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Sustainable Development and Populism

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ABSTRACT

All 193 UN member states have pledged to achieve 17 Sustainable Development Goals (SDGs), following the guiding principle to leave no one behind. At the same time, rising populist movements increasingly influence the political debate in many countries by challenging multilateral cooperation and liberal democracy. This paper contains the first empirical study of the relationship between the SDGs and populism. In order to analyse the nexus between these growingly important concepts, we introduce a new "Sustainability-Populism Framework". It allows us to asses how the performance on the 17 SDGs over time relates to electoral support for populist parties, resulting in a classification of 39 countries into four categories. Moreover, in a regression analysis, we find that for each 1-point increase on the aggregate SDG Index (out of 100) over time, the vote share of populist parties on average drops by about 2 percentage points. Our results lend some support to the notion that a strong commitment to the SDGs (overall, as well as in particular to SDGs 1, 2, 11 and 15) could be part of an appropriate and effective answer to populism. We hope to initiate a timely debate on populism and sustainable development with our study, along with more research into this complex relationship.

1. Introduction

All 193 UN member states adopted the Agenda 2030 with the 17 Sustainable Development Goals (SDGs) in 2015 in a historic effort for international cooperation. Governments pledged with these commitments to work towards a more prosperous, fair and sustainable world on behalf of the citizens they serve (United Nations, 2015). At the same time, many countries have witnessed a rise in populist movements in recent years that pose a challenge to liberal democracy and multilateral cooperation (see e.g. Mudde and Kaltwasser, 2017; Norris and Inglehart, 2018). The vote share of populist parties across the 39 countries covered in this study rose by 6.33 percentage points on average between 2006 and 2018, in some countries significantly more.

As populism can be seen as a response by parts of the population who feel that their concerns have not been addressed by mainstream policymakers, the question arises whether the evolvement of sustainable development, which calls for integrating social, environmental, and economic policies, could be related to developments of populist vote shares. Although the increased support for populism may well be rooted in developments related to the economic, social and environmental issues underlying the SDGs (for reasons on which we elaborate below), no study has yet looked systematically at the relationship between the much-debated rise of populism on the one hand, and the historic Agenda 2030 for Sustainable Development on the other hand. To address this gap, we introduce a new "Sustainability-Populism Framework" based on the first systematic classification of SDG country performance and populism. We subsequently perform the first empirical analysis of the relationship between populism and the SDGs by examining how countries have performed on the SDGs over time, and how their development in terms of sustainability relates to the socio-political outcome of electoral support for populism.

2. Background and Literature

The SDGs provide a new and enlarged understanding of sustainability as an economic, social and environmental challenge.[1] The goals are firmly rooted in the concept of sustainable development, i.e. "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987: 30, Sachs, 2015). They comprise 17 goals and 169 targets that span a range of topics from ending extreme poverty (SDG 1) to affordable and clean energy (SDG 7) or a global partnership for the goals (SDG 17) (UN 2015) (for the full list of titles see Table 1, first column). Countries' baselines are a long way from goal achievement (Schmidt-

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[1] We therefore use the terms sustainability and sustainable development synonymously in this study, in line with prior studies (see e.g. Holden et al., 2014).

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Table 1
Studies on populism in relation to macro-level factors of economic, social and environmental conditions, classification according to the SDGs.

SDG	Study / Authors	Variables of interest
SDG 1 No poverty	Grier and Maynard (2016)*	Poverty
SDG 2 Zero hunger	–	–
SDG 3 Good health and wellbeing	Spruyt et al. (2016), Rooduijn (2018)	Subjectively experienced vulnerability, questionaires about assessment of personal situation
SDG 4 Quality education	Dustmann et al. (2017), Foster and Frieden (2017)	Educational level
SDG 5 Gender equality	–	–
SDG 6 Clean water and sanitation	–	–
SDG 7 Affordable and clean energy	Fraune and Knodt (2018)	Climate and energy policy positions of parties
SDG 8 Decent work and economic growth	Algan et al. (2017), Autor et al. (2013), Foster and Frieden (2017), Funke et al. (2016), Grier and Maynard (2016)*, Guiso et al. (2017), Inglehart and Norris (2016), Norris and Inglehart (2018), Van Der Brug et al. (2005)	Unemployment (subjective and objective), (felt) globalisation loosers, GDP growth
SDG 9 Industry, innovation, infrastructure	Eatwell (2005), Mudde and Kaltwasser (2017), Rydgren (2006)	Structure of mass media, visibility of populists in the media
SDG 10 Reduced inequalities	Grier and Maynard (2016)*, Houle and Kenny (2018)*, Rodrik (2018)	(felt) inequality, Gini coefficient
SDG 11 Sustainable cities and communities	–	–
SDG 12 Responsible consumption and production	–	–
SDG 13 Climate action	–	–
SDG 14 Life below water	–	–
SDG 15 Life on land	–	–
SDG 16 Peace, justice and strong institutions	Abedi (2002), Bornschier (2012), Carter and Arzheimer (2006), Dustmann et al. (2017), Golder (2016), Houle and Kenny (2018)*, Ignazi (2005), Inglehart and Norris (2016), Magnan and Veugelers (2005), Mudde and Kaltwasser (2017), Norris (2005), Norris and Inglehart (2018), Rode and Revuelta (2014)*, Spicer (2018), Van Der Brug et al. (2005)	Political system (i.a. coalition governments, corruption of party members), electoral system (e.g. proportional), feeling reflected in the system, trust in political institutions
SDG 17 Partnership for the goals	Balfour (2017), Guiso et al. (2018), Mudde and Kaltwasser (2017)	Functioning of EU and UN institutions, trust in these institutions

* The majority of studies examine the potential causes of populism. Studies marked with an asterix examine the potential consequences of populism.

Traub et al., 2017), so the fulfilment of Agenda 2030 will necessitate significant improvements in all policy areas over the next years. What makes pursuing the SDGs a particularly challenging task is the fact these goals are at present somewhat contradictory among themselves. In other words, there are numerous trade-offs between SDGs, such as between reducing poverty and climate action, which in the future will need to be turned into mutually reinforcing synergies in the form of a virtuous cycle of SDG progress (Kroll et al., 2019).

