Greens in government. The distributive policies of a culturally progressive force

Leonce Röth, University of Cologne
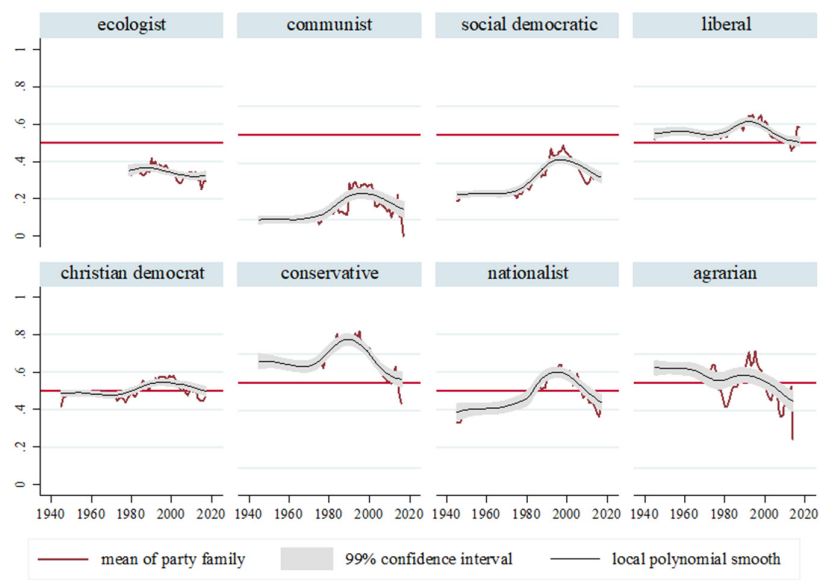
Hanna Schwander, Humboldt University of Berlin

Online Appendix

1. Location of Green parties in the socio-economic policy space

Figure A1: Mean policy positions of party families towards market liberalism (0 = interventionist to 1= market liberal)

Notes: Own calculations on the basis of CMP (n=5019). Parties with a vote share below two percent are excluded. Classification of party families adopted from CMP coding. Ethnic, regional or special issue parties are not pictured. The positions are yearly averages of party families using the classification of the CMP/Marpor dataset (Volkens et al., 2018). Positions are calculated using the issue selection and transforming procedure as described in Röth et al. (2018) or Röth (2017;2018). The red line indicates the yearly average position of party families. The black line and the attached confidence intervals are smoothed by the first polynomial.

2. Salience of socio-economic issues over party families

Figure A2: Relative emphasis on economic issues by party families
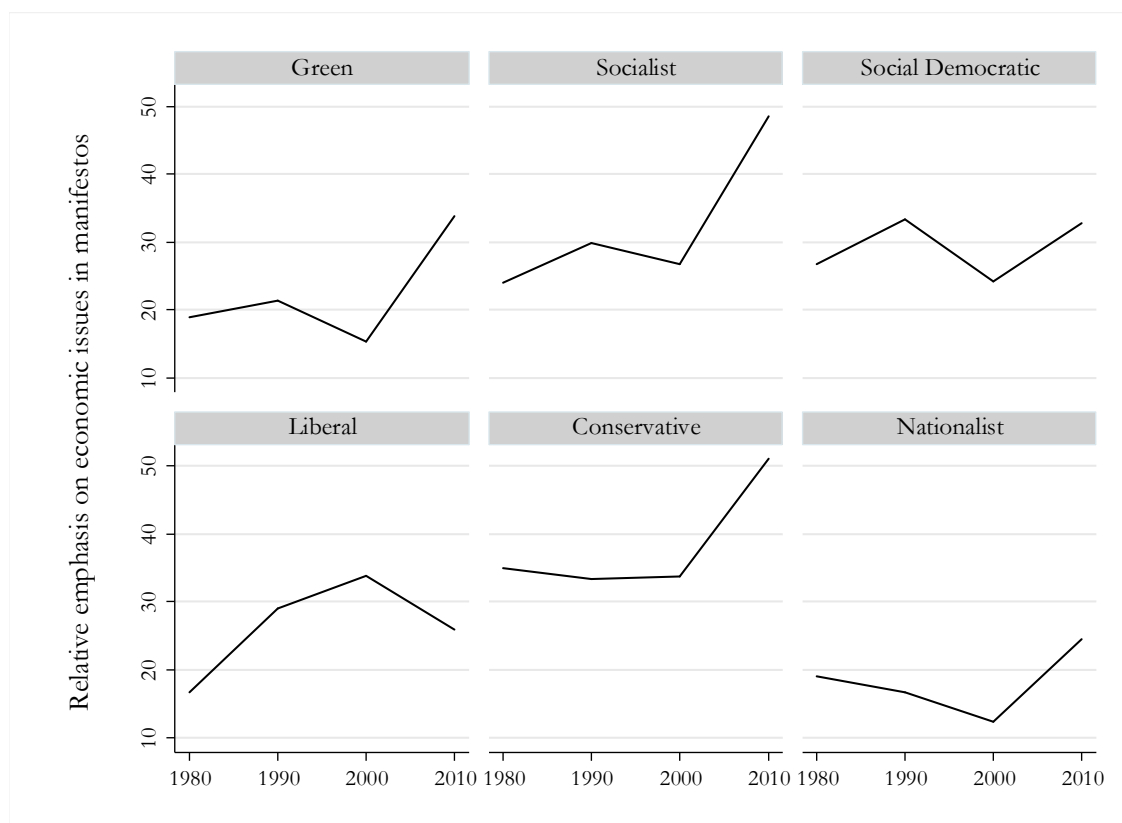
Notes: Own calculations on the basis of CMP (n=5019). Ethnic, Christian democratic, regional or special issue parties are not pictured. The relative emphasis is ten year averages of party families using the following issue categories from of the CMP/Marpor dataset (Volkens *et al.* 2018): p401 p414 p402 p403 p412 p413 p504 p415 p303 p505 p404 p409 p503 p701.

3. Selection of treatment cases – government with Green party Inclusion or Green party support

We list every government where at least one Green party is officially included in the cabinet (formal coalition party). Furthermore we added cabinets where a Green party either formally or informally supports a minority government (support cabinet). We do not include those minority support parties in the main analysis but dedicated additional models in the Online Appendix to a separation of Green support party effects versus Green coalition effects.

Table A1: List of cabinets and characteristics with Green party inclusion[1]

Country	Party	vote share	Seat share	Cabinet	formal / support	start date	Duration in days	Coalition partners	Degree of market liberalism	Portfolios	Portfolio areas	Included in main analysis	Robustness
Australia	Australian Greens	11.8	0.7	Gillard II	support	14.09.2010 Green support ended in 2013	158	1 (SD)	0.53	0	-	No	yes
Belgium	Ecolo & Agalev	14.3	13.3	Verhofstadt I	formal	13.07.1999	1460	4 (L, SD)	0.37	2	Mobility and Transport; Consumer Interest; Health and Environment	Yes	Yes
Bulgaria	Zelena Partiya	Alliance	Alliance	Dimitrov	formal	05.11.1991	421	1 (CD)	unknown	2	Mobility and Transport; Consumer; Health and Environment	No - To many missing in controls. Post-communist Transition.	Yes
Bulgaria	Zelena Partiya	Alliance	Alliance	Stanishev	formal	17.08.2005	1441	3 (S, L)	0.63	2 to 3	Finance, Environment; Prime Minister (1991-1992)	Yes	Yes
Bulgaria	Zelena Partiya	Alliance	Alliance	Oresharski	formal	29.05.2013	434	1 (L)	unknown			Yes	Yes
Czech Republic	Strana zelených	6.3	3	Topolanek II	formal	09.01.2007	850	2 (C, CD)	0.83	5	Deputy Prime Minister; Environment; Foreign Affairs; Education; Human Rights and Minorities	Yes	Yes
Czech Republic	Strana zelených	6.3	3	Fischer I	support	09.04.2009	445	.	caretaker	0	-	no	no

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[1] Two different "Green parties" in Latvia have also been part of 14 different governments since 1995 and, thus, have been part of virtually every coalition government since then. However, both parties are a more precisely an alliance between the Latvian Farmers Union and the Latvian Green Party. The ladder is culturally right wing as it is reactionary, nationalist and opposes LGBT rights. The Latvian Farmers Union is affiliated to the European faction of the Liberals and Democrats, thus, rather compares to Nordic agrarian parties. For those reasons we coded the respective governments in Latvia as not having a Green party included. The Ayrault I cabinet in France, the Rutte I cabinet in the Netherlands (Kunduz coalition) and the Abisala and Simenas cabinets in Lithuania are excluded because of very short duration.

