings suggest that political communication can limit a political backlash to green investments. Most importantly, the findings show that the political opposition to paying for green investments can be circumvented.

1. Introduction

The transition towards a net-zero emissions economy in 2050 requires mobilization of large (additional) investments in green infrastructure. Due to their public goods nature, some of these investments must be (co-)financed by governments (Meckling et al., 2022; Blanchard et al., 2023; Pekanov and Schratzenstaller, 2023). Prominent examples are investments and subsidies to construct offshore and onshore windmill-parks (Tu et al., 2021), to create hydrogen production capacity, to increase the capacity of electricity networks or to enlarge public transport networks. According to recent estimations by international organizations, additional public resources needed for green investments are in the range of 0.5–4.5 percent of GDP cumulatively over the next decade (IMF, 2021). Specifically for the EU, additional public

investments required to meet the climate goals within the EU Green Deal are assessed between 0.5 and 1 percent of GDP annually during this decade by Darvas and Wolff (2023) and between 1 and 1.8 percent of GDP by Delgado-Téllez et al. (2022). As government expenditures are financed through taxpayers' money, an immediate question thus arises as to whether or under what conditions voters will support the (co-)financing of such investments.

In order to (co-)finance green investments and to maintain long-run budgetary balance, governments can roughly choose between decreasing other contemporary expenditures or raising contemporary revenues, for example through higher taxes (Barro, 1974, 1979).¹ Both options are politically undesirable as some groups in society will be affected by reduced expenditures while other groups will be affected by the increased taxes. On top of this, green investments may have long-run

* Corresponding author. Institute of Security and Global Affairs, Faculty of Governance and Global Affairs, Leiden University, Turfmarkt 99, 2511DP, The Hague, the Netherlands.

E-mail address: j.j.kantorowicz@fgga.leidenuniv.nl (J. Kantorowicz).

¹ Governments can contribute to green investments in variety of ways. The most direct way is a subsidy or direct government spending financed by a simultaneous increase in taxes, such that (co-)financing occurs via the government budget. However, government can also impose a regulation that indirectly improves the potential of the green investment being financed. For example, by setting a norm that a designated share of electricity sold by electricity-traders is renewable, a market for green certificates is created which raises the profitability of certain renewable energy infrastructure projects. Similarly, the cashflow of renewable energy producers is improved when they are allowed to sell pollution permits under a cap-and-trade system for carbon emissions. All these forms of indirect financing instruments are subsumed under the option raising contemporary revenues, or more specifically the carbon tax option to be discussed later. For a discussion of alternative financing instruments, see, for example, Tu et al. (2021).

benefits that are not fully appreciated by current voters, which may make these voters more reluctant to accept the burden of green investments. In the short term, governments can escape this distributive dilemma through borrowing (as seen during COVID-19). Although borrowing will increase government interest expenses, it prevents the temporary high expenditures for mitigation measures from being perceived as too burdensome by the public in the short run, removing a key obstacle to public support. In fact, creditworthy governments do exactly this; they are more likely to finance new investments through borrowing rather than new taxes. See, for example, the green bonds that are part of the NextGenerationEU economic recovery package in response to COVID-19 (European Commission, 2021).

In this paper, we study to what degree financing through public debt increases support for green investments relative to other modes of finance. Because choices about climate policies are multi-dimensional, we run a conjoint experiment in which we ask respondents to indicate their preferences among green investment policies characterized by (1) the mode of financing measured by either government debt; an increase in broad-based taxes (personal income tax or VAT); an increase in narrow-based taxes with a clear additional policy goal (a carbon tax, or a wealth tax); or a reduction of public spending in other domains, (2) the size of the green investment, and (3) which other countries would also undertake similar investments. To better understand the mechanisms underlying the support for debt financing of green investments relative to the other options, we examine how several relevant individual-level characteristics of respondents relate to their preferences. We survey a large sample of more than 3000 respondents from Italy and the Netherlands. Such a choice of country case studies allows us to test if the results can replicate in two quite different public debt contexts. We take the Netherlands as the case of a relatively low indebted country with a historically fiscally conservative public, and Italy as the case of a comparatively high public debt country with a relatively less fiscally conservative public.

There is a large body of literature that studies the determinants of public support for climate policies. Public support for green investments, however, has received much less attention, as has the mode of financing of such investments (see literature review in the next section). We contribute to the literature that studies public support for climate policies by constructing budget-neutral policy alternatives such that respondents are forced to choose an alternative financing mode when they oppose debt financing. Our choice for various modes of financing for a given type of green investment are informed by the economic literature on optimal public finance. Our study is closest to D'Acunzio et al. (2022) and Dechezleprêtre et al. (2022). Both use information experiments to study how public support for various climate policies with various modes of financing, including debt, depends on the information given to the public. We add to both papers by varying experimentally the mode of financing. This allows us to identify how mode of financing causally affects public support for that policy. To do so, we use a conjoint experiment, which makes our findings robust to social desirability bias and ordering effects among attributes. To our knowledge, our paper is the first to apply a conjoint experiment design in the context of green investments. Previous conjoint studies have been mostly dealing with the optimal design of carbon taxes. Additionally, we examine the mechanisms behind preferences in more detail by studying which individual characteristics are related to support for debt financing of green investments. More specifically, we focus on time preferences, concerns about the future in general and about future generations, and fiscal conservatism. Our expectations and analytical choices, including the sample size, are pre-registered. This means that we test for hypotheses and run regressions, which were specified before we got access to the data. Such pre-registrations are nowadays common in survey experimental research to prevent p-hacking and other forms of *post hoc* research practices, and overall to increase the validity of results.

We find that among the possible modes of financing green investments, public debt is less popular than relatively narrow taxes

targeted at clear policy goals such as a carbon tax and a wealth tax. Specifically in the Netherlands, public debt is less popular than cuts in public spending in other domains. However, debt financing is more popular than broad-based taxes such as VAT and personal income tax. We further find some evidence that concerns for future generations and fiscal conservatism are negatively associated with support for debt financing of green investments, while we do not find a relationship between support for debt financing and our measure of time preferences. The latter finding, while surprising, is in line with the literature (Jacobs and Matthews, 2012; Bechtel, Jensen & Scheve, 2019). Our findings can be used to better align climate policy packages to voter preferences.

The remainder of the paper is organized as follows. The next section provides a brief overview of the literature to which this paper contributes. Section 3 outlines our hypotheses and the underlying theory. Section 4 describes our research design. Section 5 presents and discusses our results. Section 6 concludes and formulates policy recommendations.

2. Literature review

2.1. Public support for climate policies

Various papers have contributed to the understanding of the determinants of public support for climate change mitigation and adaptation policies (in short: climate policies). Dechezleprêtre et al. (2022) and Dabla-Norris et al. (2023) are examples of recent, comprehensive, cross-country surveys. Multiple studies for example show that an important barrier to adopting measures to mitigate climate change is the perceived burden of these policies for individuals (Drewe & Van den Bergh, 2016; Fairbrother, 2022; Dechezleprêtre et al., 2022).

In particular, there is an extensive literature on public support for carbon taxes. The results make clear that support for a carbon tax depends on its perceived distributional impact (e.g.; Kallbekken and Sælen, 2011; Baranzini and Carattini, 2017; Sommer et al., 2022; Douenne and Fabre, 2022) and the perceived effectiveness of achieving emission reduction (e.g. Baranzini and Carattini, 2017; Kallbekken and Sælen, 2011; Sommer et al., 2022; Douenne and Fabre, 2022). However, this distributional impact is often perceived as regressive and individuals are skeptical about the effectiveness, resulting in low support. Nonetheless, this changes when the use of revenue is considered. Many studies examine ways to make such taxes more acceptable (Klenert et al., 2018; Maestre-Andrés et al., 2019; Carattini et al., 2018). The public is often more in favor of carbon taxes if the resulting revenues are earmarked for green investments (Baranzini and Carattini, 2017; Kallbekken and Aasen, 2010; Kotchen et al., 2017; Sælen and Kallbekken, 2011).

However, much less attention has been devoted to public acceptance of other forms of climate policies than carbon taxes (Fairbrother, 2022). Green investments, in particular, have received very little attention from researchers investigating public support for climate policies. Important exceptions include Rhodes et al. (2017), who consider government R&D investments into clean energy sources, and Dechezleprêtre et al. (2022), who consider a green infrastructure program next to a carbon tax and regulation on cars and several other policies. Both studies find that costs of these programs for households play an important role in explaining support. In addition, Dechezleprêtre et al. (2022) find that green investment programs gain more support than either a carbon tax or bans on combustion-engine cars. Voters anticipate that investment programs may yield some economic spillovers next to the costs. An important question then is how the mode of finance, including debt financing, affects societal support for such programs.