Defining populism has been challenging and controversial. However, many scholars have now converged[23] to a definition of populism which has been widely used over the last decade, defining populism as a thin-centered ideology (Mudde and Kaltwasser, 2017).[4] This definition will also be followed in this paper. By contrast to 'thick-centered' or 'full' ideologies (e.g. socialism, fascism), populism, because of its thin-centered characteristic, is often attached to other ideologies, so-called 'host-ideologies', as "populism [itself] can offer neither complex nor comprehensive answers to the political questions that modern societies generate" (Mudde and Kaltwasser, 2017). Populism by itself is thus not an ideology (Freeden 2017). It is often linked to ideologies such as (left-wing) socialism (e.g. Latin America) and (right-wing) nationalism (e.g. Europe) (Mudde and Kaltwasser, 2017). This is sometimes termed 'inclusive populism' (e.g. Latin America) and 'exclusive populism' (e.g. Europe), respectively. These attributes are rather connected to the host ideologies than to populism. Populism itself is "integrative and divisive: not only does it attempt to unite an angry and silent majority, but it also tries to mobilize this majority against a defined enemy (e.g. 'the establishment')" (Mudde and Kaltwasser, 2017).

For populism to become a significant political force, the interplay of three factors is decisive (Norris, 2005): the demand for populism, the supply of populism, and the institutional rules of the political game. On the demand side, the side of the population, people are prone to populist attitudes, independent of whether there are significant populist forces active in the country or not. In terms of individual level drivers for populist attitudes, the academic literature lists cultural backlash reactions and individual economic circumstances as main factors. In terms of macro-level circumstances which foster populist attitudes in

[2] Scholars who agree with this definition are e.g. Taggart (2000,2002), Mény and Surel (2000), Mudde (2004), C. Fieschi, B. Stanley, C. Mudde, C.R. Kaltwasser. For an overview of other definitions of populism, see Mudde and Kaltwasser (2017, p.2).

[3] A notable exception to the acceptance of the 'thin-centered'-ideology approach is Freeden (2017). He claims that populism is not only 'thin-centered' but that it is 'thin': "A thin-centred ideology implies that there is potentially more than the centre, but the populist core is all there is; it is not a potential centre for something broader or more inclusive" (Freeden, 2017).

[4] Definition also used and found in Mudde (2004, p. 543) and Kaltwasser and Taggart (2016).

the population, the literature mostly names immigration, economic circumstances, corruption and the functioning of the political system as drivers. On the supply side, there have to be populist forces. Is one of the two sides missing, the populist moral in society or the populist actors will likely stay silent. Only "when elite and mass populism come together" (Mudde and Kaltwasser, 2017), there is an observable rise in populism. However, the institutional settings of the political landscape might also facilitate or hinder the rise of populism (Norris, 2005).

To locate our study of sustainable development and populism in the current literature, we provide the first classification of the research literature on populism in relation to macro-level factors of economic, social and environmental country performance which is structured by the 17 SDGs.[5] It becomes clear from our overview in Table 1 that prior studies of this kind focus on only one or very few topics that underlie the SDGs in their investigation of the relationship with populism but no comprehensive analysis such as ours exists.

Most such studies have indeed sought to explain populism as a phenomenon that is caused by issues related to the economy (in the taxonomy of the SDGs this would be SDG 8 – *Decent work and economic growth*), or the political system (SDG 16 – *Peace, justice and strong institutions*).

In terms of SDG 8, several studies find that populist parties received more support from people who experienced unemployment previously[6], e.g. Algan et al. (2017)[7] provide causal evidence, next to analyses by Guiso et al. (2017). While Inglehart and Norris (2016) did not find robust support to link economic insecurity to populist voting, subjective insecurity (measured by whether people feel at ease with living on current household budget) was negatively linked to populist voting. It might thus be the relative instead of absolute deprivation which leads to an increased demand for populism (Spruyt et al., 2016).

Further macroeconomic factors studied in the context of populism and rising individual economic insecurity (SDG 8) are economic crises, financial globalisation, and trade. Funke et al. (2016) find that financial crises, compared to economic crises or other type of economic output contractions, fractionalise parliaments and lead to larger increases of right-wing voting shares. The deepening of financial integration might also foster demand for populism as increasing financial globalisation has been a good predictor of rising income inequality (Rodrik, 2018), partly because higher integration of capital markets aggravates domestic market imperfections. In a similar vein, increased trade exposure through economic globalisation might rise demand for populism (Rodrik, 2018). While global trade offers economic opportunities and enlarges market size, not everybody necessarily benefits from trade. As Autor et al. (2013) show, increasing import competition causes higher unemployment, reduces local wages and labour market participation. Through an increase in individual economic insecurity, this might increase the demand for populism.

Turning to non-economic SDGs, the academic literature also offers a range of explanations of rising populism. Support for populists is found to be larger among the less-educated people (SDG 4; Inglehart and Norris, 2016), who are also reported to trust less in political institutions (SDG 16; Dustmann et al., 2017). Less trust in institutions in turn is also correlated with a higher probability of voting for right-wing or left-wing populist parties (Dustmann et al., 2017).

3. A New "Sustainability-Populism Framework"

In order to enable a structured, more fine-grained and qualitative interpretation of the nexus between the two concepts under study in future research, we propose a new "Sustainability-Populism Framework" (see Fig. 1). It elaborates on the four possible outcomes for the relationship between SDG performance over time and electoral support for populism. Support for populism may rise or fall, while countries may make progress or regress on the SDGs. Our empirical analysis will therefore categorize clusters of countries into four quadrants for each of the 17 SDGs along the following dimensions: SDG performance improved vs. deteriorated, and populist vote share increased vs. decreased. This provides us with the first systematic overview of how country performance on the SDGs relates to electoral support for populism, which we will describe and interpret using our new framework:

Quadrant I: "disillusioned performers" (SDG improvement, rising populism).

The countries named "disillusioned performers" have experienced progress towards the respective SDG. Nonetheless, populist parties were able to capitalize on e.g. fear of regress or scapegoating towards minorities that have led to success in the polls, regardless of the overall country performance in this goal getting better.

Quadrant II: "failing prey (to populists)" (SDG deterioration, rising populism).

Countries in this category are failing to progress on the respective SDG and are falling prey to populists and the political answers they offer.

Quadrant III: "resilient believers (in liberal democracy[8])" (SDG deterioration, falling populism).

Despite regress in the respective SDG over the last years, countries in this group keep their faith in traditional mainstream parties and the policy solutions they propose to overcome current challenges.

Quadrant IV: "consolidating achievers" (SDG improvement, falling populism).

These countries are making progress towards achieving the respective SDG, and are becoming less susceptible to populist ideas to steer the country in a different direction.