Country	Party	vote share	Seat share	Cabinet	formal / support	start date	Duration in days	Coalition partners	Degree of market liberalism	Portfolios	Portfolio areas	Included in main analysis	Robustness
Denmark	Socialistisk Folkeparti	9.2	8.9	Thorning-Schmidt I	formal	02.10.2011	854	2 (SD, L)	0.48	6 to 7	Foreign Affairs; Trade and Investment; Taxation; Business and Growth (until August 2013); Integration and Social Affairs (from August 2009); Health and Prevention; Environment; Transport (from August 2013).	Yes	Yes
Denmark	Socialistisk Folkeparti	9.2	8.9	Thorning-Schmidt II	support	03.02.2014	510	2 (SD, L)	0.54	0	.	No	Yes
Estonia	Estonian Green Movement	.	.	Savisaar	formal	30.01.1990	668	1 (SD)	unknown	1	Environment	No – The Savisaar government was not elected but rather a transition body of ministers.	Yes
Finland	Vihreä Liitto	6.5	4.5	Lipponen I	formal	13.04.1995	1463	4 (SD, C, S, L)	0.53	1	Environment+AC7+AC2:AC13+A+AC2:AC13	Yes	Yes
Finland	Vihreä Liitto	7.3	5.5	Lipponen II	formal	15.04.1999	1142	4 (SD, C, S, L)	0.52	2	Environment and Health; Social Security	Yes	Yes
Finland	Vihreä Liitto	8.5	7.5	Vanhanen II	formal	19.04.2007	1160	3 (SD, C, L)	0.47	2	Justice; Labour	Yes	Yes
Finland	Vihreä Liitto	8.5	7.5	Kiviniemi	formal	22.06.2010	365	3 (SD, C, L)	0.47	2	Justice; Labour	Yes	Yes
Finland	Vihreä Liitto	7.3	5	Katainen I	formal	22.06.2011	1007	5 (SD, C, S, L, CD)	0.47	2	International Development; Environment	Yes	Yes
Finland	Vihreä Liitto	7.3	5	Katainen II	formal	25.03.2014	91	4 (SD, C, L, CD)	0.5	2	International Development; Environment	Yes	Yes
Finland	Vihreä Liitto	7.3	5	Stubb I	formal	24.06.2014	88	4 (SD, C, L, CD)	0.5	2	International Development; Environment	Yes	Yes
France	Les Verts	5.5	2.9	Ayrault II	formal	18.06.2012	651	2 (SD)	0.42	2	Regional Development and Housing ; International Development (part of foreign affairs controlled by PS)	Yes	Yes
France	Les Verts	5.5	2.9	Valls III	formal	11.02.2016	299	2 (SD)	0.42	1	Housing	Yes	Yes
France	Les Verts	5.5	2.9	Cazeneuve	formal	06.12.2016	156	2 (SD)	0.42	1	Housing	Yes	Yes

Country	Party	vote share	Seat share	Cabinet	formal / support	start date	Duration in days	Coalition partners	Degree of market liberalism	Portfolios	Portfolio areas	Included in main analysis	Robustness
France	Mouvement des citoyens – Les verts	9.6	2.6	Jospin I	formal	02.06.1997	1798	2 (SD, S)	0.52	1	Environment and Spatial Planning ; Social Economy	Yes	Yes
Germany	Bündnis 90 die Grünen	6.7	7	Schroeder I	formal	27.10.1998	1456	1 (SD)	0.55	3	Foreign Affairs; Environment; Reactor Safety and Nature Protection; Agriculture and Consumer Affairs	Yes	Yes
Germany	Bündnis 90 die Grünen	8.6	9.1	Schroeder II	formal	22.10.2002	1127	1 (SD)	0.47	3	Foreign Affairs; Environment; Reactor Safety and Nature Protection; Agriculture and Consumer Affairs	Yes	Yes
Iceland	Vinstrihreyfingin – grænt framboð	21.7	22.2	Sigurðardóttir I	formal	01.02.2009	98	1 (SD)	0.4	4	Education, Science and Culture; Environment; Health; Finance, Fisheries and Agriculture	Yes	Yes
Iceland	Vinstrihreyfingin – grænt framboð	21.7	22.2	Sigurðardóttir II	formal	25.09.2009	1474	1 (SD)	0.33	5	Education, Science and Culture; Environment; Health; Finance; Fisheries and Agriculture	Yes	Yes
Iceland	Vinstrihreyfingin – grænt framboð	16.9	17.5	Jakobsdottir I	formal	30.11.2017	ongoing	2 (C)	unknown	3	Prime Minister; Environment and Natural Resources; Health	Yes	Yes
Ireland	Green Party	4.7	3.6	Ahern III	formal	14.06.2007	328	1 (C)	0.6	2	Communications, Energy and Natural Resources; Environment; Heritage and Local Government	Yes	Yes
Ireland	Green Party	4.7	3.6	Cowen	formal	07.05.2008	1036	2 (C, L)	0.53	2	Communications, Energy and Natural Resources; Environment; Heritage and Local Government	Yes	Yes
Italy	Federazione dei Verdi	Alliance	2.5	Prodi I	formal	17.05.1996	894	3 (SD, CD, L)	0.59	1	Environment	Yes	Yes
Italy	Federazione dei Verdi	Alliance	2.5	D'Alema I	formal	28.10.1998	419	6 (SD, CD, S, L)	0.5	2	Environment; Equal Opportunities	Yes	Yes
Italy	Federazione dei Verdi	Alliance	2.5	D'Alema II	formal	21.12.1999	129	6 (SD, CD, S, L)	0.55	2	Environment;; Agriculture and Forests, European Affairs	Yes	Yes
Italy	Federazione dei Verdi	2	2.4	Prodi II	formal	17.05.2006	722	6 (SD, CD, S, L)	0.42		.	Yes	Yes

Country	Party	vote share	Seat share	Cabinet	formal / support	start date	Duration in days	Coalition partners	Degree of market liberalism	Portfolios	Portfolio areas	Included in main analysis	Robustness
Lithuania	Lietuvos žalioji partija	.	3	Prunskiene	formal	07.03.1990	299	3 (C, S, CD)	unknown	1	Deputy Prime Minister	No –To many missing in controls. Post-communist	Yes
Lithuania	Lietuvos žalioji partija	.	3	Prunskiene	formal	07.03.1990	299	3 (C, S, CD)	unknown	1	Deputy Prime Minister	No –To many missing in controls. Post-communist	Yes
Lithuania	Lietuvos žalioji partija	.	3	Vagnorius I	formal	13.01.1991	558	2 (C, CD)	unknown	1	Deputy Prime Minister	No - To many missing in controls. Post-communist	Yes
Luxembourg	Déi Gréng	10.1	10	Bettel	formal	04.12.2013	1458	2 (L, SD)	0.49	3	Justice; Sustainable Development and Infrastructure; Environment	Yes	Yes
Netherlands	Politieke Partij Radikalen	4.8	4.7	Den Uyl I	formal	11.05.1973	1475	4 (SD, CD, L)	0.4	1	Culture, Recreation and Social Work; Science Policy (within ministry of education); Infrastructure (within ministry of transport)	Yes	Yes
Netherlands	Politieke Partij Radikalen	1.7	2	Den Uyl II	formal	25.05.1977	208	3 (SD, CD, L)	0.39	1	Culture, Recreation and Social Work; Science Policy (within ministry of education); Infrastructure (within ministry of transport)	Yes	Yes
New Zealand	Green Party	7	7.5	Clark II	support	15.08.2002	1159	2 (SD)	0.49	0	-	No	Yes
New Zealand	Green Party	5.3	5	Clark III	support	17.10.2005	1129	2 (SD)	0.57	0	-	no	Yes
New Zealand	Green Party	7.4	6.7	Key I	support	19.11.2008	1120		0.64	0	-	no	yes