Given that existing studies on public support for climate policy focus

mostly on carbon taxation, and to some extent on direct regulatory interventions imposed on private entities, they are mostly concerned with potential distributional effects across populations rather than across time (Sommer et al., 2022).² To the best of our knowledge, two studies examine preferences for debt financing and therefore closely relate to our work. First, D'Acunto et al. (2022) use an information-treatment experiment in Germany to study societal support for various ways of covering the costs of climate adaptation. They consider government debt, a CO₂ tax, an increase in income tax for top earners, a tax on beneficiaries from climate change, or private insurance against the costs of climate change. They find low support for debt financing of climate adaptation policies. Second, Dechezleprêtre et al. (2022) use an information treatment experiment in a sample covering 20 countries and find evidence of support for green investments financed by public debt. They also find non-experimental evidence that public debt is less popular as a mode of financing than a tax on the wealthiest or a carbon tax.

2.2. Conjoint experiments

Conjoint experiments have become increasingly popular for studying preferences in multidimensional choice setups, such as voting and public policy reforms (e.g. Hainmueller et al., 2014). Likewise, these types of experiments found a broad application in the literature examining public preferences for climate change policies (e.g. Bechtel et al., 2019a; Bechtel et al., 2020; Beiser-McGrath and Bernauer, 2019a; Beiser-McGrath and Bernauer, 2019b; Carattini et al., 2017; Huber et al., 2020; Ščasný et al., 2017; Freire et al., 2021; Nicoli et al., 2023). Conjoint experiments have been shown to reduce social desirability bias (Hainmueller et al., 2014; Horiuchi et al., 2022), which may be present in survey experiments examining stated preferences of respondents, and ordering effects among attributes.

3. Theoretical background

When governments (co-)finance green public investments, government spending will increase in the short-run. If one assumes a fixed budget and disregards a potential future financial return, new spending must be offset by either an increase in revenue (taxes), or spending cuts in other areas of the budget. This is how policies are generally presented to respondents in public opinion surveys and survey experiments. This occurs usually in the form of an average cost to citizens or an aggregate amount that the entire country must immediately confront.

In practice, however, the burden of new government spending is distributed unequally across the population. First, under progressive taxation schemes, the median citizen likely pays less than a citizen with a higher income. Second, governments can choose to distribute the burden of such green investments across time, which is the focus of this paper.

Borrowing in response to temporary high expenditures provides two advantages to governments. First, if individuals and governments face the same interest rates and individuals expect increased debt and interest payments will be repaid via future taxes (that is, the conditions for Ricardian Equivalence hold, Barro, 1974), governments can use debt financing to smooth government and aggregate consumption. By doing so, governments can prevent high temporary tax burdens on firms and individuals that would negatively impact the economy (Barro, 1979). This argument is even more compelling when the borrowing is used to finance projects that have a (social) return in the future. Second, when individuals do not foresee that increased debt and interest payments will lead to higher taxes, or when interest rates payable by government are lower than the interest rates faced by individuals, extra government

borrowing or deficit financing may be preferred over increases in current taxes because the future tax payments are perceived as less burdensome (Barro, 1974). There are various theoretical arguments and empirical findings that suggest that the Ricardian equivalence may not hold in reality (e.g. Fatás et al., 2019). For example, myopic behavior by voters is supported by work from psychology, behavioral economics and neurology. The degree and ways in which individuals discount the future has been summarized in Cohen et al. (2020).

If voters do not completely account for the future consequences of debt, politicians can create a “fiscal illusion” by shifting the burden of contemporary investments to future periods, hiding the true burden for current generations. Borrowing can provide short-term autonomy to politicians to adopt policies that would otherwise face public opposition. However, in the longer-run the higher interest payments—or inflationary pressure—will restrict future governments if the return on investment fails to outpace interest rates. This is in line with the insights of Buchanan and Wagner (1977) who recognized that although expansionary policies financed by deficits would be popular during economic downturns, voters would not recognize the need to reduce government surpluses during economic upturns and resist consolidation. Nordhaus (1975) explains how this mechanism might yield political business cycles. More recently, Bisin et al. (2015) conclude that governments may borrow too much when politicians are tempted to use deficit-finance to please partly myopic voters. See Fatás et al. (2019) for a review of the literature.

Various empirical studies show that citizens are more supportive of costly military engagements when such actions were paid for with borrowing rather than taxation (Flores-Macias and Kreps, 2017; Kriner et al., 2018). Beyond such evidence, the frequency with which governments use debt financing even when economically harmful indicates that this strategy has political benefits. If governments were using borrowing simply to avoid uncertainty through tax-smoothing, periods of deficits should equal periods of surplus. However, in reality, a deficit bias has emerged as government surpluses are rare relative to deficits (Wyplosz, 2014). Given that voters perceive the costs of increased taxes and cuts in spending most likely higher than the costs of public debt, we arrive at our first hypothesis:

H1. The support for green investments is greater if they are financed via public debt as compared to other sources of financing such as taxes and cuts in government spending.

Although Hypothesis 1 refers to taxes broadly conceived, certainly not all taxes are perceived the same, and it is therefore unclear whether debt finance can be expected to be favored over every tax category. For a given use of revenue, the perceived social benefit of raising a particular tax depends on the general perceptions of government, the distributional impact and fairness of the tax, and how this compares to the perceived effect on the economy (Stantcheva, 2021). In particular, Stantcheva (2021) finds that fairness considerations are the most important determinant of support of income and estate taxes. Slemrod (2006) in addition finds that reform receives more support when high-income households are expected to pay more tax and when one's own household is expected to pay less tax. Both arguments are found to be equally important.

In our setup, personal income tax and the value-added tax are broad-based taxes paid by almost all individuals with almost similar economic effects. It can therefore be expected that both are perceived roughly the same. However, the wealth tax and the carbon tax are more targeted in the sense that the legal incidence of these taxes is more related to targeted groups in society that either have relatively high wealth or relatively high carbon emissions.

Given a skewed wealth distribution it is likely that most individuals will perceive increasing the wealth tax as fair. This expectation is in line with Bremer and Bürgisser (2023) who find the strongest support for policy packages including progressive (top) income taxes.

The literature about public support for a carbon tax discussed in the

² A notable exception is a study by Bechtel et al. (2020). They demonstrate that people generally prefer constant carbon pricing over a pricing scheme which ramps up the burden over time.

previous section indicates that support increases if the revenues of such a tax are earmarked for green investments, and there is suggestive evidence that a carbon tax and a wealth tax may be preferred to debt financing (Dechezleprêtre et al., 2022). Consequently, we expect that wealth taxes and carbon taxes might receive support for reasons beyond pure financing. Therefore, the broad-based personal income tax and the value added tax are better candidates to test the public's preference for current or delayed (deficit) financing of extra government green investment. This discussion leads us to the second, more specific hypothesis.

H2. The support for green investments is greater if they are financed via public debt as compared to broad-based taxes.

The first two hypotheses directly test the policy preference of individuals. The following three hypotheses consider to which degree various perspectives on the future affect this policy preference. Hypothesis 3 focuses on the standard economic perspective of time discounting; Hypothesis 4 focusses on fiscal conservatism which aligns with a more prudent approach to risks; Hypothesis 5 adds concern for future generations (altruism) to traditional time preferences.

If preferences for debt financing are driven by individuals' relatively high discount rates, we would expect that individuals with higher discount rates prefer debt more than individuals with lower discount rates. The empirical evidence about the link between time preference and policy preferences is mixed. While some studies find that time preferences do not drive individuals' preferences for long-term investments (Jacobs and Matthews, 2012; Bechtel, Jensen & Scheve, 2019), others do find a correlation between time preferences and preferences for the timing of taxation (e.g., Bechtel et al., 2020). Considering the theoretical expectations highlighted above, we put forward the following conditional hypothesis:

H3. The increase in support to finance green investments via public debt is greater for individuals with higher discount rates than for individuals with lower discount rates.

Besides different degrees of time preference, individuals are also likely to differ in their preferred degree of fiscal prudence. Whereas some individuals will support the ideas of Barro (1974, 1979) that it is best to smooth the cost of temporary high government expenditures, others will support the analyses of Buchanan and Wagner (1977) that it is better to ensure annual budget balance. The latter group we regard as fiscally prudent and refer to them as fiscal conservatives. Such fiscal prudence may translate into a preference for fiscal austerity or fiscal consolidation, and therefore a lower preference for government debt. One could argue that the prudence preference measured here concerns caution about the future—and the future need for debt—combined with being skeptical about how the government functions. In line with this, Stantcheva (2021) finds that the view of government matters for the evaluation of policy.