The SDGs are based on the guiding principle of leaving no one behind (United Nations, 2015), and are equipped with measurable outcomes. As populists often proclaim to be the voice of precisely those who are "left behind" (Mudde and Kaltwasser, 2017), progress on the SDGs would mean that fewer people will be left behind, which possibly undermines the populists' core argument and basis for their electoral support. In a similar vein, Kousser and Tranter (2018) have shown for the case of environmental policies that partisan polarisation at the mass level can be overcome when different political leaders converge upon a broad strategy of environmental policies. Elaborating on this reasoning, if political leaders pursue policies in support of the SDGs, which embody a unifying agenda for economic prosperity, social inclusion and environmental sustainability, this should lead to improved quality of life in particular for those who may have felt left behind, and subsequently a decrease in populist party support at the ballot box. Expanding on the state of the literature as displayed in Table 1, we therefore hypothesize:

Hypothesis: Better performance on the SDGs over time will be associated with diminishing electoral support for populist parties.

[5] For a situational and psychological account of populism, which is not the focus of this study, see e.g. Kakkar and Sivanathan (2017). Likewise, for micro-level evidence of a cultural backlash see Norris and Inglehart (2018).

[6] Occupational class on the other hand does not seem to predict support for populists (e.g. no significant effect of low-waged, unskilled manual workers) (Ingelhart and Norris, 2016).

[7] Algan et al. (2017) use regional voting data and find significant positive effect of unemployment on extreme votes. It is the change in unemployment which triggers these results.

[8] While liberal democracy is a term that is contested itself in the Political Science literature, our understanding of it in the context of populism is based on Pappas (2019), whereby the populist parties in many countries can be understood as pursuing "democratic illiberalism" which stands in contrast to the ideal of liberal democracy. In general, however, it has to be acknowledged that any cross-country analysis of populism will be somewhat simplistic as the phenomenon is quite context specific to every nation and political environment.

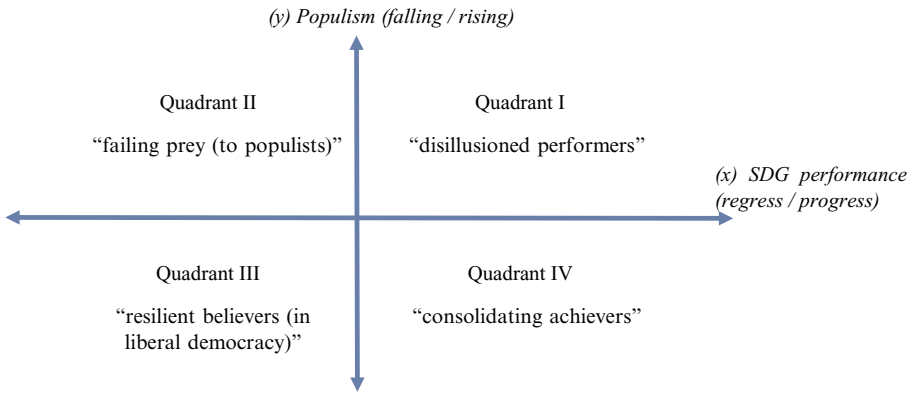

Fig. 1. "Sustainability-Populism Framework".

4. Data & Methods

4.1. Data

The SDG Index database provides globally available data at country level on the SDGs (Sachs et al., 2018). It has been described as "the most comprehensive picture of national progress on the SDGs and offers a useful synthesis of what has been achieved so far" (Nature Sustainability Editorial 08/14/2018, n.d.). The database contains data for 193 countries with up to 111 indicators per country on all SDGs.[9] Indicators for each goal are normalized and aggregated to a goal score, which in the end is again aggregated into an SDG Index score for each country using equal weighting of all 17 SDGs. Moreover, by examining sub-indices to investigate each SDG, we are able to get a more differentiated picture of the socio-political consequences of sustainable development than previous measurements which only focused on, for instance, four dimensions (Holden et al., 2014). Time series data for SDG performance over time is available from the SDG Index & Dashboards database for the years 2010–2015, which is the data used in the empirical analysis of this paper.

It is important to note, however, that the SDG Index database is an independent analytical effort, and as such contains a number of subjective judgments regarding, for instance, the indicator selection, or the aggregation method. It is a synthesized measure for comparing countries' absolute outcomes on measures related to the SDGs. Also, some SDGs also have clearly defined numerical targets while those that do not were defined by Sachs et al. (2018) to fill the gaps.

In order to test whether the SDG Index is the most appropriate measure in this context of study, we will compare the result to other prominent indices: The Human Development Index, the Social Progress Index, the World Happiness Report Index, as well as the Gini coefficient, again controlling for GDP per capita.

Similar to the debate about defining populism, there are many ways of measuring populism. This analysis focuses on the measurement of support for populist parties (contrary to e.g. affinity for populism / populist attitudes as measured in surveys), measured as the vote share of populist parties in national elections as classified and coded by the following literature and their databases: Inglehart and Norris, 2016; Rodrik, 2018; Funke et al., 2016 (See Appendix Table A1 for an overview of parties coded as populist parties by these authors). Election data is retrieved from the ParlGov database[10] and the CLEA database[11].[12] Data for both concepts (SDGs and populism) are available for 39 countries in total.[13] These countries (listed in footnote 13) are mainly high-income countries and in Europe due to the coverage of the populism variable. While such a relatively homogenous sample is advantageous in that it provides a meaningful comparison of similar countries, this composition should of course be kept in mind with regard to the limited generalizability of the findings for other world regions and income groups.

4.2. Method

For our first main analysis, we calculate the change in performance of 39 countries on the SDG Index aggregate country score, as well as subsequently on 16 of the 17 SDGs[14] separately, during the period 2010–2015 based on the normalized goal scores (range from 0 to 100) in the SDG Index database (Sachs et al., 2018).[15] We then explore the

[9] Detailed information, including the full list of indicators and the raw data used here are available from www.sdgindex.org.

[10] Parliaments and Governments Database (ParlGov): http://www.parlgov.org/

[11] Constituency-Level Election Archive (CLEA): http://www.electiondataarchive.org

[12] Only national elections are used (i.e. election results of European parliament elections are ignored). If there were more than one national election in one year, the results of the last election are used in the analysis and the other elections are ignored.

[13] Countries covered: AUS, AUT, BEL, BGR, BOL, BRA, CAN, CHE, CYP, CZE, DEU, DNK, ECU, ESP, EST, FIN, FRA, GBR, GRC, HRV, HUN, IRL, ITA, JPN, LTU, LUX, LVA, MLT, NIC, NLD, NOR, PER, POL, PRT, ROU, SVK, SVN, SWE, TUR. Our analysis focuses on political parties, not individual Heads of Government. The US is missing since the US Republican Party under Donald Trump's presidency is not categorized as populist in the aforementioned databases, even though the President's leadership style would meet the definition. For an account of status anxiety as explanation for Trump's election victory see Mutz (2018). We would encourage future research to expand the international data on populism from populist parties to populist politicians and government officials in order to enable further analyses.