Country	Party	vote share	Seat share	Cabinet	formal / support	start date	Duration in days	Coalition partners	Degree of market liberalism	Portfolios	Portfolio areas	Included in main analysis	Robustness
New Zealand	Green Party	6.3	6.7	Ardern	formal	26.10.2017	ongoing	2 (SD, C)	unknown	"4 "	All of them support party ministers only. Finance, Health and Transport; Environment; Justice	Yes	Yes
New Zealand	Green Party	5.2	5.8	Clark I	support	09.12.1999	980	2 (SD)	0.38	0	-	No	Yes
Romania	Mişcarea Ecologistă din România	2.6	3	Stolojan	formal	16.10.1991	394	3 (L)	0.42	1	Environment	No – Post-communist Transition.	Yes
Slovakia	Strana zelených na Slovensku	Alliance	Alliance	Dzurinda I	formal	30.10.1998	1447	4 (CD, C, S, SD)	0.74	0	-	no	yes
Slovenia	Zeleni Slovenije	8.8	10	Peterle	formal	16.05.1990	677	4 (L, CD, SD)	0.44	4	Environmental Protection and Regional Development; Environmental Conversation and Land Use Management; Research and Technology; Power Engineering	Yes	Yes
Slovenia	Zeleni Slovenije	3.7	5.6	Drnovsek I	formal	22.04.1992	265	4 (L, SD)	0.32	2	Environment; Health, Family and Social Security	Yes	Yes
Sweden	Miljöpartiet de Gröna	4.5	4.6	Persson II	support	07.10.1998	1475	1 (SD)	0.59	0	-	No	Yes
Sweden	Miljöpartiet de Gröna	4.6	4.9	Persson III	support	21.10.2002	1445	1 (SD)	0.57	0	-	No	Yes
Sweden	Miljöpartiet de Gröna	6.9	7.2	Lofven	formal	02.10.2014	ongoing	1 (SD)	unknown	7	Deputy Prime Minister; International Development and Climate; Financial Markets, Consumer Affairs and Finance; Education; Environment; Housing and Urban Development; Digitalization; Culture and Democracy	Yes	Yes
mean		**7.7**	**6.2**				**809**		**0.5**	**1.7**			

Notes: L = Liberals; SD = Social Democrats; CD = Christian Democrats; C = Conservatives; S = Socialists. Party names refer to the time, when the respective parties achieved government participation. We select the respective Green parties within the European Union if they fulfil the criteria above as well as being members in the Greens-European Free Alliance (or the respective preceding alliances). Green parties of non-member states are selected via their partisan label and a strong emphasis on environmental protection.

We decided to exclude cabinets from post-communist countries between 1990 and 1992. This affects cabinets with Green parties from Bulgaria, Lithuania, Estonia, Romania and Slovenia). The reason are as follows:

- Some early post-communist governments were not based on parliamentary elections (Lithuania and Estonia until 1992).
- There are a lot of missing data on key controls in almost all of the first two years in post-communist countries.
- When they exist, they indicate massive economic turbulences. For example, during the Dimitrov cabinet in Bulgaria we observe a negative growth rate of around minus 7%, public debt skyrocket from 170% to 290% of the GDP, economic integration massively changed on a yearly basis (fluctuations of around 12%). The balancing procedure also indicates, that there are no appropriate matches once we include the Dimitrov Cabinet. Similar developments characterize the early democratic years of Estonia, Lithuania, Romania and Slovenia. For the sake of consistency we dropped all cabinets in the first two years after transition from communism to democracy. This decision affects the following governments with Green party inclusion:
  - Savisaar (Estonia), Prunskiene and Vagnorius I (both Lithuania), Dimitrov (Bulgaria), Stolojan (Romania), Peterle and Drnovsek I (Slovenia).

4. Data and sources

First, we need to make sure that differences are not due to ideological differences between (predominantly center-left) coalition partners. Based on the idea that these differences cannot be fully captured by party families (Döring and Schwander 2015), we measure government positions on redistributive and tax policies using Comparative Manifesto Project data (CMP). Following Röth (2017), we select distributive policy issues which can be definitely attributed either to more market-liberal or state-interventionist policies[2] and measure the degree of market liberalism of a party with an item response model. We then calculate government positions by weighting each government party's position by its relative cabinet seat share to account for the variety of positions in coalition governments (government participation data are based on Döring and Manow 2012). The resulting variable *market liberalism of government* has been standardized and ranges from 0 (most interventionist) to 1 (most market-liberal). Note that the CMP data does not allow us to separate between redistributive, social investment and issues of taxation. Thus, and if our assumptions on the different interests of Green parties within the welfare domain and across distributive policy dimensions in general are correct, the overall economic positions of Green parties might appear misleading for our research question. While the main objective of the market-liberalism variable is to control for the ideology of Green parties' coalition partners, this leaves the programmatic effect of Green parties to be explained mainly by dummy accounting for their government participation.

The ability of governments to implement reforms in line with their preferences depends on adequate majorities with sufficient time for the implementation of reforms. We control for time through *the duration of the cabinet* measured in days for the respective year in the country-year specifications and with the overall *cabinet duration in days* for the cabinet periodization. Majorities are measured via the relative *cabinet share of seats in parliament*.

Globalization and *Europeanization* are seen to be the main drivers of welfare state retrenchment and exert downwards pressure on income and corporate taxes. We control for globalization with the proportion of exports and imports to overall GDP (Armingeon *et al.* 2017). We control the level as well as the first difference of globalization in order to distinguish between the effect exerted by historically open economies and the changing economic integration over time.

The influence of Europeanization is tested by an index of European Monetary Union (EMU) integration, summing up the membership levels of the three implementation stages. We also include *union density* as a control because organized labour might be a relevant opponent of both less redistributive and more market-liberal reforms. Again, we incorporate the level as well as the first difference in order to capture established channels of organized labour as well as changing dynamics in terms of organized interests.

Short- and long-term economic and demographic developments are major drivers of welfare generosity. *Unemployment* is an important influence and varies significantly in the short-run. The overall affluence of a society is controlled by the Chain index – the natural logarithm of real *GDP per capita*. In addition, we include the *growth rate of GDP* in order to capture economic cycles. We control for *public debt* by the lagged level and the change rate, as public obligations should restrict redistributive generousity and might make tax cuts less likely. The base of citizens entitled to pensions is controlled by the *proportion of citizens older than 65* as a percentage of the population. Additionally, all socio-demographic controls are controlled at their level as well as their first difference. Finally, each model includes lagged level dependent variables to capture the declining likelihood of further redistributive reforms in countries that are already liberalized to a high degree. Table A.2 lists data and sources of the control variables.

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[2] Those are the following issue categories of the CMP/Marpor project: 401, 402, 414, 505, 403, 404, 409, 501, 504, 701, 503, 412, 413 and 415.