The extent to which the public is fiscally conservative is the object of much discussion in literature (Bremer and Bürgisser, 2023). While some studies find that citizens are in favor of austerity (e.g., Bansak et al., 2021a; Barnes and Hicks, 2018), others argue that voters are against fiscal consolidation (e.g., Bojar et al., 2022; Jacques and Haffert, 2021). We argue that individuals with more fiscally conservative views are less inclined to support financing green investments through public debt than individuals with less fiscally conservative views.

H4. The increase in support to finance green investments via public debt is greater for individuals with less strong preferences for fiscal discipline than for individuals with strong preferences for fiscal discipline

A key aspect of green investments is that they will benefit future generations. Studies in psychology show evidence that some people do care about future generations (Wade-Benzoni and Tost, 2009; Graham et al., 2017). The economic literature suggests that the preference for

debt financing depends on whether individuals care for future generations (e.g. Akerlof, 2007). Ricardian equivalence, when there is no preference for or against debt, holds when individuals value future generations similarly to themselves. A preference for debt may follow if there is no concern for future generations at all. In line with this, Fairbrother et al. (2021) show that people who care more about the well-being of future generations are more willing to support both climate policies and debt reduction. The fact that green investments will benefit future generations might have competing effects. Borrowing may shift costs to those who will benefit most, but people most concerned with future generations may be averse to burdening future generations with debt. We therefore hypothesize that people who are more concerned with the well-being of future generations might favor green investments but are less inclined to finance them via public debt.

H5. The increase in support to finance green investments via public debt is greater for individuals who are less concerned about the future and the well-being of future generations than for individuals who are more concerned about the future and the well-being of future generations.

4. Research design

4.1. Experiment design

To test the hypotheses, we ran a survey³ consisting of three main modules in Italy and the Netherlands. Module 1 contained a standard questionnaire for socio-demographic (objective) characteristics including gender, age, region of residence and education which were used to control survey quotas. Module 2 comprised pre-treatment questions on subjective attitudes, which served as moderating variables in conditional hypotheses like discount rates, the level of fiscal conservatism, concerns about the future consequences and generations. In Module 2 we also asked several auxiliary questions to help us understand how people reason about the incidence of various fiscal instruments. Lastly, Module 3 contained a conjoint experiment and an open-ended question asking respondents about their reasoning for making conjoint choices.⁴ The full survey flow is provided in Supplementary Material.

Conjoint experiments are widely used to study preferences in multidimensional choice contexts and offer several widely recognized advantages. For a more in-depth discussion of the methodological advantages of conjoint experiments, see Hainmueller et al. (2014), Bansak et al. (2021b), and Horiuchi et al. (2022).

In this study we deploy a paired-profile conjoint experiment whereby we present respondents with descriptions of two hypothetical “packages” of green investments. In our setup, the green investments vary based on their size, on whether they are part of a broader international effort, and on how the green investments are financed. It is to stress that the latter attribute is of interest in this study. The other two attributes serve to unconfound the financing treatment in case respondents associate certain type of financing with its size and/or international effort. The cost attribute is formulated as a share of GDP, instead of costs beard by individuals since whether individuals will be burdened by the costs of investments is conditional on the financing mode. Table 1 details all attributes of green investments and their levels (randomly assigned per each conjoint task). It is to underscore that before declaring their

³ The study was approved by the ethics committee at the Faculty of Governance and Global Affairs of Leiden University on April 30, 2022 (reference no. 2022-009-ISGA-Kantorowicz). The pre-analysis plan, in turn, is available via OSF.

⁴ Block 4 of the survey comprised a vignette survey experiment attempting to test whether positive and negative framing public debt can shift public preferences towards financing green investments via public debt. We report the result of this experiment in Supplementary Material.

Table 1
Attributes and levels displayed in the conjoint tables.

Attributes	Levels
Main source of financing the investment	Increase of government debt Increase of personal income tax Increase of VAT Increase of carbon tax Increase of wealth tax Cuts in other budgetary spending
Size of additional investments, annually in years 2022–2030	0.1% of GDP 0.5 % of GDP 1.0% of GDP 1.5% of GDP 2.0% of GDP 2.5% of GDP
Similar levels of additional investments introduced by	No other countries The United States European Union China All industrialized countries All developing countries

preferences respondents were given precise information as to what various financing modes imply.⁵ They were also provided with the information on the other two attributes, specifically what GDP is and how it is measured (see section “Translations” in Supplementary Material for more details about the survey flow and information provided to respondents).

The design of the conjoint experiment was fully factorized, i.e. all possible combinations of attributes’ levels were allowed. Attributes were randomly ordered between participants, but the order of attributes was kept constant within participants to reduce the cognitive burden imposed on respondents. Fig. 1 displays an example (in English) of the conjoint task performed by respondents (the Dutch and Italian examples are provided in Figure A1 and A2 in Supplementary Material). In each conjoint task respondents gave answers to two questions. In the first question, they were (forced) to choose a preferred investment profile (either investment A or B). The second question was a rating item in the form of two sliders where respondents were asked to rate both investments on a 1–7 Likert scale. Both forced choice and rating questions

are displayed in Figure A3 and A4 in Supplementary Material.

4.2. Data collection

We used cross-sectional data of the Dutch and Italian respondents recruited via the survey firm Dynata in October 2022. The samples of respondents are quota-representative to reflect target populations’ characteristics in terms of gender, age, education, and region of residence. In Table A2 in Supplementary Material, we demonstrate that the deviations between target and sample characteristics are relatively minor. The reason for choosing Italy and the Netherlands is not to test for differences across the two countries, but rather to examine if the results replicate in two radically different contexts. These are: (1) the context of relatively low public debt and historically fiscally conservative public—The Netherlands (public debt at the level of 56 percent of GDP in 2020), and (2) the context of relatively high public debt and comparatively less fiscally conservative public—Italy (sovereign debt close to 156 percent of GDP in 2020).

The aim was to collect a well-powered sample of 1500 participants per country. This sample, allowing us to uncover small effect sizes of 3 percentage points, was derived in a principled manner using a newly available tool for calculating statistical power in conjoint experiments developed by Stefaneli and Lukac (2020). See Supplementary Material and Figure A6 for the detailed parameters included in the power analysis. The final sample size of this study—1589 respondents in Italy and 1576 in the Netherlands—reaches an *ex-ante* registered sample size. Given that each respondent was asked to perform eight tasks whereby in each task two green investment profiles were evaluated, the total number of observations per country is above 25,000 observations, resulting in the final sample size of more than 50,000 observations. That means that each investment profile is assessed some 231 times on average.

4.3. Estimation procedure

We estimate the treatment effects using an ordinary least squares (OLS) regression model with standard errors clustered at the level of respondents⁶ and with raking survey weights.⁷ OLS regression greatly facilitates the interpretation of results and is commonly used to obtain the main quantities of interest in the conjoint experiments, i.e., the

Green investment	Proposal A	Proposal B
Main source of financing additional investments	Increase of VAT	Cuts in other budgetary spending
Similar level of additional investments introduced by	The European Union	All industrialized countries
Size of additional investments, annually in years 2021–2030	2.5% of GDP	1.5% of GDP

Fig. 1. An example of the conjoint task.

⁵ In particular, we stress that respondents by and large understood the perceived incidence of the debt financing. Namely, that it will burden future generations. Around 40% of respondents in both Italy and the Netherlands indicated “future generations” as a group to bear the largest consequences of public debt. This was the dominant answer for this mode of financing. See Table A1 in Supplementary Material for the detailed description of perceived incidence of various financial instruments.

⁶ Notice that each respondent performs eight conjoint tasks thus observations are not independent within respondents.

⁷ We employ raking survey weights to make sure that sample characteristics correspond with target population characteristics in terms of gender, age, education and region of residence. As evident from Table A2 in Supplementary Material, the deviations between target and sample characteristics are rather small.

average marginal component effects (AMCEs; changes in support vis-à-vis a reference attribute's level) (Hainmueller et al., 2014), marginal means (MMs; the mean support for a given profile containing a given attribute's level) and differences in marginal means (diff-in-MMs) (Leeper et al., 2020). MMs and diff-in-MMs are particularly suitable for testing conditional hypotheses. In the Supplementary Material we provide a set of tests validating the basic assumptions of the conjoint experimental design, namely the absence of carry-over and profile-order effects. We furthermore examine if the randomization of attributes levels worked as intended and check for balance of basic individual level characteristics across experimental treatments.

For robustness, we use three types of outcome variables in the regression analysis. Of primary interest in the conjoint survey experiments is the binary (forced) choice outcome variable whereby respondents choose one preferred investment out of two displayed investment profiles. We also use two other outcome variables, the ordinal rating scale (from 1 to 7) and a dichotomized form of the rating scale where scores 5–7 are coded as 1 (support) and scores 1–4 are coded as 0 (no support). This dichotomous measure is used to estimate the proportion of the population (or subpopulation of interest) that supports specific green investment in line with procedures adapted by Bansak et al. (2021a). We report the results for the forced choice binary question and the dichotomized rating, while the results for the untransformed rating scales can be found in Supplementary Material.