[14] The change over time in SDG 12 cannot be calculated for the countries under study because of insufficient data.

[15] The following exceptions are made. First, for SDG 14 and SDG 16, we only look at the change from 2012 to 2015 due to data availability issues before this time period. Second, the calculation of the changes in SDG 6 are only based on a subset of the indicators: for most countries, the SDG 6 indicator is calculated as average over safesan- and safewat-variable; if these were not available, it is based on the sanita-variable; if the latter was not available, it is based on the water-variable. Third, SDG 1 is measured as oecdpov (poverty rate after taxes and transfers) for all OECD-countries and as wpc (poverty headcount ratio at 1.90 dollar per day) for all non-OECD countries because these measures are more sensible due to the different economic development stages the countries are in. Fourth, the SDG 10 is only available for OECD countries with a differing time-span, namely only looking at the change from 2013 to 2015, for EST, FRA, NLD, and SWE. Fifth, SDG 17 is iteratively calculated on the maximum number of subindicators available for each country. If not all three were available, the average of n_sdg17_govex and n_sdg17_oda is taken; was this not available, the average over n_sdg17_govex and n_sdg17_tax was taken. When it was not possible to calculate an average over two subindicators, the subindicator which

relationship between this progress (or regress) towards reaching the SDGs and changes in populist vote shares from the second last to the last election in each country[16] (elections taking place between 2011 and 2018[17]). In a scatterplot analysis, we depict the change in SDG performance on the x-axis, and the change in populist vote shares on the y-axis. We then group countries into four quadrants according to categories for each SDG, which we have called the "Sustainability-Populism Framework" (see previous section).

In addition, we perform a regression analysis to determine the statistical relationship between the two concepts under study whilst controlling for the change in GDP per capita in constant PPP, which is a widely-used standard control variable to capture changes in living standards (see e.g. Delhey and Kroll, 2013). This results in the following specification:

$$\Delta Pvote_share_{it-tx} = \alpha + \beta_1 \Delta SDG_x_{i2015-2010} + \beta_2 \Delta gdppc_{i2015-2010} + \varepsilon_{it}$$

5. Results

The descriptive statistics can be seen in Table 2Fig. 2 displays the relationship between change in the country performance on the SDG aggregate country score (over the period of 2010–2015) on the x-axis with the change in populist vote share during the latest election on the y-axis. It can be observed that the majority of the 39 countries covered in this study made progress between 2010 and 2015 in almost all SDGs except SDG 2 (where the situation in the majority of countries deteriorated), and SDG 1 and 15 (no clear majority regarding progress vs. regress). The y-axis shows the change in populist vote share during the last election: Countries above 0 have witnessed an increase in populist vote share, while countries below 0 saw the share of populist voters decline.

The scatterplots therefore allow us to categorize clusters of countries along four quadrants for the SDGs overall, as well as separately for each goal, using the "Sustainability-Populism Framework" introduced earlier. Taken together, most countries can be considered "disillusioned performers" or "consolidating achievers" (see Fig. 2).

Looking at the scatterplots in Fig. 3, a heterogenous picture emerges across the SDGs when examined separately with regard to their respective relationship with the populist vote share. The countries are spread out in a relatively balanced manner over all four quadrants for certain goals (with at least 3 countries in each of the four quadrants): SDG 4, SDG 5, SDG 7, SDG 8, SDG 10, SDG 11, SDG 13, SDG 14, SDG 16, SDG 17. For other goals, with few exceptions countries can be found in three quadrants (SDG 1, SDG 6, SDG 15) or only two quadrants (SDG 2, SDG 3, SDG 9) (see also Table 3). As the country sample consists of mainly high-income countries, the level of SDG change can at times be very similar. In some cases, SDGs relate to securing a certain level of living standards which have already been reached or are very close to achievement in the countries under study. The top-coded nature of many SDG Index component measures (which reach 100) as well as some compressed distributions need to be mentioned here. This fact partly explains a lack of variation in SDG changes for certain goals (e.g. SDG 1, 7, 15), where the observable change in the countries tends to be within a rather narrow range or where countries already reached an indicator scoring of 100. As our analysis is based on the changes of SDG, we refrain from using truncated estimation models to take account of the top-coded nature. As we do not observe an abnormal frequency of zeros in the SDG data, we do not use a Poisson model and rather stick to a simple OLS estimation.

Table 2
Descriptive statistics.

	(1)	(2)	(3)	(4)	(5)
Variables	N	mean	sd	min	max
Populist vote share	64	27.10	24.47	0	97.73
Aggregate SDG Index	234	85.80	7.627	57.65	98.68
SDG 1	227	87.60	21.74	9.474	100
SDG 2	78	93.16	3.203	83.18	100
SDG 3	77	96.71	4.042	84.69	100
SDG 4	234	92.28	10.16	44.86	100
SDG 5	222	86.88	9.431	57.32	100
SDG 6	180	90.77	10.99	58.44	100
SDG 7	114	98.44	3.975	77.04	100
SDG 8	152	87.29	11.44	53.44	100
SDG 9	233	80.54	19.24	22.57	100
SDG 10	130	85.60	15.40	40.72	100
SDG 11	71	92.21	4.627	81.54	99.91
SDG 13	234	90.21	7.805	61.64	100
SDG 14	124	71.06	12.97	39.33	92.63
SDG 15	222	93.24	13.13	36.15	100
SDG 16	154	81.74	16.01	45.71	100
SDG 17	189	62.59	22.71	6.103	100

In order to illustrate the analytical value of our Sustainability-Populism Framework, it can be seen that for SDG 1, for example, most countries are "failing prey (to populists)", "disillusioned performers" or "consolidating achievers" while only two out of 39 are "resilient believers (in liberal democracy)". This finding lends support to the notion that poverty is an issue that when it is deteriorating, mainstream traditional parties have a hard time defending their political concepts against populists. Only two countries were doing so with some success: Greece and Poland. Even within a quadrant, such as the one "failing prey (to populists)", the extent to which populists capitalize on growing poverty varies considerably: Italy, for instance, saw a similarly large increase in the populist vote share as Latvia despite the former experiencing only a fraction of the spread in poverty compared to the latter.[18]

Regarding SDG4, as another example of how our framework can be applied for the interpretation, most countries are "disillusioned performers" or "consolidating achievers". Nicaragua is a country, however, that has experienced regress with regard to the goal of quality education for all, and consequently is falling prey to populists to a certain extent, given the increase in the vote share for populist parties.