Table A2: Data and sources (distribution based on country years)

	n	mean	Std. dev	Description	Source
Dependent variables					
Social transfers in general	1230	13.12	3.73	Social security transfers, % of GDP	All Armingeon et al. (2017)
Unemployment	917	1.17	0.97	Unemployment benefits expenditure in cash, % of GDP 8public/mandatory private)	
Old age	923	7.09	2.25	Old age expenditure, % of GDP (public)	
Housing	899	0.31	0.33	Housing expenditure, % of GDP (public)	
Family	923	2.00	0.95	Expenditure for families, % of GDP (public	
Childcare	790	0.47	0.43	Childcare and early educational services, % of GDP (public)	
Active labor market	774	0.62	0.44	Active labour market programmes expenditures, % of GDP (public)	
Education	417	4823.84	2352.3	Education spending in Euro, divided by target group in PPS	Ronchi (2016)
Corporate tax	973	33.61	11.04	Corporate tax rate	Own compilation. Various sources (detailed list of sources on demand).
Top marginal income tax	1,072	49.54	14.28	Top marginal income tax rate	Data for various countries are taken from (TPC 2018) and OECD Tax Database (2018). Additional data on Austria, Belgium, United States and Germany are added by the author.
VAT	1,096	15.61	7.86	Value added tax rate	Own compilation. Various sources (detailed list of sources on demand).
Independent variables					
Green parties in government	1,360	0.05	0.22	Green party in formal government participation	Own calculation
Green parties as cabinet support parties	1,360	0.02	0.14	Green parties as formal or informal support party of minority government without portfolio	Own calculation
Opportunity structures					
Days governed per year	1,360	316.99	73.15	Count of days government governed within respective year	Own calculation
Seat share cabinet	1,360	55.53	12.23	Seat share combined of all cabinet parties as percentage of entire parliament	Own calculation
Market liberalism of government	1,337	0.53	0.16	Degree of market liberalism of government. Party positions weighted by relative cabinet seat share	Röth et al. (2017)
Socio-economic conditions					
Unemployment	1,360	7.00	4.48	Percentage of unemployed from entire workforce	Armingeon et al. (2017)
Δ Unemployment	1,318	0.11	1.20		Armingeon et al. (2017)
GDP per capita (int $, log)	1,360	15920.01	6257.88	GDP per capita in int. $, ppp (base 1990). Logarithmized	World Bank (2018)
GDP growth	1,271	2.56	3.34	GDP growth rate	Armingeon et al. (2017)
Public debt	1,360	54.91	36.40	Public debt as percentage of GDP	Armingeon et al. (2017)
Δ Public debt	1,346	1.28	8.12	Δ of public debt as percentage of GDP	Armingeon et al. (2017)
Δ Open economy	1,326	1.25	7.13	Change in Open Economy (below)	Armingeon et al. (2017)
Level open economy	1,360	84.21	48.79	Openness of the economy, measured as total trade (sum of import and export) as a percentage of GDP, in current prices.	
Union density	1,360	39.72	21.22	Union density in percent of workforce	Armingeon et al. (2017)
Δ Union density	1,318	0.11	1.20	Δ of union density in percent of workforce	Armingeon et al. (2017)
Share of citizens over 65	1,360	14.36	2.86	Percentage of people older 65	Armingeon et al. (2017)
Δ Share of citizens over 65	1,346	0.16	0.17	Δ of percentage of people older 65	Armingeon et al. (2017)
European Monetary Union	1,360	0.17	0.37	Member state of the EMU	Own calculation
Regional authority over education	1,360	1.53	0.83	High state-wide authority = 2; medium = 1, low = 0	Inverse of Kleider et al. (2017)
Government spending as percentage of GDP	1,241	43.83	7.56	Government spending as percentage of GDP	UNESCO 2019

Note: Included countries: Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Latvia, Lithuania, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

5. Balance of control and treatment

The characteristics of governments where Green parties participate are far from balanced compared with those without it: Green parties govern in circumstances with higher unemployment, comfortable coalition majorities, higher union density, with more people employed in services; they govern in context with higher debt, lower growth and a more globalized economy. In order to deal with this, we use entropy balancing as an established and non-parametric way to obtain regression weights (Hainmueller and Xu, 2013). This procedure assigns higher weights to observations of governments without Green party participation that are similar to governments with Greens. The balancing procedure serves the purpose of comparing Green coalition governments with the most similar governments without Green party inclusion.

As Green party governments are themselves a heterogeneous group of cabinets, we attempt to balance not only the mean but also the variance and skewness. Entropy balancing allows to reweight data according to their first three moments (mean, variance and skewness; see Hainmueller, 2012). As we observe considerable difference in all three moments (see Tables 3 and 4), we adjust the data with balancing on all three moments accordingly. The large amount of control cases (1170 versus 63 treatment cases) allows for such ambitious moment constraints and the entropy balancing procedure converges after 16 iterations. However, once we change the periodization to cabinet periods, we lose a lot of variation in the controls, and the balancing procedure converges only on the first moment (mean). In this periodization 30 treatment cases are compared, 543 control cases and balance of the means is achieved after 12 iterations (compare Tables 5 and 6)

Another way of putting differences in the distribution of controls between treatment and control group is model the selection into treatment effect via panel logistic regression. Table 7 confirms what is already visible in the balance tables. Furthermore, the findings indicate that Green governments are very likely to govern in circumstances where welfare state spending is above the average. Taking this into account, means to have another important argument way we should abstain from levels as the dependent variable because it would cause serious concerns of endogeneity.

Table A3: Balance of control variables between governments with and without Green parties – country years

Before weighting	Treatment (Green party in government)			Control (no Green party in government)		
	Mean	Variance	Skewness	Mean	Variance	Skewness
Opportunity structures						
Days governed per year	316.80	5012.00	-1.09	317.40	5103.00	-1.65
Seat share cabinet	58.96	74.98	-0.12	55.77	136.80	0.02
Market liberalism of government	0.53	0.01	0.66	0.53	0.03	-0.15
Socio-economic conditions						
Unemployment	9.02	11.83	1.10	6.91	19.17	1.11
GDP growth	1.68	9.02	-0.92	2.64	10.86	-0.96
Public debt	64.48	960.30	0.54	53.50	1200.00	1.20
Δ Open economy	1.88	48.61	-1.38	1.23	48.75	1.89
Level open economy	89.83	1195.00	0.75	81.40	2281.00	2.18
European Monetary Union	0.53	0.25	-0.12	0.16	0.14	1.81
GDP per capita (log)	18600	29000000	-0.67	15932	36100000	0.46
Union density	42.07	588.80	0.27	39.16	416.40	0.60
Share of people over 65	15.72	8.76	-0.50	14.23	7.67	0.25
Δ debt	1.56	34.35	1.42	1.23	31.96	0.85
Δ Share of people over 65	0.25	0.03	0.88	0.16	0.03	0.35
Δ Union density	-0.34	1.09	-0.17	-0.58	5.19	-2.88
Δ Unemployment	0.12	1.96	1.52	0.12	1.49	1.62

Balance of data after entropy balancing – country years

after weighting	Treatment (Green party in government)			Control (no Green party in government)		
	Mean	Variance	Skewness	Mean	Variance	Skewness
Opportunity structures						
Days governed per year	316.80	5012.00	-1.09	316.80	5012.00	-1.09
Seat share cabinet	58.96	74.98	-0.12	58.96	74.98	-0.12
Market liberalism of government	0.53	0.01	0.66	0.53	0.01	0.66
Socio-economic conditions						
Unemployment	9.02	11.83	1.10	9.02	11.83	1.10
GDP growth	1.68	9.02	-0.92	1.68	9.02	-0.92
Public debt	64.48	960.30	0.54	64.48	960.40	0.54
Δ Open economy	1.88	48.61	-1.38	1.88	48.61	-1.38
Level open economy	89.83	1195.00	0.75	89.84	1195.00	0.75
European Monetary Union	0.53	0.25	-0.12	0.53	0.25	-0.12
GDP per capita	18600	29000000	-0.67	186000	29000000	-0.67
Union density	42.07	588.80	0.27	42.07	588.80	0.27
Share of people over 65	15.72	8.76	-0.50	15.72	8.76	-0.50
Δ debt	1.56	34.35	1.42	1.56	34.35	1.42
Δ Share of people over 65	0.25	0.03	0.88	0.25	0.03	0.88
Δ Union density	-0.34	1.09	-0.17	-0.34	1.09	-0.17
Δ Unemployment	0.12	1.96	1.52	0.12	1.96	1.52

Note: Pre-treatment distribution generated by the ebalance package using Stata (Hainmueller and Xu, 2013). 66 Treatment cases are balanced to 1186 control cases. Convergence achieved after 16 iterations.