Apart from the outcome variables and variables capturing experimental treatments (attributes' levels), we further use several control variables (gender, age, education, income, ideological standing and climate change attitudes)⁸ and moderating variables for testing conditional hypotheses. As to the latter, testing H3 requires measuring discount rates (impatience). We capture this using a survey item devised by Falk et al. (2018)—the so-called staircase method (details found Supplementary Material). We divide respondents into two groups with “higher” and “lower” discount rates and use a more parsimonious version of the staircase method where we expose respondents to only two (out of five) steps of the staircase. In fact, only one step was sufficient to roughly divide respondents into two equally sized groups, i.e., those with “high” and “low” discount rates (impatience).

To test H4 we need to measure respondents' attitudes on fiscal conservatism and employ a simplified version of the social and economic conservatism scale created by Everett (2013). We asked respondents how positive (0–10 Likert scale) they feel about the following issues: (1) welfare benefits, (2) limited government, (3) fiscal responsibility (limited budget deficit), (4) business. Of main interest is item 3 directly measuring attitudes towards fiscal discipline. The binary variable grouping respondents into those with “more positive” and “less positive” feelings about fiscal responsibility is created based on the median value on this item. Furthermore, to arrive at a broader measure of “economic conservativeness” we created a composite measure by computing the mean of all four items (the scale on the feelings towards welfare benefits is reverted so that the higher values indicate a more conservative approach). The grouping into two groups was subsequently performed based on the median value.

Finally, the conditional hypothesis H5 requires information on the extent of people's subjective concerns about the future and the well-being of future generations. To measure people's concerns about the future, we deploy an ultra-short version of the instrument capturing people's consideration of future consequences devised by Vilar et al. (2022). The concerns about the well-being of future generations are, in turn, measured via items designed by Fairbrother et al. (2021). In line with our pre-analysis plan, we followed simple aggregation procedures to cluster respondents into two groups based on these variables—respondents with “high level of concerns” and “low levels of

concerns.” The precise questions asked and details about the aggregation procedures are specified in Supplementary Material.

5. Results and discussion

5.1. Baseline hypotheses

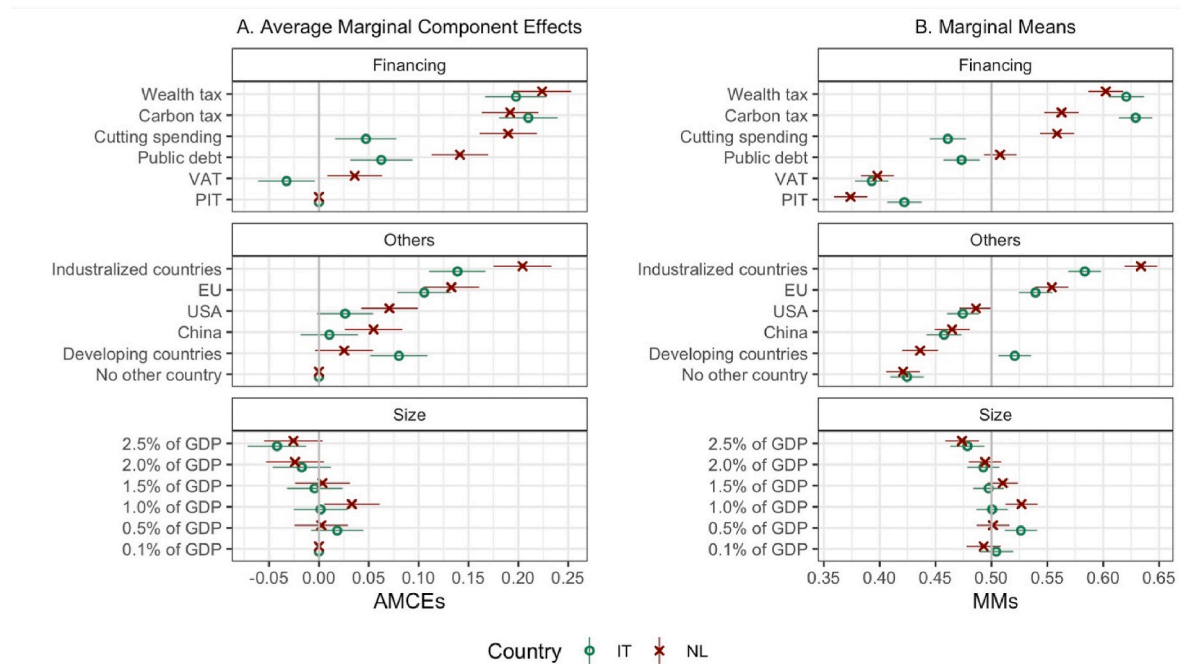
Fig. 2 (Panel A—forced choice and Panel B—dichotomized ratings⁹) provides results for H1 and H2 to examine whether the support for green investments is greater if they are financed by public debt as compared to other financing means (H1) or as compared with only broad-based tax instruments (H2). It is clear from the figure that the evidence is in line with H2. The support for green investments is greater in both Italy and the Netherlands if these investments are financed via public debt rather than PIT and VAT, which both are broad-based tax categories. The AMCEs for the forced choice outcome (Panel A, left figure) offer an impression of the size of the effects. Namely, in the Netherlands the probability of choosing the green investment package financed by public debt is greater by some 13 points as compared to financing via PIT and some 10 points as compared to VAT. In Italy the AMCEs are lower on average. The probability of favoring the green investments financed by public debt increases by nearly 9 points when compared to VAT and by 5 points when compared to PIT. All these differences are statistically significant at the conventional level of 5%. The estimated effects are somewhat lower when using the dichotomized rating variable (Panel B, left figure), which contrary to the AMCEs from the forced choice design allow for comparing the overall support for green investments conditional on their design aspects. Here, AMCEs are nearly 9 and 6 points higher in favor of public debt as compared to PIT and VAT, respectively, in the Netherlands. In Italy the same AMCEs are, in turn, 6 and 3 points. As before, these differences are significant at the conventional level of 5%. All in all, the Italian respondents seem to be slightly less favorable towards financing green investments through public debt than the Dutch respondents. This could be driven by the debt-aversion developed in recent years by the Italian public following the public finance crises in the early 2010s. In fact, according to our survey (pre-treatment question measuring fiscal conservativeness), the Italian public appeared to be much more positive about limited budget deficit than the public in the Netherlands (see Figure A17 in Supplementary Material).

Contrary to the expectations in H1, even greater support for green investments is observed in both countries if financing is pursued with narrow, targeted wealth or carbon taxes. For the Dutch sample, the corresponding AMCEs (from the forced choice design and as compared to PIT) are nearly 23 points for the wealth tax and 20 points for the carbon tax in. In Italy the same AMCEs are both close to 21 points. The result concerning the greater favorability towards carbon tax than public debt might at first appear puzzling given generally widespread public opposition towards carbon taxes. This result could be explained in several ways. First, the literature broadly indicates that the public is more supportive of carbon taxes if the revenues stemming from them are earmarked for environmental projects (see, e.g., Carattini et al., 2017; Beiser-McGrath and Bernauer, 2019a; Dechezleprêtre et al., 2022). In fact, this is precisely implied by our set-up where the revenues from carbon taxes are specified to finance green investments. The second explanation could be that the public is not fully aware of the economic incidence of the carbon tax, i.e., the public might not realize that this tax burden will also fall on them. To shed light on this, we use one of the pre-treatment questions attempting to capture people's perceived economic incidence of various fiscal instruments. In the Supplementary Material (Figure A18), we show that respondents who think that households with lower income will be among those who will bear the greatest burden of carbon tax increases are indeed much less supportive

⁸ For the detailed description of how the control variables were operationalized, see Supplementary Material.

⁹ The conjoint results for untransformed rating scale questions are reported in Figure A16 in Supplementary Material.