In order to further explore the nature of the statistical relationship

(*footnote continued*)
was available is taken.

[16] A first exception is made for Spain where the difference is taken between the election in 2011 and 2016, ignoring the election in 2015 as taking the change from 2015 to 2016 would provide little information along the time-dimension. A second exception is made for the UK where the snap election in 2017 is ignored.

[17] For 31 countries, the last election took place in 2015 or later. For these countries, the temporal sequence between the SDG performance (x) and populist vote share (y) means that we examine a potential *subsequent* effect of (x) on (y). For 5 countries, the last election took place in 2014, and for 3 countries between 2011 and 2013, but we chose to include these 8 additional countries with elections prior to 2015 deliberately because in fact the SDG indicators most often have a time lag of several years. If this time lag did not exist, we would need to speak of a potential *contemporaneous* effect of (x) on (y) for this group of 8 countries, strictly speaking. In general, our analysis only examines a *potential* effect since for an in-depth analysis of causality in the relationship under study, a broader data coverage and further analyses would be necessary (see limitations).

[18] One can see in Figure 2 that populism is on the rise in a majority of countries. Therefore, we would like to stress that there might be factors above and beyond the ones captured by our explanatory variables driving an underlying trend (either at the global or national level) towards populism – such as cultural factors. As we had outlined in the literature review, our research thereby complements prior studies on cultural and psychological factors' potential impact on the support for populism such as Norris and Inglehart (2018) and explicitly does not claim to replace them.

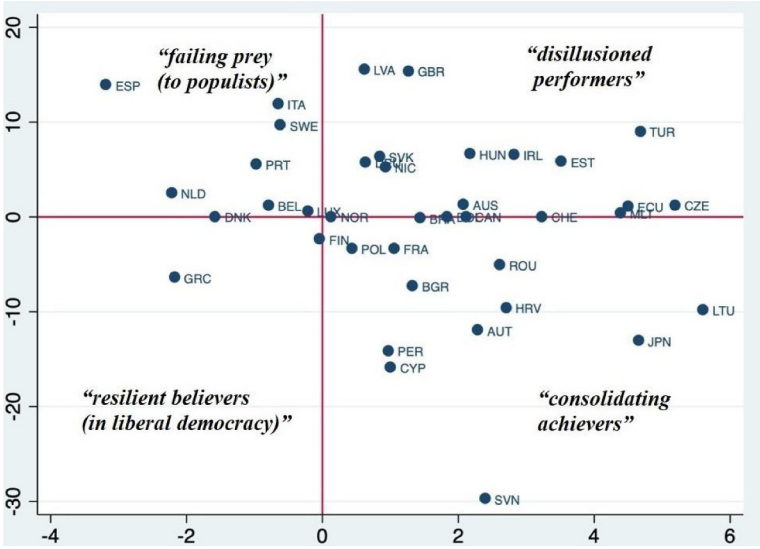

Fig. 2. Change in aggregated SDG Index and change in populist vote shares.

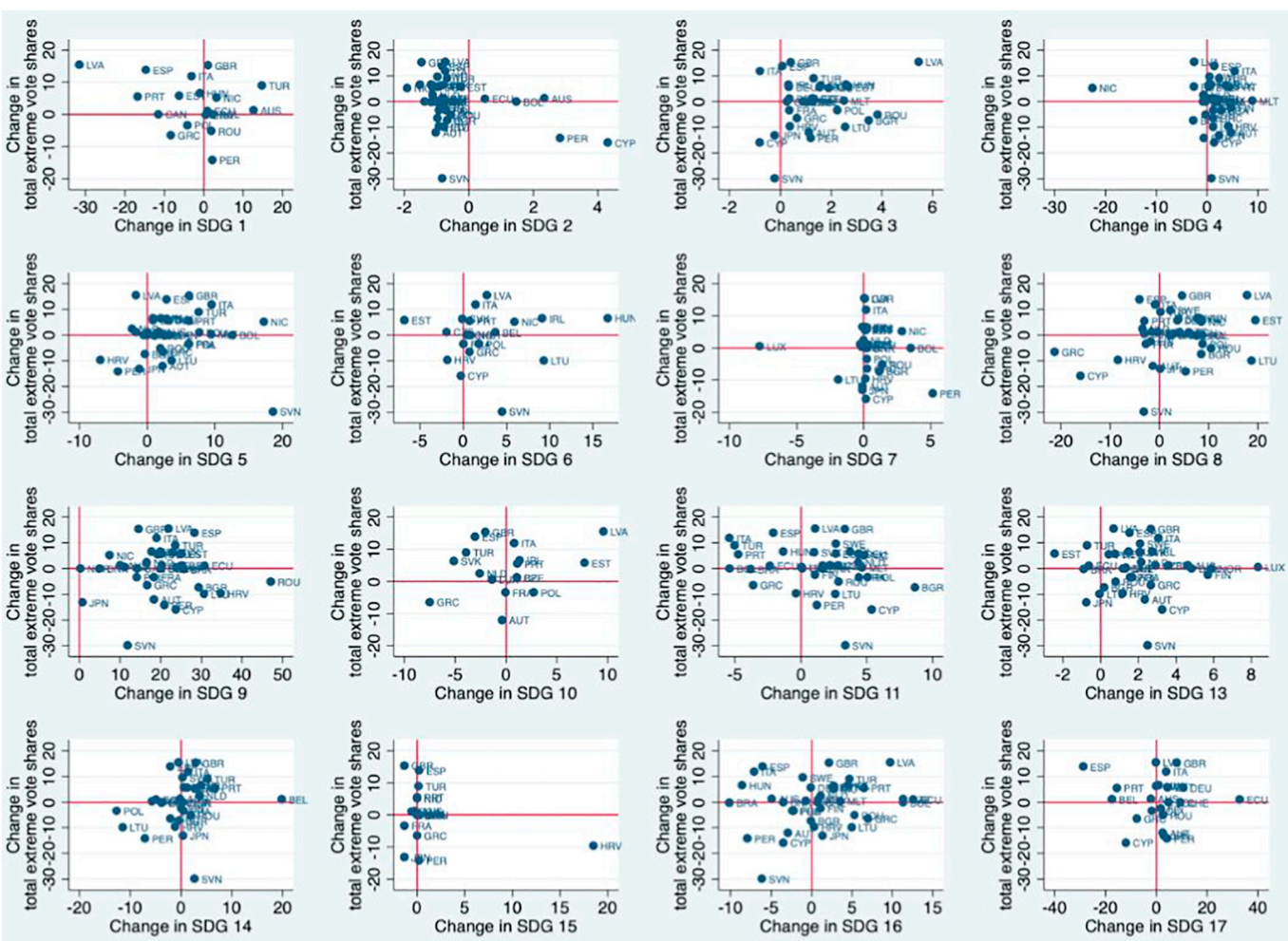

Fig. 3. Scatter plots showing the change in each SDG from 2010 to 2015 (x) and the change in populist votes in the last election (y).

between the two concepts beyond the aforementioned framework and following our hypothesis, we perform a linear regression analysis controlling for the change in GDP p.c., measured in PPP. We thereby examine the SDG performance as a potential determinant of the populist vote share, as displayed in Table 4 (only significant results are displayed here; the full regression results are available in the appendix, Table A2). We find a significant negative effect of overall SDG country performance over time on the change in populist vote share, controlling for the change in GDP p.c.: For each 1-point increase on the aggregate SDG Index (out of 100), the vote share of populist parties on average

Table 3
Number of countries in each quadrant (as displayed in Fig. 2).