Table A4: Balance of control variables between governments with and without Green parties – cabinet periodization

Before weighting	Treatment (Green party in government)			Control (no Green party in government)		
	Mean	Variance	Skewness	Mean	Variance	Skewness
Opportunity structures						
Days governed per cabinet	1132.00	287627.00	-0.02	825.20	223559.00	0.56
Seat share cabinet	57.81	82.00	0.11	54.14	172.00	-0.41
Market liberalism of government	0.51	0.01	1.13	0.52	0.03	-0.19
Socio-economic conditions						
Unemployment	8.92	9.21	0.97	7.43	19.39	1.08
GDP growth	1.73	3.49	-0.29	2.56	15.64	2.57
Public debt	67.30	1007.00	0.40	55.19	1445.00	1.53
Δ Open economy	5.89	58.61	1.10	2.91	81.40	1.87
Level open economy	87.79	1225.00	0.83	79.55	2043.00	2.25
European Monetary Union	0.54	0.26	-0.15	0.14	0.12	2.02
GDP per capita	19299	27600000	-0.80	15294	37000000	0.45
Union density	39.98	608.30	0.30	38.81	443.90	0.59
Share of people over 65	16.03	9.18	-0.68	14.44	8.28	0.29
Δ debt	2.72	207.00	0.95	2.78	156.00	-1.86
Δ Share of people over 65	0.61	0.20	0.40	0.36	0.11	0.43
Δ Union density	-1.41	9.92	-2.78	-1.44	15.54	-3.77
Δ Unemployment	0.19	7.69	0.28	0.28	3.97	0.93

Balance of data after entropy balancing - *cabinet periodization*

after weighting	Treatment (Green party in government)			Control (no Green party in government)		
	Mean	Variance	Skewness	Mean	Variance	Skewness
Opportunity structures						
Days governed per cabinet	1132.00	287627.00	-0.02	1132.00	238219.00	-0.38
Seat share cabinet	57.81	82.00	0.11	57.81	141.70	-0.09
Market liberalism of government	0.51	0.01	1.13	0.51	0.02	-0.34
Socio-economic conditions						
Unemployment	8.92	9.21	0.97	8.92	28.74	1.39
GDP growth	1.73	3.49	-0.29	1.73	10.11	-3.24
Public debt	67.30	1007.00	0.40	67.30	1503.00	0.90
Δ Open economy	5.89	58.61	1.10	5.89	119.40	2.49
Level open economy	87.79	1225.00	0.83	87.79	2787.00	2.59
European Monetary Union	0.54	0.26	-0.15	0.54	0.25	-0.15
GDP per capita (log)	19299	27600000	-0.80	19298	35200000	0.16
Union density	39.98	608.30	0.30	39.98	541.80	0.47
Share of people over 65	16.03	9.18	-0.68	16.03	7.43	-0.11
Δ debt	2.72	207.00	0.95	2.72	260.00	-2.42
Δ Share of people over 65	0.61	0.20	0.40	0.61	0.18	0.21
Δ Union density	-1.41	9.92	-2.78	-1.41	10.44	-4.17
Δ Unemployment	0.19	7.69	0.28	0.19	7.07	1.04

Note: Pre-treatment distribution generated by the ebalance package using Stata (Hainmueller and Xu, 2013). 30 Treatment cases are balanced to 543 control cases. Convergence achieved after 16 iterations.

Table A5: Selection into Treatment, Panel-Probit Model: Effect of controls on the Green Party participation in government

	Coef.	P>|z|	Effect of confounding and endogeneity concerns
Opportunity structures			
Days governed per year	0.00	0.425	
Seat share cabinet	0.03**	0.012	Cannot be endogenous
Market liberalism of government	-1.83**	0.012	Cannot be endogenous
Socio-economic conditions			
Unemployment	0.11**	0.016	Unemployment. Omission would overestimate Green party effect
GDP growth	-0.10*	0.058	Strong negative effect on social spending change because measured as share of GDP. Omission would underestimate Green party effect.
Public debt	-0.02***	0.009	Negative effect on social spending changes. Omission would overestimate Green party impact.
Δ Open economy	0.01	0.364	
Level open economy	-0.01	0.129	
European Monetary Union	0.30	0.317	
GDP per capita (log)	0.01***	0.001	Negative effect on changing social spending. Omission would underestimate Green party effect
Union density	0.02	0.210	
Share of people over 65	-0.07	0.927	
Δ debt	-0.01	0.489	
Δ Share of people over 65	1.61***	0.006	Share of older people does not systematically affect social spending as an aggregate. Positive effect on pension. Omission overestimate Green party impact.
Δ Union density	0.00	0.973	
Δ Unemployment	-0.10	0.329	
Lagged dependent (level of social spending in t-1)	0.13**	0.026	Raises concerns of endogeneity once we would use the levels as dependent variable

6. Overview of missing data

Table A6: Missing data and coverage of positive cases

Variable	Before imputation					After imputation	
	Missing	Total	Missing for positive cases only	Total positive cases	Percent Missing	Missing	Missing for positive cases only
Greens in government	0	1,360	0	64	0	0	0
Unemployment	27	1, 360	0	64	1.99	0	0
Days governed per year	0	1, 360	0	64	0	0	0
Seat share government	0	1, 360	0	64	0	0	0
Market liberalism of government	23	1, 360	0	64	1.69	23	0
Debt	0	1,457	0	64	0	0	0
GDP growth	89	1, 360	2	64	6.54	0	0
Δ Open economy	13	1, 360	0	64	0.96	13	0
Level economic globalization	0	1, 360	0	64	0	0	0
European Monetary Union	0	1, 360	0	64	0	0	0
Percentage of people older 65	16	1, 360	0	64	1.18	0	0
GDP per capita (log)	28	1, 360	1	64	2.06	0	0
Union density	109	1, 360	0	64	8.01	0	0
Δ Share of people over 65	14	1, 360	0	64	1.03	14	0
Δ Union density	14	1, 360	0	64	1.03	14	0
Δ Unemployment	42	1, 360	0	64	3.09	34	0

7. Robustness

7.1 Effect heterogeneity through exclusion of countries

There are several entry points to assess the robustness of our results. In a first step, we take individual countries from the regression in order to assess if single countries and thereby specific Green parties drive the results (see Table A.6).

Table A7: *Robustness of core effects to case-wise country exclusion – based on country-years*

Country excluded	Green formal governments	Social transfers	Housing	Family	Childcare
All included	**Yes**	**0.09***	**0.03***	**0.04*****	**0.03*****
Australia	No	0.08*	0.03*	0.04***	0.03***
Austria	No	0.10**	0.03*	0.04***	0.03***
Belgium	Yes	0.11**	0.03*	0.05***	0.03***
Bulgaria	Yes	0.11**	0.03*	0.03**	0.03***
Canada	No	0.10**	0.02*	0.04***	0.03***
Croatia	No	0.10**	0.03**	0.04***	0.03***
Cyprus	No	0.08*	0.03*	0.04***	0.03***
Czech Republic	Yes	0.09*	0.03*	0.04***	0.03***
Denmark	Yes	0.09*	0.03*	0.05***	0.04***
Estonia	Yes	0.10**	0.03*	0.04***	0.03***
Finland	*Yes*	*0.22****	*0.04***	*0.08****	*0.04****
France	Yes	0.11**	0.03*	0.04***	0.02***
Germany	Yes	0.13**	0.04**	0.05***	0.04***
Greece	No	0.09*	0.03*	0.04***	0.03***
Hungary	No	0.09*	0.03*	0.05***	0.03***
Iceland	*Yes*	*0.11***	*0.01*	*0.06****	*0.03****
Ireland	Yes	0.07	0.02*	0.02*	0.04***
Italy	Yes	0.06	0.04**	0.04**	0.03***
Japan	No	0.09*	0.03**	0.04***	0.03***
Latvia	Yes/No	0.09*	0.03**	0.04**	0.03***
Lithuania	Yes	0.08	0.03*	0.04***	0.03***
Luxembourg	Yes	0.09*	0.03**	0.04***	0.03***
Malta	No	0.07	0.03*	0.04***	0.03***
Netherlands	Yes	0.06	0.03**	0.04***	0.03***
New Zealand	Yes	0.09*	0.03**	0.04***	0.03***
Norway	No	0.09*	0.03**	0.04***	0.03***
Poland	No	0.09*	0.03*	0.04***	0.03***
Portugal	No	0.09*	0.03	0.04***	0.03***
Romania	Yes/No	0.09*	0.02*	0.04***	0.03***
Slovakia	No	0.10**	0.03*	0.04***	0.02***
Slovenia	Yes	0.08*	0.03*	0.04***	0.03***
Spain	No	0.09*	0.03*	0.04***	0.03***
Sweden	Yes	0.06	0.03*	0.04**	0.03***
Switzerland	No	0.09*	0.03*	0.04***	0.03***
United Kingdom	no	0.09*	0.03**	0.04***	0.03***

Notes: * < 0.90; **<0.95; ***<0.99 levels of confidence. All models are individually entropy balanced. That means de-selected countries do not influence the regression weights. Dependent on the model, the first three or the first two moments are balanced. The first two moments are selected when the first three moments failed to converge.