Panel A. Forced choice question



Panel B. Dichotomized rating scale question

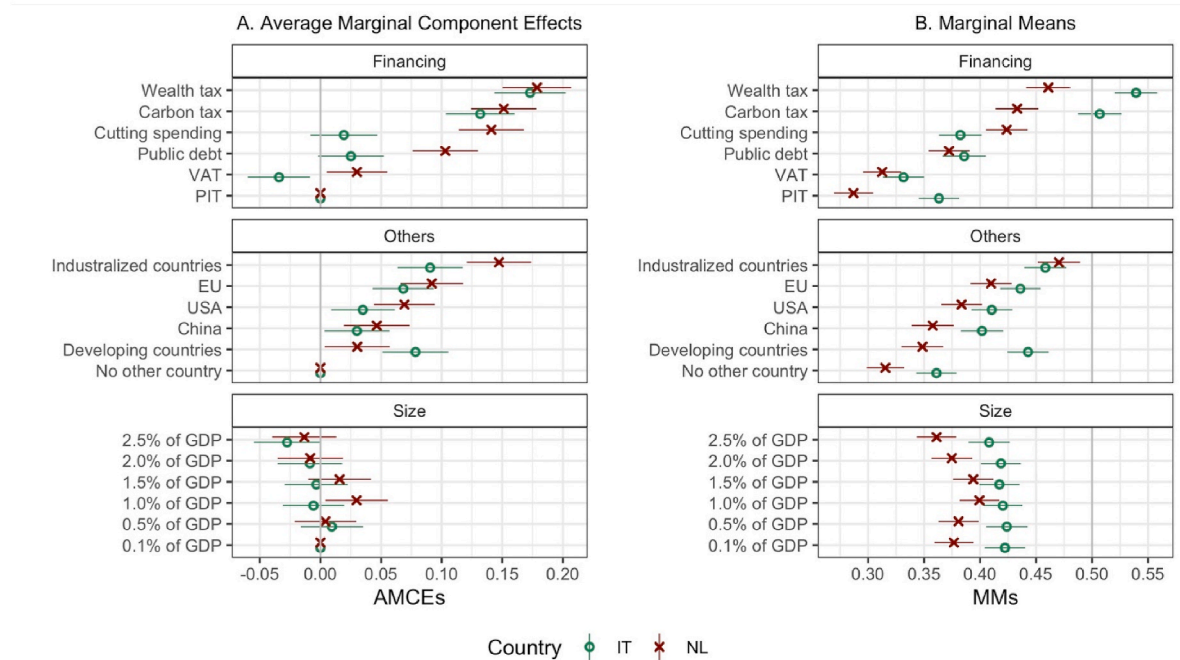


Fig. 2. Conjoint survey results testing H1 and H2. Panel A. Forced choice question, Panel B. Dichotomized rating scale question.

of the carbon tax to finance extra green investments.

As to the differences between Italy and the Netherlands, financing green investments via cuts in other budgetary spending leads to an even greater support in the Netherlands than financing via public debt, while in Italy these two financing modes are comparable. It is clear from Panel B of Fig. 2 (right figure) that, generally, the public is not in favor of green

investments as such. The share of people with clear preferences for green investments is around 40%. Likewise, the Italian public is slightly more favorable towards green investments than the Dutch public. What is more, some design features—namely, financing via wealth or carbon taxes—make the green investments favorable by most of the Italian respondents.

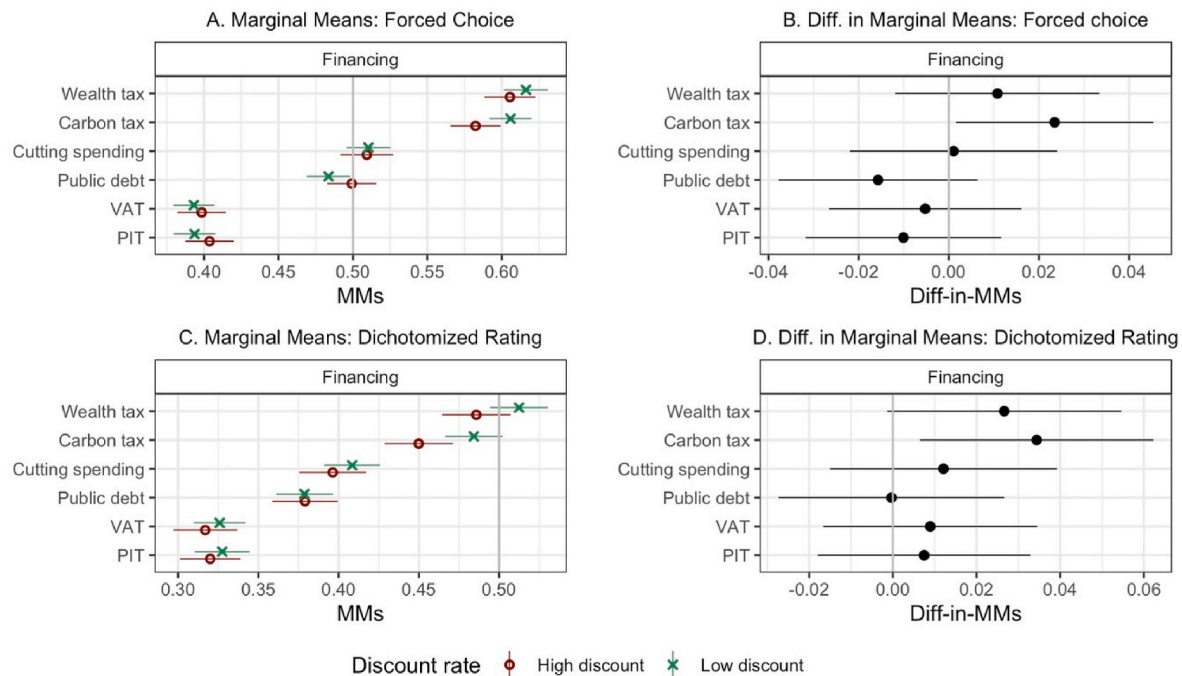


Fig. 3. Conjoint survey results testing H3 (conditioning on discount rate).

When looking at the remaining attributes—the international effort and the size of green investments—it is notable that there is strong support for green investment efforts in both countries when they are undertaken together with other countries and only weak favorability for a specific volume of investments. The structural topic model performed on open-ended answers confirms that the mode of financing and international effort around green investments are the most crucial factors shaping respondents' decisions (see Supplementary Material).

5.2. Conditional hypotheses

To increase statistical power and given that the ordering of preferences on the main attribute of interest (financing) is roughly the same in Italy and the Netherlands, we combine both samples for subgroup analyses to test conditional hypotheses.¹⁰ The conditional hypotheses are tested sequentially and separately, with only one interaction term included at a time.

The first conditional hypothesis—H3—argues that public debt financing should increase support for green investments to a larger extent among respondents with high discount rates as compared to respondents with low discount rates. Fig. 3 again gives an overview of the results by employing both forced choice and dichotomized rating outcome variables. Overall, we recover no evidence in favor of H3. By and large, people with various discount rates display similar preferences for green investments financed through public debt. The results for the rating scale question corroborate this finding (see Supplementary Material).

Contrary to H3, we provide partial evidence in favor of H4. In line with this hypothesis, public debt increases the favorability towards green investments particularly among respondents who are less fiscally conservative. As can be seen in Fig. 4, this conclusion is valid for both of the moderating variables (fiscal conservativeness more specifically in

panels A-D and economic conservativeness more broadly in panels E-H). However, this clear result is obtained only for the forced choice outcome variable and not for dichotomized rating variable, which delivers null results. The forced choice question nudges respondents to more carefully consider trade-offs and to declare one of the two packages as strictly more preferred resulting in assigning a 1 to a more favored package and 0 otherwise in every task. On the other hand, the dichotomized rating measure may result in both packages being unfavored (both obtaining a score 0, i.e., rating below 5 on a 1–7 Likert scale) or both being favored (obtaining a score of 1, i.e., rating at minimum 5). When the analysis is rerun on the subsample of the choices where respondents clearly mark one project as favored and the other as unfavored, the results for the dichotomized rating fall much closer to those obtained for forced choice variable (see Figure A25 in Supplementary Material). However, this pattern can only be confirmed for the fiscal dimension of conservativeness and not the broader economic one.

Finally, we find some evidence in favor of H5, which argues that public debt financing should increase support for green investments particularly among individuals who care less about the future consequences and future generations than among individuals who care a lot about these future-oriented aspects. The results in support of H5 are evident when considering people's concerns about future generations and the binary forced choice variable (Panel E and F of Fig. 4). The fact that the results for the dichotomized rating question do not corroborate this finding (Panel G and H) is somewhat puzzling. In Supplementary Material (Figure A22) we show that the results for the dichotomized rating are much more in line with those produced by the forced choice outcome if we rerun the analysis on the subset of choices where respondents marked one package as clearly favored (resulting in a 1) and another as clearly unfavored (resulting in a 0). This result provides some further confidence in H5 whereby concerns about future generations are used as a conditioning variable. The results for other conditioning

¹⁰ The decision regarding combining both samples was not pre-specified in the pre-analysis plan.