SDG	Nr. of countries in Quadrant 1	Nr. of countries in Quadrant 2	Nr. of countries in Quadrant 3	Nr. of countries in Quadrant 4	No change in at least one variable
Agg. SDG Index	13	7	2	12	5
SDG 1	5	6	2	4	2
SDG 2	2	18	11	2	5
SDG 3	15	1	3	10	4
SDG 4	14	4	3	11	3
SDG 5	15	3	4	9	4
SDG 6	10	3	2	9	4
SDG 7	13	5	3	7	2
SDG 8	13	7	7	7	5
SDG 9	19	0	0	13	5
SDG 10	13	6	3	9	3
SDG 11	14	6	3	11	5
SDG 13	16	3	3	10	4
SDG 14	15	5	7	7	5
SDG 15	3	3	2	4	7
SDG 16	13	7	8	6	3
SDG 17	12	6	3	11	5

drops by about 2 percentage points. We also find significant negative effects of progress in SDG 1 (*No Poverty*), SDG 2 (*Zero Hunger*), SDG 11 (*Sustainable Cities and Communities*) and SDG 15 (*Life on Land*). The effect sizes vary as follows: For each 1-point increase on the SDG 1 indicator (out of 100), the vote share of populist parties on average drops by about 0.3 percentage points, while for SDG 2 it drops by about 2.4 percentage points, for SDG 11 by about 1 percentage point, and for SDG 15 by about half a percentage point.

The GDP variable is measured as GDP per capita in constant US Dollar and taken as seasonal difference. The positive, significant GDP coefficient provides some evidence to confirm a divergence of high and low-income groups as a driver for increasing support for populist parties, as suggested by previous literature (e.g. Rodrik, 2018). As our variable of interest is the change in support for populists, measured as changes in the vote share of populist parties, we restricted our explanatory variables to reflect changes as well. We hypothesize that changes in the SDG Index are related to changes in the vote share and not the level of the SDG Index. Similarly, we expect changes in GDP per capita to drive changes in populist vote share. If GDP per capita was to stay constant, we would not expect an effect on increasing or decreasing support for populist parties. Therefore, we did not look at the level of GDP per capita as explanatory variable. While the correlation of the overall SDG index in level with GDP per capita in levels is indeed rather high (0.6***), the changes in the SDG Index and the changes in GDP per capita are not significantly correlated (0.05).

In order to interpret the size of the coefficients and the variables that were used for the calculation of each score, readers ought to consult the detailed list of over 100 variables used in the methodology section of Sachs et al. (2018). In short, each sub-score consists of several variables that were normalized and aggregated to a goal score. The overall SDG score is the average of all 17 SDG scores per country (equal weighting).

Removing the outliers (LVA, SVN, HRV) leaves the results of the regressions largely unchanged. The coefficient of the overall SDG Index is slightly smaller (−1.485**) compared to the full sample regression. The individual SDG indicator regressions remain robust for SDG 2 and SDG 11 (full results available upon request).

As a test of whether the SDG Index is the most appropriate measure in this context of study, we compare the result to other prominent indices: The Human Development Index (HDI), the Social Progress Index (SPI), the World Happiness Report Index (WHRI), as well as the Gini coefficient, again controlling for GDP per capita (Table 5). In the same manner as with the SDG Index, we examine the country performance on these alternative indices 2010–2015 in relation to subsequent populist vote shares, with the exception of the Social Progress Index which unfortunately due to data limitations is only available from 2014 onwards.

In contrast to the significant results of the SDG Index in this context, we observe no significant coefficient aside from the Social Progress Index. However, due to the data limitation issue these results are not entirely comparable. We do encourage further research into this promising avenue in a number of years when comparable time periods are available for a paper to look in-depth at a systematic comparison between these and other indices in relation to populism.

Table 4
Regression analysis, change in populist vote shares.

	Change in populist vote share	Change in populist vote share	Change in populist vote share	Change in populist vote share	Change in populist vote share
Change in agg. SDG indicator (2010–2015)	−1.991**				
	(−0.006)				
Change in SDG 1 (2010–2015)		−0.342*			
		(−0.024)			
Change in SDG 2 (2010–2015)			−2.399**		
			(−0.005)		
Change in SDG 11 (2010–2015)				−0.976**	
				(−0.008)	
Change in SDG 15 (2010–2015)					−0.488***
					(0)
Change in GDP per capita PPP (2010–2015)	0.00128*	0.000777*	0.0005	0.000945*	0.000515
	(−0.021)	(−0.036)	(−0.0148)	(−0.014)	(−0.123)
Constant	−0.0362	−1.995	−2.484	−0.344	−0.69
	(−0.982)	(−0.281)	(−0.129)	(−0.838)	(−0.713)
N	39	38	39	35	37
adj. R-sq	0.188	0.096	0.112	0.139	0.008
F	4.735	5.635	10.52	5.398	11.68

p-values in parentheses: * $p < .05$, ** $p < .01$, *** $p < .001$

Table 5
Alternative indices and populist vote share.

	Change in populist vote share	Change in populist vote share	Change in populist vote share	Change in populist vote share
Change in HDI (2010–2015)	63.19 (0.657)			
Change in WHRI (2010–2015)		2.491 (0.507)		
Change in Gini (2010–2015)			−0.0895 (0.911)	
Change in SPI (2014–2015)				−0.623*** (0.009)
Change in GDP per capita PPP (2010–2015)	0.000609* (0.085)	0.000621** (0.032)	0.000708* (0.061)	0.000713* (0.058)
Constant	−2.726 (0.449)	−1.512 (0.386)	−1.294 (0.486)	−1.512 (0.386)
N	39	39	38	39
adj. R-sq	0.015	0.024	0.013	0.024
F	2.02	2.519	1.874	2.519

Values in parentheses: * $p < .1$, ** $p < .05$, *** $p < .01$

As Latin American forms of populism differ significantly from European forms, we ran an additional analysis of EU vs. Latin American countries for comparison. Unfortunately, the data coverage is very unequal with 30 European countries and only five in Latin America, which compromises the validity of these findings. Nonetheless, for illustration we added a dummy variable for the Latin American countries in an additional analysis (full results available upon request). The results remain unchanged, the dummy is insignificant in the regression with the overall SDG Index as well as in the individual SDG indicator regressions (except for SDG 6 where the dummy is significant).