Indeed, we find two countries whose exclusion substantially increases the effect of Green parties on welfare spending. These countries are Finland and France. Rising coefficients indicate that Greens seem to have a weak or no effect on the investigated policies. The supposedly weak impact of Green parties in Finland could be explained by the tradition of "rainbow coalitions" (*sateenkaarihallitukset*) including parties from the entire political spectrum and a long tradition of high family expenses. The

second argument is supported by the strong rise in the coefficient of Greens in government on family spending once Finland is excluded. The weak impact of Green parties in France might be due to the presidential system and should have the root in other social spending areas than housing, family and childcare since the effects on those three welfare spending dimensions is in line with the average effects even when France is excluded from the regressions. Overall, the effect of Greens on housing is not as robust as the two crucial spending areas of family and childcare. In many models with particular countries excluded, the effect on housing fails to reach the 90% confidence level. The exclusion of Iceland, in particular, causes a substantial drop in the effect. Upon reversion, Icelandic Greens might have had a strong influence on housing expenses. Indeed, the Green Prime Minister Johanna Sigurðardóttir (I and II) put a strong priority on housing in order to defend home ownership in the aftermath of the financial crisis.

These country examples refer to another example of effect heterogeneity. Green parties in government have never been as electorally strong as in Iceland and nonetheless hardly have affected the policy domains we empirically assessed. This shows, that we cannot expect a simple relationship of electoral strength and policy impact within the cases of Greens in government. The small number of treatment cases prevents us from assessing this aspect more systematically.

7.2 First differences and/or levels

Some controls are added in first differences whereas others are not. For some variables first differences are hardly justified. Table A.7 provides information on levels and first differences for every variable and a justification for inclusion or exclusion. In short, we do not have a principled perspective on the inclusion of levelled or differenced controls but theoretic reasons let us include controls as either level, changes or both. Nonetheless, we estimated every model with only first differenced controls, with exclusively levelled controls and also models including both. The results demonstrate that the inclusion of only differenced, levelled or mixed models do not change the patterns of our results (see Table A.8).

Table A8: First differenced and levelled controls

Treatment (Green parties in government)	Level	To measure the treatment as first difference would be against our argument and should in generally not be done with government preferences because it would assume that long legacies of parties in government have no impact besides their first alternation into government.
Controls		
Lagged level	Level	We think the level of social spending makes a difference, because at lower levels higher increases are possible.
Seat share cabinet	Level	In order to control for the sufficient majorities to implement welfare reforms. FD makes no sense. Governments with Greens have on average more government seats.
Δ GDP	First difference	Growth rates are by definition an effective way of reducing welfare spending, since it is measured as percentage of GDP. Green parties face lower growth rates.
GDP (log)	Level	States with higher wealth spend more on welfare and are also more likely to have strong Green parties.
market ideology of government	Level	Included to create the benchmark of a most similar ideological governments without Greens. FD makes no sense. Some scholars have used government ideology as first difference but that is theoretically hard to defend. For example, a long legacy of social democratic governments (like in Sweden) has often been shown to be associated with incremental changes towards a social democratic welfare regime. A first differenced government variable would assume that only the first alternation matters. In fact, in countries like Japan we would expect no change at all with such a specification.
Days governed per year	Level	Included in order to control for shorter terms in cabinet transition years. FD makes no sense. No difference for Green governments.
unemployment rate	Level	More recipients of welfare. Important benchmark for governments to spend more or less.
Δ unemployment rate	First difference	Increased number of recipients but no effect on the prospects of green parties.
Δ globalization	First difference	Rising economic integration might curb governments' room to maneuverer. Green governments face higher increase of economic integration.
globalization	Level	Highly globalized countries are associated with more generous welfare states as well as more Green governments.
EMU	Level	Reduced fiscal leeway and lower likelihood to increase welfare spending and the same time more Green governments. FD makes no sense.
people over 65	Level	Old people are less likely to vote Green and also cause higher welfare spending (pensions).
Δ people over 65	First difference	Increased shares of old people rise welfare spending and make a Green vote less likely.
union density	Level	Higher union density is associated with higher welfare spending and with fewer Green parties in government.
Δ union density	First difference	A decline in union density might be associated with more Green parties in government and also with lower likelihoods to increase welfare spending.
Public debt	Level	High public debt decreases the room to maneuver for governments to increase spending. Green governments appear predominantly in high public debt contexts.
Δ Public debt	First difference	Rising debt has the same effects such as the level of debt.

One might be irritated by the fact that we opted for a first difference model and still included a lagged dependent variable instead of the more conventional specification with a level dependent variable and a lagged DV as control. We demonstrate that results for a differenced dependent variable and a level dependent variable controlled by a lagged dependent variable are equivalent (compare models in Table A9).

Table A9: First differences and lagged dependent variable

Model Nr.	Dependent variable (first differences)	Effect of Greens (everything else equal)	Positive cases	Identical to model 1 but dependent variable as level
				Lagged DV controlled
		PCSE with EB		
(1)	Social transfers in general	0.09**	66	0.09**
	Social protection			
(2)	Unemployment	0.04	59	0.04
(3)	Old age	0.00	60	0.00
(4)	Housing	0.03*	59	0.03*
	Social investment			
(5)	Family	0.05**	60	0.05**
(6)	Childcare	0.03***	54	0.03***
(7)	Active labor market	0.00	54	0.00
(8)	Education	182.56***	39	182.56***
(10)	Corporate tax	-0.16	61	-0.16
(11)	Top marginal income tax	0.18	55	0.18
(12)	VAT	-0.12	61	-0.12

Notes: * < 0.90; **<0.95; ***<0.99 levels of confidence. Δ refers to changes and l. to lagged variables. EB = Entropy Balancing. All dependent variables are measured as public expenditures, % of GDP

7.3 Fixed and random effects

We do not have a principled opinion for or against fixed effects but rather follow the position of Bell and Jones (2015). In that perspective, fixed effects are an effective means to exclude covariance from cross-case comparison and thus, to a certain degree, reduce endogeneity concerns. However, in many circumstances cross-case comparisons provide valuable information and the between variance should not necessarily be excluded. It should rather be transparently singled out in order to describe the leverage of cross- and within-case comparison for a specific effect. In that sense, we add fixed effects in order to single out what effects are driven by within- or between-country comparisons. We modelled random effects, country fixed effects, decade fixed effects as well as country and decade fixed effects combined. A note on the balancing procedure in combination with fixed effects is necessary. Since balancing assigns analytical regression weights across and within countries it is logically incompatible with a country fixed effect model, where only within-country comparisons are envisaged. Thus, we use no balancing for the fixed effects models. The model results are listed in Table A.9. The fixed effects models further support all of our inferences for the social investment category as well as the Green government effect on housing. However, there are observations from the fixed effects models which cast a bit of doubt on our evidence on Green tax policies. In all models using country fixed effects, we find a positive and significant effect on the top marginal income tax and p-values for the negative vat effect are only slightly over conventional significant levels. Ignoring cross-country comparison and limiting our inference to within-country comparisons, we would have to add, that Greens in government have a tendency to increase the progressivity of the tax system.