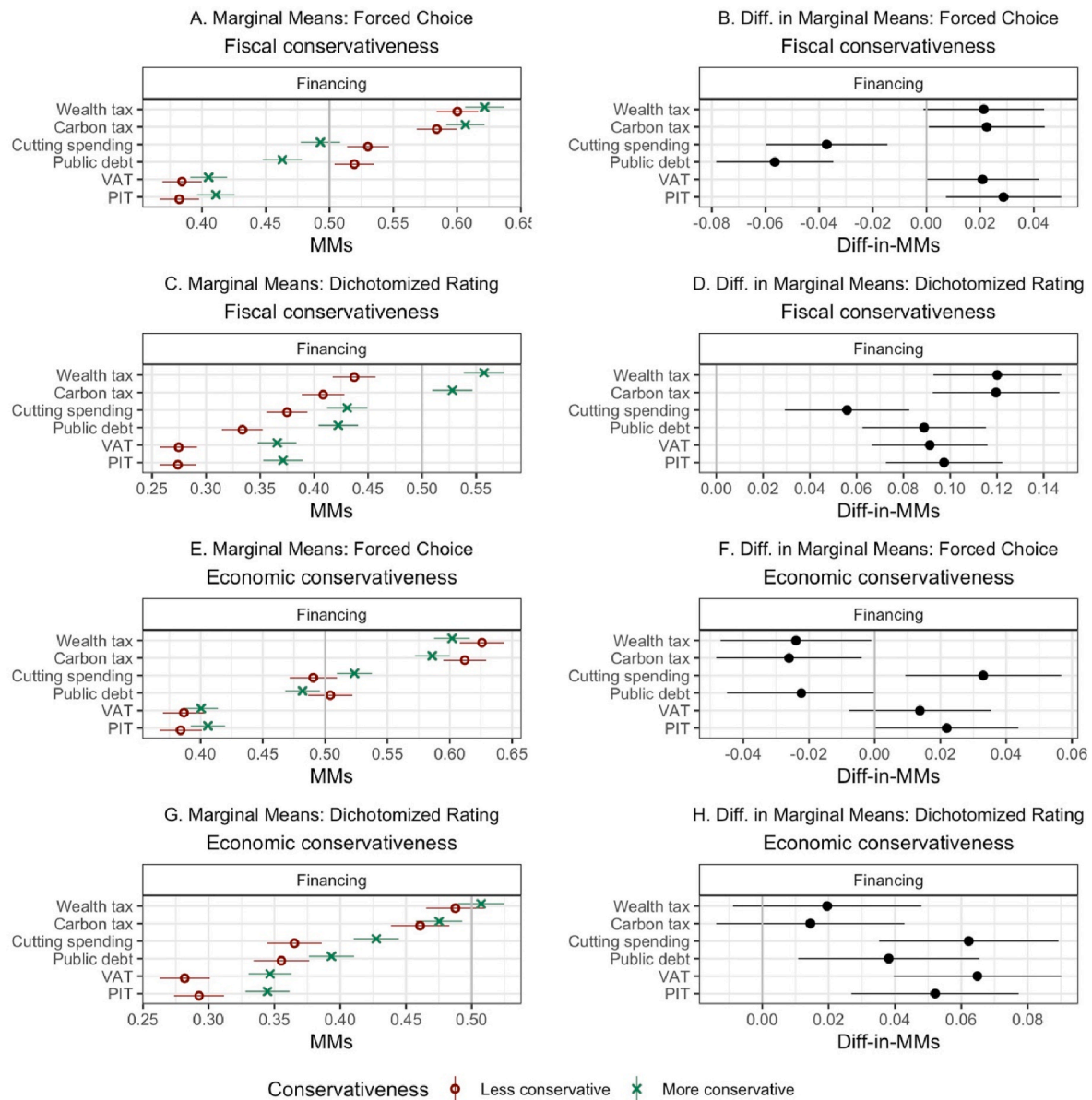


Fig. 4. Conjoint survey results testing H4 (conditioning on conservativeness).

variables provide no evidence (concerns about future consequences: Panels A-D of Fig. 5) or moderate evidence in favor of H5 (thinking about future generations: Figure A20 in Supplementary Material).

In addition to these hypothesis tests, we run an exploratory analysis to detect further interaction effects between the attributes' levels and individual level characteristics of respondents, using procedures devised by Ratkovic and Tingley (2017). Since this analysis goes beyond the pre-analysis plan, we mention these results only in a cursory fashion in Supplementary Material (Figure A27), calling for further research on these additional aspects.

6. Conclusions and policy implications

Our analysis provides experimental evidence that financing green investments with public debt is politically efficient for governments which, due to a favorable credit rating, have sufficient access to capital markets. We find that financing with public debt increases support for green investments by roughly 10 percentage points compared to income taxes. This aligns with the view that policy finds greater support when citizens are shielded from immediate distributional costs, and is in line with the recent economic literature that highlights that debt finance may be preferred when voters are myopic or when government

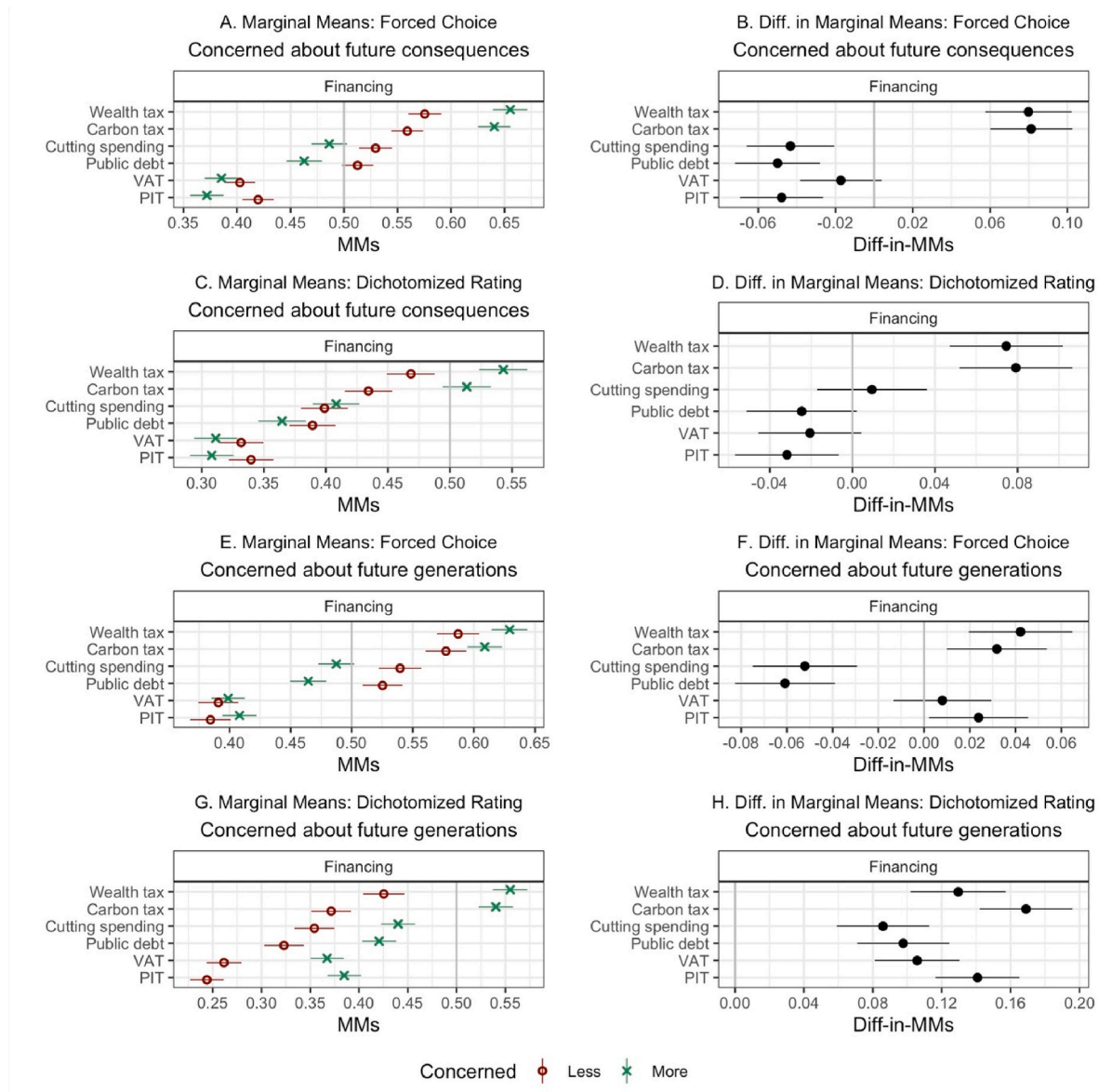


Fig. 5. Conjoint survey results testing H5 (conditioning on concerns about future consequences and generations).

investment is productive. In particular, public debt permits reshaping political constraints and allows governments greater autonomy to pursue unpopular policies in the short term. Our results suggest that politicians can limit public opposition if they decide to finance green investment with public debt. Our results cannot be explained by a standard (economic) measure of time preference amongst voters, but we do find evidence that fiscal conservatives and people who care about future generations—two variables which may measure a richer perspective of the future—prefer public debt finance relatively less. This suggests the debt financing may have greater political benefits among political coalitions that do not rely on fiscally conservative voters.