6. Discussion

Following our overview of previous studies on populism and related macro-level factors, we have established that the literature has focused on concepts that underlie SDGs 8 and 16 but misses many other components of sustainable development. We therefore provided the first holistic comparative assessment of macro-level country performance as captured by the economic, social and environmental SDGs in relation to populism.

We introduced a new "Sustainability-Populism Framework" to structure analyses as well as discussions, both in research and policy-making, regarding these two important concepts in the future. We were subsequently able to classify four groups of countries for each SDG based on the change in SDG performance as well as electoral support for populism (Fig. 2). As political systems in many nations continue to be faced with growing populist parties, our analysis has shed some light onto examples where mainstream political parties prevailed as unchallenged political hegemons in light of their good performance on economic, social and environmental SDGs. We have also shown examples of where these mainstream political parties were even successful in getting unwavering support from voters despite deteriorating performance in certain SDGs (Quadrant III: "resilient believers (in liberal democracy)").

Our framework ought to enable a rich body of research to emerge, e.g. into the common characteristics of countries falling into each category. In this regard, we reiterate a recommendation by Holden et al. (2014). Although their analysis has a different focus, the same logic can be applied with regard to the conclusions and implications for future research. They put forward that such results "are helpful in determining where each country is 'located' on each of the pairs of dimensions, and this demonstrates their position globally and where 'best' practice resides, so that there is a learning process that can be initiated. As more data becomes available, more countries can be included in the graphic presentations, and it also means that subsequent research can look in more detail over the positional changes of the individual countries to review their progress towards sustainable development [and in our case also the electoral support for populism]." In this context, we encourage future research that examines the common characteristics of countries in each respective quadrant of our framework, as well as the causes and consequences of their positioning, particularly with the help of qualitative methods. A particularly promising avenue for future research may be dissecting the political discourses in the countries where populists triumph despite progress towards the SDGs (Quadrant I: "disillusioned performers"), and what differentiates such a political discourse from the ones taking place in countries of the other three categories.

Moreover, we had hypothesized that as the SDGs are based on the principle of leaving no one behind (United Nations, 2015), progress on the SDGs may undermine the populists' argument (as the self-proclaimed voice of those left behind) and basis for their electoral success. We did indeed find some support for our hypothesis that better performance on the SDGs over time will be associated with diminishing electoral support for populism (Table 4). We observed a significant negative relationship between the change in SDG performance and the change in populist vote share in a linear regression analysis controlling for GDP: For each 1-point increase on the aggregate SDG Index (out of 100) over time, the subsequent vote share of populist parties on average drops by about 2 percentage points. We also found significant negative effects of a change in SDG 1 (*No Poverty*), SDG 2 (*Zero Hunger*), SDG 11 (*Sustainable Cities and Communities*) and SDG 15 (*Life on Land*). Our results lend some support to the notion that a strong commitment to the SDGs (overall, as well as in particular to the SDGs 2, 11 and 15) could be part of an appropriate and effective answer to populism. Our research thereby complements prior studies on cultural and psychological factors' potential impact on the support for populism by a comprehensive perspective on macro-level factors of economic, social and environmental conditions.

We do stress, though, that the precise causal channels through which SDG progress may lead to diminishing support for populism are a subject well worth of more in-depth investigation going forward. In order to fully establish causality between the concepts under study, broader data coverage and further analyses would be necessary. In general, our analyses are limited by the availability of data, notably on populism. More research with a broader country coverage and time span would be beneficial to expand analyses such as this one in the future. There are also still significant gaps in SDG monitoring which ought to be closed in the future. Specifically, it would be desirable to have time-series data with the baseline year of 2015 (when the SDGs were signed into action), as well as real-time monitoring which is important to narrow the significant time lag for many indicators. Finally, studies on the consequences of populism on SDG performance (rather than temporal precedence given to SDG performance as a potential cause of populism as investigated here) can shed light onto the other direction of this relationship. We acknowledge that our regression analysis is unable to compare all SDGs at once due to the issue of multicollinearity. It should be kept in mind also for the model pertaining to the whole SDG Index that several goals are very closely related. For a detailed analysis of correlations both positive (synergies) and negative (trade-offs) between the components of the SDG Index, see Kroll et al., 2019.

In the end, our study shall serve as a first illustration of promising analyses on populism and sustainable development. We very much hope to have helped initiate a rich emerging research branch on these important topics.

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.