Table A10: Fixed Effects – based on country-years

Model Nr.	Dependent variable (first differences)	Effect of Greens (everything else equal)	Positive cases	Random effects	Decade fixed effects	Country fixed effects	Decade and country fixed effects
				Lagged DV controlled	Lagged DV controlled	Lagged DV controlled	Lagged DV controlled
		PCSE with EB					
(1)	Social transfers in general	0.09**	66	0.10**	0.11**	0.14***	0.13***
	Social protection						
(2)	Unemployment	0.04	59	0.04	0.05	0.05	0.04
(3)	Old age	0.00	60	0.02	0.01	0.00	0.00
(4)	Housing	0.03*	59	0.03*	0.03*	0.03**	0.03*
	Social investment						
(5)	Family	0.05**	60	0.05***	0.05*	0.04*	0.03
(6)	Childcare	0.03***	54	0.03***	0.03***	0.03***	0.03***
(7)	Active labor market	0.00	54	-0.01	0.00	0.01	0.01
(8)	Education	182.56***	39	69.83**	74.62*	49.89	48.61
	Taxes						
(10)	Corporate tax	-0.16	61	-0.19	-0.12	-0.11	-0.01
(11)	Top marginal income tax	0.18	55	0.17	0.37	0.97	1.13*
(12)	VAT	-0.12	61	-0.04	0.02	-0.10	-0.05

Notes: * < 0.90; **<0.95; ***<0.99 levels of confidence. Δ refers to changes and l. to lagged variables. EB = Entropy Balancing. All dependent variables are measured as public expenditures, % of GDP

7.4 Education spending and decentralized authority over education

Authority over education policies is one of the most decentralized policy issues (Kleider et al., 2018), thus, we suspect that Green parties' impact as a government coalition partner on education spending is conditional on the level of centralization. We take advantage of the indicator of regional authority over education (Kleider et al., 2018) and assume Green parties to be effective once authority over education lies not with the regional level but with the state-wide level (reversed indicator) ranging from 0 (regional authority) to 2 (no regional authority). We exclude the medium category of 1, since it is reserved for observations in Italy only.

As this qualification to our argument equally holds for the "benchmark" models, we additionally interact the market liberalism indicator with the level of state-wide authority. The marginal effects are depicted in Figure A.3 and confirm the intuition above. Green parties in state-wide government positively and significantly increase spending on education if authority over education lies with the state level. In contrast, state-wide market liberal governments have no significant effect on education spending in the very same institutional configuration.
Acknowledging the distribution of per capita spending on education (5% percentile = 1454; 95% percentile 8735), Greens make a difference even compared to most similar center-left governments of about 214€ per year (these numbers refer to the left hand side of Figure A.3). Market liberal governments do not have a significant effect on education spending in the interaction models.

There is one important flaw in the reversal of the regional education authority indicator. Low regional education over authority does not equal high state-wide authority over education. The most obvious examples are Scandinavian countries where authority over education is neither located on the regional nor on the state-wide level but on the local level. Accordingly, we exclude Scandinavian countries from the models and run the same interactions again (right hand side of Figure A.3). As expected the positive effect of Green parties in government on education spending rises from 214€ per year to 303€. In relation to the average spending of 4,823€ per capita, this appears to be a substantial effect.

However, two notes of caution are warranted. First, the interaction models do not work with a lagged dependent variable and thus the lagged dependent variable is excluded from all interaction models. As a consequence, part of the effect could be caused by endogeneity, Greens are simply more likely to become powerful in context with high educated spending. Second, if feedback effects are present, higher levels of education spending increase the change rate, too. However, there is no evidence for feedback effects once we run separate models with the lagged level of education spending on the first difference of education spending (showing a negative coefficient, although not significant). Furthermore, in the model without interaction, Greens had a positive and significant effect on education too and lagged levels are controlled.

Figure A3: Interaction of government preferences and the location of educational authority – cabinet periodization
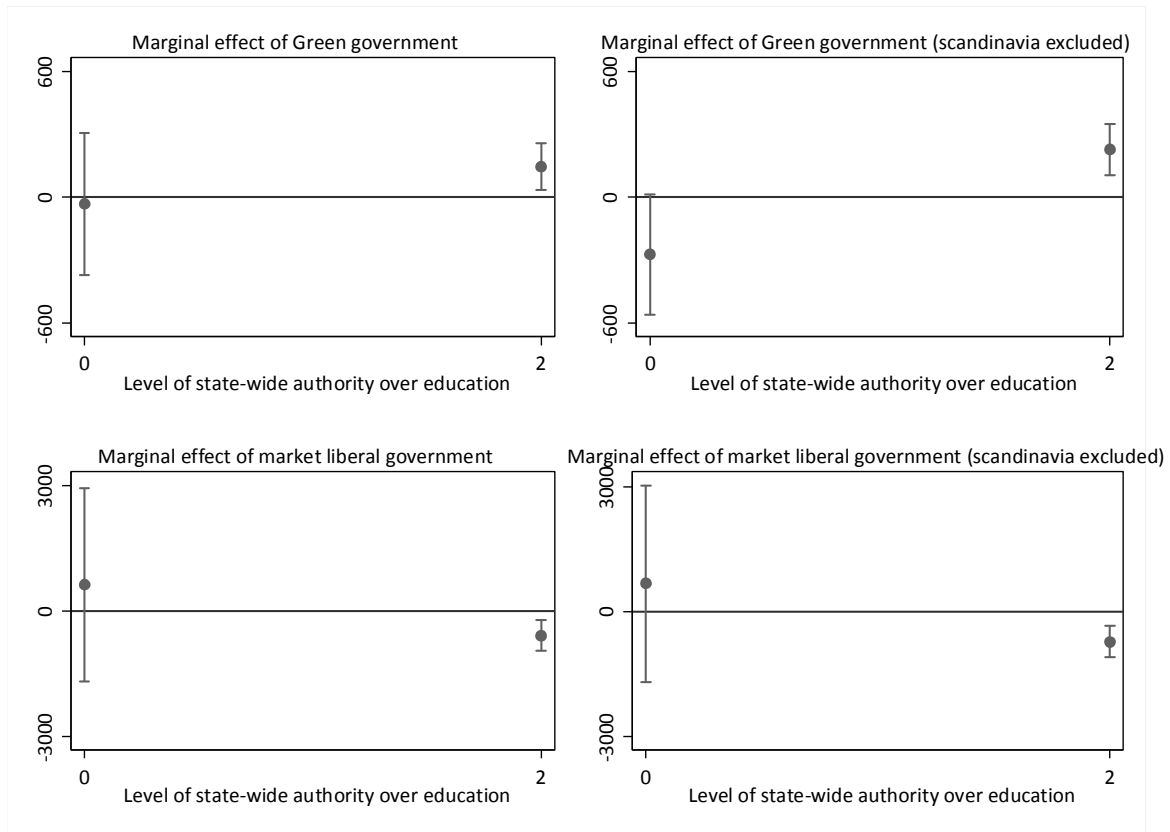
Controls: Δ GDP, Δ globalization, l. globalization, EMU, people over 65, unemployment rate, market ideology of government, union density, seat share of government, days governed.

Notes: 90 % confidence intervals. Countries with 0 (Australia, Belgium, Canada, Germany, Spain, Switzerland, UK after devolution); countries with 1 (Italy, not shown); countries with 2 (Austria, Bulgaria, Croatia, Czech Republic, Cyprus, Estonia, Denmark, Finland, France, Greece, Hungary, Iceland, Ireland, Japan, Latvia, Lithuania, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Sweden, UK before devolution).

7.5 Alternative indicators for education spending

We justified the usage of Ronchis' (2016) education spending data over the conventionally used data of UNESCO in the article by fragmentary distribution as well as the higher comparability of COFOG spending classifications. In absolute terms, there are more observations on UNESCO education spending data than Ronchis' reclassification of COFOG spending data entail (see Eurostat 2011, 63-64 for a detailed discussion of differences). Furthermore, Ronchis' approach creates per capita data which are to a lesser degree subject to distortions of economic and socio-demographic developments.

However, Ronchis' data are complete for the time period from 2000 to 2015 whereas UNESCO data have up to 43 percent missing, dispersed across countries and time points in our sample. Using the first difference of spending of the UNESCO data as the dependent variable, missing data add up to around 50 percent of all country-year observations (even higher for cabinet periodization, dependent on the handling of missing data in the aggregation). Unfortunately, only less than a third of our treatment cases would remain in the sample. Panel models with panel corrected standard errors do not even converge.