Besides the relative support for public debt, we find that the two most popular funding mechanisms are carbon and wealth taxes. This finding corroborates recent work that shows carbon taxes are popular when their revenues are earmarked to environmental investments (Beiser-McGrath and Bernauer, 2019a) and it shows that citizens are willing to accept high-cost climate change mitigation strategies. These results are also in line with recent papers that show support for more inclusive green transitions (Dechezleprêtre et al., 2022; D'Acunzio et al., 2022). Furthermore, these results correspond with findings by Bremer

and Bürgisser (2023) who show that voters generally care more about taxes and spending than about debt, and support more progressive tax systems.

Important progress has been made in implementing effective policies that limit CO₂ emissions, including carbon prices, and in combining such green policies with suitable redistribution. Yet, the political path to implementing such inclusive green policy packages that both achieve environmental goals and ensure that lower income households are not burdened too much may be (too) long. For example, as Mildenberger (2020) demonstrates, there is no natural coalition to support carbon taxes in advanced industrialized democracies, which makes it easier for industry lobbies to push their agenda. Wealth taxes, on the other hand, have recently seen renewed interest, but are also both politically and administratively difficult to implement due to insufficient international cooperation in the face of the mobility of wealthy taxpayers (e.g., Saez and Zucman, 2022).

In the short-run and in countries with access to affordable private credit, debt financing therefore seems to be in the general public's interest as it allows to achieve part of the climate objectives without directly solving the distributional conflict. For countries that lack

accessWade-Benzoni and Ps to affordable private credit markets, our results suggest that official creditors—or governments with access to affordable credit—have an opportunity to play a leading role in financing green investments where public support opposes broad-based taxes. Related to this is the NextGenerationEU policy package which includes the Recovery and Resilience Facility that is targeted at economic revival from the COVID-19 pandemic. This EU policy package is financed by bonds issued by the European Commission on behalf of the Member States. Given our findings, we conjecture that communicating to the public the fact that these post COVID-19 policies are financed via debt should increase public support for them. The situation whereby the debt is incurred by a supranational body (here the European Commission), instead by the national government, could lead to an even greater increase of public support. These are fruitful inquiries for future research.

By demonstrating the political benefits of debt-financings, our results also help explain the emergence of green bonds in the public sector (Monk and Perkins, 2020). Our findings suggest that instituting such collective financing instruments can aid in not only increasing economic efficiency but also relieving political opposition to green investment schemes. Our results also hold relevance for political communication. Many green investments are wholly or partially funded by deficits, yet the public is often unaware of it. Our results suggest that political backlash to these investments can be dampened by communicating that they do not require immediate transfers.

Funding

Research for this article was supported by a grant from the Global Transformations and Governance Challenges programme at Leiden University. DiGiuseppe would like to acknowledge support from ERC Horizon 2020 Grant # 852334.

CRedit authorship contribution statement

Jaroslav Kantorowicz: Conceptualization, Methodology, Investigation, Visualization, Data curation, Project administration, Funding acquisition, Writing – review & editing. **Marion Collewet:** Conceptualization, Methodology, Writing – review & editing. **Matthew DiGiuseppe:** Conceptualization, Methodology, Investigation, Writing – review & editing. **Hendrik Vrijburg:** Conceptualization, Methodology, Writing – review & editing.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Jaroslav Kantorowicz reports financial support was provided by Leiden University. Jaroslav Kantorowicz reports a relationship with Leiden University that includes: funding grants. Jaroslav Kantorowicz has patent pending to None.

Data availability

Data will be made available on request.

Acknowledgments

This paper was presented and obtained constructive comments from participants of the GTGC annual conference, L-PEG seminar, Work-in-Progress seminar at the department of economics at the Institute of Tax Law and Economics and multiple other inner workshops held at Leiden University. The authors are thankful for all the input. Similarly, the authors wish to thank the steering committee of the interfaculty programme on Global Transformations and Governance Challenges at Leiden University for generously supporting this project. We are also indebted to Nina Waals and Alessia Aspide who provided help with

translations, and to Goran Dominioni who gave us comments on the survey instrument.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.enpol.2023.113899>.

References

- Akerlof, G.A., 2007. The missing motivation in macroeconomics. *Am. Econ. Rev.* 97 (1), 5–36.
- Bansak, K., Bechtel, M.M., Margalit, Y., 2021a. Why austerity? The mass politics of a contested policy. *Am. Polit. Sci. Rev.* 115 (2), 486–505.
- Bansak, K., Hainmueller, J., Hopkins, D.J., Teppel, Y., 2021b. Conjoint survey experiments. In: Druckman, J.N., Green, D.P. (Eds.), *Cambridge Handbook of Advances in Experimental Political Science*. Cambridge University Press, New York.
- Baranzini, A., Carattini, S., 2017. Effectiveness, earmarking and labeling: testing the acceptability of carbon taxes with survey data. *Environ. Econ. Pol. Stud.* 19, 197–227.
- Barro, R.J., 1974. Are government bonds net wealth? *J. Polit. Econ.* 82 (6), 1095–1117.
- Barro, R.J., 1979. On the determination of the public debt. *J. Polit. Econ.* 87 (5), 940–971.
- Barnes, Lucy, Hicks, Timothy, 2018. Making austerity popular: the media and mass attitudes toward fiscal policy. *Am. J. Polit. Sci.* 62 (2), 340–354.
- Bechtel, M.M., Genovese, F., Scheve, K.F., 2019a. Interests, norms and support for the provision of global public goods: the case of climate co-operation. *Br. J. Polit. Sci.* 49 (4), 1333–1355.
- Bechtel, M.M., Jensen, A.S., Scheve, K., 2019b. Measuring time preferences in large surveys. Available at SSRN 3422697.
- Bechtel, M.M., Scheve, K.F., van Lieshout, E., 2020. Constant carbon pricing increases support for climate action compared to ramping up costs over time. *Nat. Clim. Change* 10 (11), 1004–1009.
- Beiser-McGrath, L.F., Bernauer, T., 2019a. Could revenue recycling make effective carbon taxation politically feasible? *Sci. Adv.* 5, eaax3323.
- Beiser-McGrath, L.F., Bernauer, T., 2019b. Commitment failures are unlikely to undermine public support for the Paris agreement. *Nat. Clim. Change* 9, 248–252.
- Bisin, A., Lizzeri, A., Yariv, L., 2015. Government policy with time inconsistent voters. *Am. Econ. Rev.* 105 (6), 1711–1737.
- Blanchard, O., Gollier, C., Tirole, J., 2023. The portfolio of economic policies needed to fight climate change. *Annual Review of Economics* 15, 689–722.
- Bojar, A., Bremer, B., Kriesi, H., Wang, C., 2022. The effect of austerity packages on government popularity during the Great Recession. *Br. J. Polit. Sci.* 52 (1), 181–199.
- Bremer, B., Bürgisser, R., 2023. Do citizens care about government debt? Evidence from survey experiments on budgetary priorities. *Eur. J. Polit. Res.* 62 (1), 239–263.
- Buchanan, J.M., Wagner, R.E., 1977. *Democracy in Deficit: the Political Legacy of Lord Keynes*. Academic Press, New York.
- Carattini, S., Baranzini, A., Thalmann, P., Varone, F., Vöhringer, F., 2017. Green taxes in a post-paris world: are millions of nays inevitable? *Environ. Resour. Econ.* 68, 97–128.
- Carattini, S., Carvalho, M., Fankhauser, S., 2018. Overcoming public resistance to carbon taxes. *Wiley Interdisciplinary Reviews: Clim. Change* 9 (5), e531.
- Cohen, J., Ericson, K.M., Laibson, D., White, J.M., 2020. Measuring time preferences. *J. Econ. Lit.* 58 (2), 299–347.
- D'Acunto, F., Möhrle, S., Neumeier, F., Peichl, A., Weber, M., 2022. How to Finance Climate Change Policies? Evidence from Consumers. *CESifo, Beliefs* (No. 9727).
- Dabla-Norris, E., Helbling, T., Khalid, S., Khan, H., Magistretti, G., Sollaci, A., Srinivasan, K., 2023. In: *Public Perceptions of Climate Mitigation Policies: Evidence from Cross-Country Surveys*, vol. 2023. International Monetary Fund Staff Discussion Notes, 002.
- Darvas, M.Z., Wolff, G.B., 2023. A green fiscal pact for the EU: increasing climate investments while consolidating budgets. *Clim. Pol.* 23 (4), 409–417.
- Dechezleprêtre, A., Fabre, A., Kruse, T., Planterose, B., Chico, A.S., Stantcheva, S., 2022. Fighting Climate Change: International Attitudes toward Climate Policies (No. W30265). National Bureau of Economic Research.
- Delgado-Téllez, M., Ferdinandusse, M., Nerlich, C., 2022. Fiscal Policies to Mitigate Climate Change in the Euro Area, vol. 6. ECB Economic Bulletin Articles.
- Douenne, T., Fabre, A., 2022. Yellow vests, pessimistic beliefs, and carbon tax aversion. *Am. Econ. J. Econ. Pol.* 14 (1), 81–110.
- Drews, S., Van den Bergh, J.C., 2016. What explains public support for climate policies? A review of empirical and experimental studies. *Clim. Pol.* 16 (7), 855–876.
- European Commission, 2021. Next generation EU – green bond framework. In: Commission Staff Working Document2, SWD(2021), p. 242 final.
- Everett, J.A.C., 2013. The 12 item social and economic conservatism scale (SECS). *PLoS One* 8 (12), 1–11.
- Fairbrother, M., Arrhenius, G., Bykvist, K., Cambell, T., 2021. Governing for future generations: how political trust shapes attitudes towards climate and debt policies. *Frontiers in Political Science* 3 (656053), 1–14.
- Fairbrother, M., 2022. Public opinion about climate policies: a review and call for more studies of what people want. *PLOS Climate* 1 (5), e0000030.
- Falk, A., Becker, A., Dohmen, T., Enke, B., Huffman, D., Sunde, U., 2018. Global evidence on economic preferences. *Q. J. Econ.* 133 (4), 1645–1692.