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Appendix

Table A1
List of parties coded as populist parties

Country	Parties coded as populists
Australia	One Nation Party; Communist Party of Australia
Austria	Alliance for the Future of Austria; Freedom Party of Austria; Liberal Forum; NEOS – The New Austria;Team Stronach; The Greens – The Green Alternative
Belgium	New Flemish Alliance; People's Party; Flemish Block; People's Union; Workers' Party of Belgium
Bulgaria	Democrats for a Strong Bulgaria; Bulgaria for Citizens Movement; Citizens for European Development of Bulgaria; United Democratic Forces; Alternative for Bulgarian Revival; Attack; Bulgaria Without Censorship; National Front for the Salvation of Bulgaria; IMRO – Bulgarian National Movement
Bolivia	Movimento al Socialismo
Brazil	Brasilian Labour party; Partido Trabalhista Brasileiro
Canada	Communist (Labour-Progressive) Party
Cyprus	Democratic Party; Democratic Rally; European Party; Progressive Party of Working People; Ecological and Environmental Movement; Movement for Social Democracy EDEK
Czech Republic	Action of Dissatisfied Citizens; Free Bloc; Communist Party of Bohemia and Moravia; Party of Free Citizens; Green Party
Germany	Alternative for Germany; German People's Union; German Pirate Party; Animal Protection Party
Denmark	People's Movement against the EU
Ecuador	Partido Roldosista Ecuatoriano; Partido Conservador Ecuatoriano; Partido Renovador Institucional de Acción Nacional; Alianza PAIS; Concentration de Fuerzas Populares
Spain	Citizens – Party of the Citizenry; Union, Progress and Democracy; Galician Nationalist Block; Communist Party | United Left; We Can
Estonia	Free Party; #Estonian Greens
Finland	Democratic Union | Left Alliance; Finnish Party | True Finns
France	Democratic Centre; Centre Democracy and Progress; Movement for France; Reformers Movement; Reformers Movement; Union for French Democracy | Democratic Movement; National Front; Greens; French Communist Party
United Kingdom	United Kingdom Independence Party; Plaid Cymru; Scottish National Party
Greece	Popular Orthodox Rally; The River; Independent Greeks; Democratic Left; Communist Party of Greece; Peoples Association – Golden Dawn; Coalition of the Left
Croatia	Croatian Party of Rights; Croatian Party of Rights; Croatian Democratic Alliance of Slavonia and Baranja; Croatian Labourists – Labour Party; Sustainable Development of Croatia
Hungary	Democratic Coalition; Together – Party for a New Era; Jobbik Movement for a Better Hungary; Politics Can Be Different
Ireland	Green Party; People Before Profit Alliance; Sinn Fein; Socialist Party
Italy	Democratic Centre; North League Centre Left; Brothers of Italy – National Centre-right; Five Star Movement; Democratic Party; Communist Refoundation Party; Left (Ecology) Freedom
Japan	Japan Restoration Party; Japan Communist Party
Lithuania	The Way of Courage; Election Action of Lithuania's Poles; Lithuanian Peasant Party; Order and Justice – Liberal Democratic Party
Luxembourg	Action Committee Pensions | Alternative Democratic Reform Party; Democratic Party; The Greens; The Left; Luxembourg Socialist Workers' Party
Latvia	Latvian National Independence Movement; Latvian Association of Regions; National Alliance / For Fatherland and Freedom / LNNK; For Latvia from the Heart; Unity; Equal Rights; Socialist Party of Latvia; For Human Rights in a United Latvia; Harmony; National Harmony Party
Malta	Nationalist Party
Nicaragua	Frente Sandinista de Liberación Nacional
Netherlands	Party for Freedom; Socialist Party
Peru	Alianza Popular Revolucionaria Americana - Alianza Popular Revolucionaria Americana
Poland	Poland Together | Alliance; Real Politics Union | Congress of the New Right; Law and Justice; United Poland; Your (Palikot's) Movement
Portugal	Bloc of the Left; Unified Democratic Coalition; Earth Party
Romania	Democratic Party; Democratic Liberal Party; Liberal Democratic Party; People's Movement Party; National Liberal Party; People's Party – Dan Diaconescu
Slovakia	Most-Hid; Ordinary People and Independent; Freedom and Solidarity; Slovak Democratic and Christian Union – Democratic Party; Slovak Democratic Coalition; Slovak National Party
Slovenia	New Slovenia – Christian People's Party; Slovenian Democratic Party; Slovenian People's Party; Party of Miro Cerar; Alliance of Alenka Bratusek; Democratic Party of Pensioners of Slovenia; Zoran Jankovic's List – Positive Slovenia; United Left; United List – Social Democrats
Sweden	Pirate Party; Feminist Initiative; Sweden Democrats
Turkey	National Action Party; Peoples' Democratic Party; Social Democratic Populist Party | Republican People's Party

Note: The coding is taken from Inglehart and Norris, 2016. If a country is not covered there, we consult Rodrik, 2018. If a country is not covered there, we consult Funke et al., 2016.

Table A2
Full regression table

Dependent variable: Change in total populist vote shares (latest elections) - Explanatory var: five-year change in SDG indicators																	
	Change in populist vote share	Change in populist vote share	Change in populist vote share	Change in populist vote share	Change in populist vote share	Change in populist vote share	Change in populist vote share	Change in populist vote share	Change in populist vote share	Change in populist vote share	Change in populist vote share	Change in populist vote share	Change in populist vote share	Change in populist vote share	Change in populist vote share	Change in populist vote share	Change in populist vote share
Change in agg. SDG indicator (2010-2015)	-1.991**																
	-0,006																
Change in SDG 1 (2010-2015)		-0.342*															
		-0,024															
Change in SDG 2 (2010-2015)			-2.399**														
			-0,005														
Change in SDG 3 (2010-2015)				0,689													
				-0,591													
Change in SDG 4 (2010-2015)					-0,226												
					-0,16												
Change in SDG 5 (2010-2015)						-0,0617											
						-0,902											
Change in SDG 6 (2010-2015)							-0,205										
							-0,649										
Change in SDG 7 (2010-2015)								-0,367									
								-0,574									
Change in SDG 8 (2010-2015)									0,244								
									-0,206								
Change in SDG 9 (2010-2015)										-0,0476							
										-0,721							
Change in SDG 10 (2010-2015)											0,199						
											-0,681						
Change in SDG 11 (2010-2015)												-0.976**					
												-0,008					
Change in SDG 13 (2010-2015)													0,116				
													-0,776				
Change in SDG 14 (2010-2015)														0,408			
														-0,073			
Change in SDG 15 (2010-2015)															-0.488***		
															0		
Change in SDG 16 (2010-2015)																0,259	
																-0,36	
Change in SDG 17 (2010-2015)																	-0,15
																	-0,345
Change in GDP per capita PPP (2010-2015)	0.00128*	0.000777*	0,0005	0.000623*	0,000696	0,000523	0,000731	0,000631	0,000358	0,000721	0,00058	0.000945*	0,000716	0,000511	0,000515	0,000606	0,0015
	-0,021	-0,036	-0,148	-0,03	-0,059	-0,09	-0,083	-0,078	-0,191	-0,054	-0,153	-0,014	-0,051	-0,114	-0,123	-0,057	-0,085
Constant	-0,0362	-1,995	-2,484	-2,239	-1,483	-0,752	-0,917	-1,632	-1,559	-0,803	0,921	-0,344	-1,891	-0,95	-0,69	-1,651	-0,743
	-0,982	-0,281	-0,129	-0,372	-0,415	-0,683	-0,667	-0,379	-0,4	-0,799	-0,735	-0,838	-0,358	-0,656	-0,713	-0,373	-0,747
N	39	38	39	38	39	37	30	38	37	39	22	35	39	31	37	39	24
adj. R-sq	0,188	0,096	0,112	0,018	0,023	-0,02	-0,004	0,003	0,039	0,013	-0,029	0,139	0,011	0,023	0,008	0,034	0,049
F	4,735	5,635	10,52	2,566	2,1	1,644	1,71	1,816	2,39	2,001	1,687	5,398	2,304	3,768	11,68	1,974	1,686
p-values in parentheses																	
* p<0.05, ** p<0.01, *** p<0.001																	

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