Nonetheless, we assessed the relationship of the proposed measurements of education spending and Green parties in government empirically by:

1) Linear imputation of the UNESCO education spending data (education as % of government spending as well as education spending as % of GDP)
2) Comparing models with and without imputation
3) Interaction with state-wide authority over education

The results are summarized in Table A.10 and entail all controls and specifications of the other models on education spending. We added government spending as percentage of GDP (UNESCO 2019c) for the model in line 1.

Table A.11: Other sources of education spending

DV (with imputation)	Source	Missing (country years without imputation)	Missing data after imputation	Effect of formal green participation	p-value	Marginal effect (low state-wide authority)	Marginal effect (high state-wide authority)	n	DV (Without imputation)	p-value	n
Education as % of government spending	UNESCO (2019a)	49.78 %	5.96 %	0.05	0.546	0.16	0.09	908	0.20	0.148	527
Education spending as % of GDP	UNESCO (2019b)	34.93 %	2.50 %	0.04*	0.092	0.06*	0.03	934	-0.00	0.924	648

Controls: Δ GDP, Δ globalization, l. globalization, EMU, people over 65, unemployment rate, market ideology of government, union density, seat share of government, days governed and for government spending as percentage of GDP.

7.6 Cabinets with informal and formal Green party support

Green parties have lent formal or informal support to several cabinet without being formally part of the government coalition (see Table A.11). First, we replicated the main analysis by treating them as cabinets with Green party inclusion too. Following Table A.1 we end up with 89 instead of 64 government years including Greens as formal coalition partners and with status. Re-running all models, we see very similar patterns of Green party influence on welfare and tax policies (see Table A.11).

Adding Green support parties to the treatment does not change the main patterns for our inference since all key findings remain significant and comparably substantial. However, adding support parties causes all key effects to become slightly weaker, which indicates that formal government participation drives our theorized patterns. Excluding formal Green parties in government from the model and just using support parties as a treatment shows mainly null-findings (not shown). The exception is top marginal income tax where Green support parties have a significant negative effect (also visible in tendency from the differences in Table A.11 between models in line 10).

Table A.12: Green parties' impact on social protection and social investment

	Dependent variable (first differences)	Effect of Greens (everything else equal)		Effect of Greens (everything else equal) – adding support party cabinets		
		Country-years	Positive cases	Country-years	Positive cases	Total No. of cases
(1)	Social transfers in general	0.09**	66	0.03	92	1,194
	Social consumption					
(2)	Unemployment	0.04	59	0.01	84	877
(3)	Old age	0.00	60	0.01	86	885
(4)	Housing	0.03*	59	0.02**	85	861
	Social investment					
(5)	Family	0.05**	60	0.04**	86	885
(6)	Childcare	0.03***	54	0.02***	80	758
(7)	Active labor market	0.00	54	-0.02*	80	742
(8)	Education	182.56***	39	61.64*	48	389
(9)	Corporate tax	-0.16	61	-0.16	87	889
(10)	Marginal income tax	0.18	55	-0.02	81	1,010
(11)	Vat	-0.12	61	-0.04	87	1,009

Controls: days governed per year (cabinet duration in days for the cabinet periodization), seat share of government, market ideology of government, unemployment rate, Δ unemployment rate, Log level of GDP, GDP growth, public debt, Δ public debt, open economy, Δ open economy, EMU, union density, Δ union density, people over 65, Δ people over 65.

Notes: * < 0.90; **<0.95; ***<0.99 levels of confidence. Δ refers to first differences. EB = Entropy Balancing. The dependent variables are measured as public expenditures, % of GDP (first difference). The exception is education spending (measured as per capita equivalents).

7.7 Restricting the time period of the sample

Greens in government are not equally distributed over time but mainly entered governments since the 1990s. Accordingly, comparison groups, entailing observations before 1990, might justify doubts on our results. To a certain degree we take care of these differences by the entropy balancing approach. Observations with very atypical characteristics receive lower regression weights. However, balancing is only effective on observed characteristics. There might be additional unobserved characteristics in the pre-1990 period which influence the relative impact of Greens in government on tax and welfare policy. In order to make such a possibility transparent, we reduce the sample successively and simultaneously restrict the balancing procedure to the respective periods. For education spending this exercise is meaningless, since our education data start in 2000. Disaggregated spending data start in 1980 and accordingly the 1970s are not included in any model. The patterns of effects do not change in a way that we have to adapt our main inferences.

Table A13a: Restricting the time period of the sample – yearly periodization

	Dependent variable (first differences)	Effect of Greens (everything else equal)	Effect of Greens (everything else equal)	Effect of Greens (everything else equal)	Effect of Greens (everything else equal)	
		Country-years	Country-years	Country-years	Country-years	
		1970-2015	1980-2015	1985-2015	1990-2015	Time span with existing dependent variable
(1)	Social transfers in general	0.09**	0.04	0.03	0.03	1970-2015
	Social consumption					
(2)	Unemployment	-	0.03	0.03	0.03	1980-2015
(3)	Old age	-	0.03	0.02	0.02	1980-2015
(4)	Housing	-	0.03*	0.03*	0.02*	1980-2015
	Social investment					
(5)	Family	-	0.04**	0.03**	0.03**	1980-2015
(6)	Childcare	-	0.02**	0.01**	0.02***	1980-2015
(7)	Active labor market	-	-0.00	-0.00	-0.00	1980-2015
(8)	Education	-	-	-	182.56***	2000-2015
(9)	Corporate tax	-0.16	-0.05	0.03	0.10	1970-2015
(10)	Marginal income tax	0.18	-0.01	0.02	0.06	1970-2015
(11)	Vat	-0.12	-0.13	-0.14	-0.14	1970-2015

Controls: days governed per year (cabinet duration in days for the cabinet periodization), seat share of government, market ideology of government, unemployment rate, Δ unemployment rate, Log level of GDP, GDP growth, public debt, Δ public debt, open economy, Δ open economy, EMU, union density, Δ union density, people over 65, Δ people over 65.

Notes: * < 0.90; **<0.95; ***<0.99 levels of confidence. Δ refers to first differences. EB = Entropy Balancing. The dependent variables are measured as public expenditures, % of GDP (first difference). The exception is education spending (measured as per capita equivalents).

Table A13b: Restricting the time period of the sample – cabinet periodization

	Dependent variable (first differences)	Effect of Greens (everything else equal) Country-years 1970-2015	Effect of Greens (everything else equal) Country-years 1980-2015	Effect of Greens (everything else equal) Country-years 1985-2015	Effect of Greens (everything else equal) Country-years 1990-2015	Time span with existing dependent variable
(1)	Social transfers in general	0.26**	0.24*	0.23	0.20	1970-2015
	Social consumption					
(2)	Unemployment	-	0.04	0.04	0.02	1980-2015
(3)	Old age	-	0.03	0.03	0.03	1980-2015
(4)	Housing	-	0.05***	0.05***	0.04***	1980-2015
	Social investment					
(5)	Family	-	0.07**	0.07**	0.06	1980-2015
(6)	Childcare	-	0.06***	0.06***	0.06***	1980-2015
(7)	Active labor market	-	-0.04	-0.04	-0.05	1980-2015
(8)	Education	-	-	-	55.70	2000-2015
(9)	Corporate tax	0.00	-0.08	0.03	0.09	1970-2015
(10)	Marginal income tax	0.31	0.02	-0.03	-0.02	1970-2015
(11)	Vat	-0.19*	-0.14	-0.08	-0.03	1970-2015

Controls: days governed per year (cabinet duration in days for the cabinet periodization), seat share of government, market ideology of government, unemployment rate, Δ unemployment rate, Log level of GDP, GDP growth, public debt, Δ public debt, open economy, Δ open economy, EMU, union density, Δ union density, people over 65, Δ people over 65.

Notes: * < 0.90; **<0.95; ***<0.99 levels of confidence. Δ refers to first differences. EB = Entropy Balancing. The dependent variables are measured as public expenditures, % of GDP (first difference). The exception is education spending (measured as per capita equivalents).

8 Appendix specific references

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