- Fatás, A., Gosh, M.A.R., Panizza, U., Presitero, M.A.F., 2019. The motives to borrow. International Monetary Fund Working. Paper 19/101.
- Flores-Macías, G.A., Kreps, S.E., 2017. Borrowing support for war: the effect of war finance on public attitudes toward conflict. *J. Conflict Resolut.* 61 (5), 997–1020.
- Freire, D., Mignozzetti, U., Skarbek, D., 2021. Institutional design and elite support for climate policies: evidence from Latin American countries. *Journal of Experimental Political Science* 8, 172–184.
- Graham, H., Bland, J.M., Cookson, R., Kanaan, M., White, P.C., 2017. Do people favour policies that protect future generations? Evidence from a British survey of adults. *J. Soc. Pol.* 46 (3), 423–445.
- Hainmueller, J., Hopkins, D.J., Yamamoto, T., 2014. Causal inference in conjoint analysis: understanding multidimensional choices via stated preference experiments. *Polit. Anal.* 22 (1), 1–30.
- Horiuchi, Y., Markovich, Z., Yamamoto, T., 2022. Does conjoint analysis mitigate social desirability bias? *Polit. Anal.* 30 (4), 535–549.
- Huber, R.A., Wicki, M.L., Bernauer, T., 2020. Public support for environmental policy depends on beliefs concerning effectiveness, intrusiveness, and fairness. *Environ. Polit.* 29 (4), 649–673.
- IMF, 2021. Reaching Net Zero Emissions. Paper prepared by Staff of the International Monetary Fund for the Group of Twenty. Available via. <https://www.imf.org/external/np/g20/pdf/2021/062221.pdf>.
- Jacobs, A.M., Matthews, J.S., 2012. Why do citizens discount the future? Public opinion and the timing of policy consequences. *Br. J. Polit. Sci.* 42 (4), 903–935.
- Jacques, O., Haffert, L., 2021. Are governments paying a price for austerity? Fiscal consolidations reduce government approval. *European Political Science Review* 13 (2), 189–207.
- Kallbekken, S., Aasen, M., 2010. The demand for earmarking: results from a focus group study. *Ecol. Econ.* 69 (11), 2183–2190.
- Kallbekken, S., Sælen, H., 2011. Public acceptance for environmental taxes: self-interest, environmental and distributional concerns. *Energy Pol.* 39 (5), 2966–2973.
- Klenert, D., Mattauch, L., Combet, E., Edenhofer, O., Hepburn, C., Rafaty, R., Stern, N., 2018. Making carbon pricing work for citizens. *Nat. Clim. Change* 8 (8), 669–677.
- Kotchen, M.J., Turk, Z.M., Leiserowitz, A.A., 2017. Public willingness to pay for a US carbon tax and preferences for spending the revenue. *Environ. Res. Lett.* 12 (9), 094012.
- Kriner, D., Lechase, B., Cappella Zielinski, R., 2018. Self-interest, partisanship, and the conditional influence of taxation on support for war in the USA. *Conflict Manag. Peace Sci.* 35 (1), 43–64.
- Leeper, T.J., Hobolt, S.B., Tilley, J., 2020. Measuring subgroup preferences in conjoint experiments. *Polit. Anal.* 28 (2), 207–221.
- Maestre-Andrés, S., Drews, S., van den Bergh, J., 2019. Perceived fairness and public acceptability of carbon pricing: a review of the literature. *Clim. Pol.* 19 (9), 1186–1204.
- Meckling, J., Aldy, J.E., Kotchen, M.J., Carley, S., Esty, D., et al., 2022. Busting the myths around public investment in clean energy. *Nat. Energy* 7, 563–565.
- Mildenberger, M., 2020. Carbon Captured: How Business and Labor Control Climate Politics. MIT Press.
- Monk, Alexander, Perkins, Richard, 2020. What explains the emergence and diffusion of green bonds? *Energy Pol.* 145, 111641.
- Nicoli, F., Van der Duin, D., Burgoon, B., 2023. Which Energy Security Union? An experiment on public preferences for energy union alternatives in 5 western European countries. *Energy Pol.* 183, 113734.
- Nordhaus, W.D., 1975. The political business cycle. *Rev. Econ. Stud.* 42 (2), 169–190.
- Pekanov, A., Schratzenstaller, M., 2023. A Targeted Golden Rule for Public Investments? A Comparative Analysis of Possible Accounting Methods in the Context of the Review of the Stability and Growth Pact. WIFO studies, WIFO number 70628.
- Ratkovic, M., Tingley, D., 2017. Sparse estimation and uncertainty with application to subgroup analysis. *Polit. Anal.* 25 (1), 1–40.
- Rhodes, E., Axsen, J., Jaccard, M., 2017. Exploring citizen support for different types of climate policy. *Ecol. Econ.* 137, 56–69. \.
- Sælen, H., Kallbekken, S., 2011. A choice experiment on fuel taxation and earmarking in Norway. *Ecol. Econ.* 70 (11), 2181–2190.
- Sommer, S., Mattauch, L., Pahle, M., 2022. Supporting carbon taxes: the role of fairness. *Ecol. Econ.* 195, 107 359.
- Slemrod, J., 2006. The role of misconceptions in support for Regressive Tax Reform. *Natl. Tax J.* LIX (1), 57–75.
- Saez, E., Zucman, G., 2022, May. Wealth taxation: lessons from history and recent developments. In: AEA Papers and Proceedings, vol. 112, pp. 58–62, 2014 Broadway, Suite 305, Nashville, TN 37203: American Economic Association.
- Ščasný, M., Zvěřinová, I., Czajkowski, M., Kyselá, E., Zagórska, K., 2017. Public acceptability of climate change mitigation policies: a discrete choice experiment. *Clim. Pol.* 17 (Suppl. 1), S111–S130.
- Stantcheva, S., 2021. Understanding tax policy: how do people reason? *Q. J. Econ.* 136 (4), 2309–2369.
- Stefanelli, A., Lukac, M., 2020. Subjects, Trials, and Levels: Statistical Power in Conjoint Experiments. <https://doi.org/10.31235/osf.io/spkcy>.
- Tu, Q., Mo, J., Liu, Z., Gong, C., Fan, Y., 2021. Using green finance to counteract the adverse effects of COVID-19 pandemic on renewable energy investment. The case of offshore wind power in China. *Energy Pol.* 158, 112542.
- Vilar, R., Milfont, T.L., Araújo, R.d.C.R., et al., 2022. Consideration of future consequences (CFC): validation and proposition of an ultra-short scale. *Curr. Psychol.* 41, 3428–3442.
- Wade-Benzoni, K.A., Tost, L.P., 2009. The egoism and altruism of intergenerational behavior. *Pers. Soc. Psychol. Rev.* 13 (3), 165–193.
- Wyplosz, C., 2014. Fiscal rules: theoretical issues and historical experiences. In: Alesina, A., Giavazzi, F. (Eds.), *Fiscal Policy after the Financial Crisis, Volume Fiscal Rules: Theoretical Issues and Historical Experiences*. University of Chicago Press and National Bureau of Economic Research, pp. 495–529.