

Is Inequality Tearing Us Apart?

The Effect of Income Inequality on Political Polarization

Abstract

This paper empirically investigates whether income inequality affects political polarization in the Netherlands. Using a new database that covers observations of Dutch municipalities, the paper quantifies the effect income inequality has on political polarization of the left-right and progressive-conservative dimensions of the political spectrum. The results indicate that a 0.01 increase in the Gini coefficient – the measure of income inequality – leads to a 0.06 increase in the left-right polarization rate. Compared with the differences in polarization in the Dutch municipalities, these findings are relatively modest in size. The results are caused by increased support for parties to the right of the political spectrum. The results become only just insignificant once clustered standard errors are used. With regard to progressive-conservative polarization, no significant relationship with income inequality is found.

Master Thesis International Economics
Economics and Business

Name: L. Klappe BSc LLB
Student number: 379865

Supervisor: Prof. dr. E.M. Bosker
Second assessor: Prof. dr. A.J. Dur

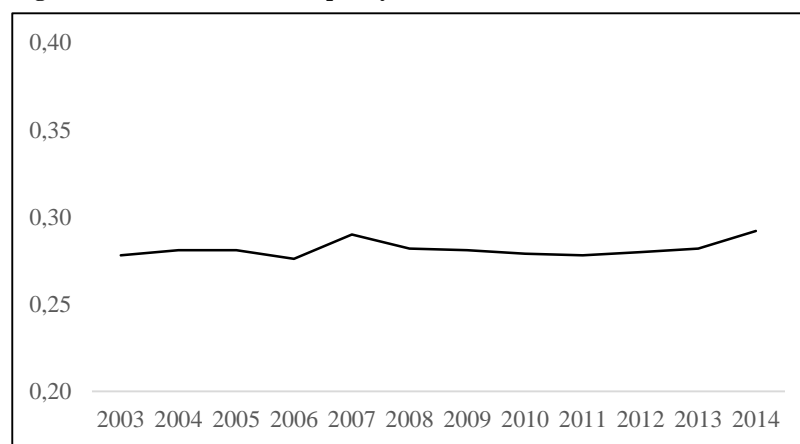
Final version: 3-10-2018

1 Introduction

Economic inequality is taking extreme forms worldwide. Although the global economy has expanded substantially over the past few decades, only a limited group of people are reaping the benefits of this. According to the World Inequality Report 2018, written by a dozen prominent economists, since 1980 the top 1% of the world has captured twice as much global income growth as the bottom 50% (Alvaredo, Chancel, Piketty, Saez, & Zucman, 2017). Of course, this is not to say that all countries are doing equally badly. The Netherlands, together with the Scandinavian countries, has the lowest level of income inequality in the world. This does not, however, apply to the equal distribution of equity capital (Haegens, 2017).

Since the turn of the century income inequality in the Netherlands has remained stable. Most substantive changes in earnings before tax are offset by distributional measures of the Dutch government. Over the past two decades the Gini coefficient for spendable income, which is a measure of inequality, has fluctuated between 0.28 and 0.29 (Centraal Bureau voor de Statistiek, 2017).¹ Figure 1 displays this graphically, based on data relating to Dutch households.

Figure 1. National Income Inequality (Gini coefficient)



Source: Centraal Bureau voor de Statistiek (2017)

At the same time a recent report of the Sociaal and Cultureel Planbureau [Institute for Social Research] shows that in the past 25 years, an increasing number of people have come to believe that income disparities in the Netherlands should be reduced; reflected as a percentage, an increase from 55% to 74%. It is puzzling where these opinions come from, as the actual

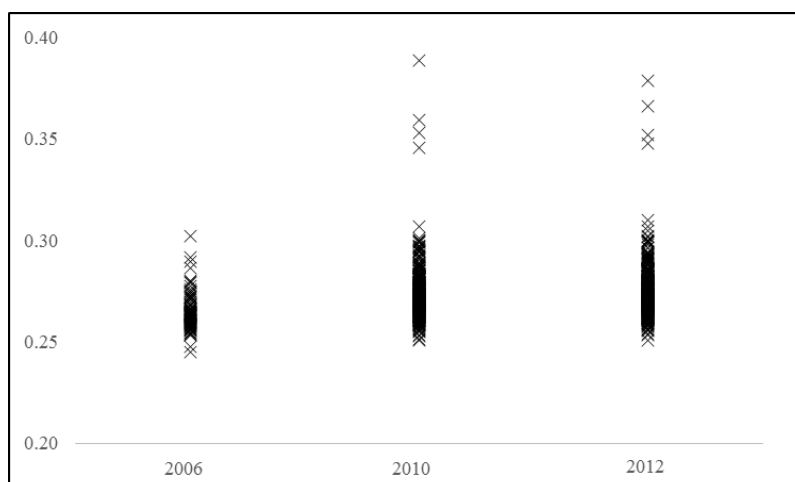
¹ The Gini coefficient takes the value of 0 in the case of complete equality. In the case of complete inequality the coefficient takes the value of 1. A more extensive explanation is provided in the Data section.

measured income inequality has remained virtually unchanged during this period. Especially low and middle educated people want smaller income differences, but 70% of the highly educated are also of the opinion that the differences should be smaller (Bijl, Boelhouwer, & Wennekers, 2017). It is clear that income inequalities matter for Dutch citizens.

Another global trend that we observe is a world which is politically polarizing. Recent examples are the Brexit referendum, in which the Leave-group won with only 51.9% of the votes, the election of Donald J. Trump as president of the United States (US) without the majority of the popular vote, and the complete fragmentation of the Dutch political landscape. Ever since the rise and murder of the Dutch politician Pim Fortuyn in 2002 the hidden differences that were already there have been revealed. It is not so much that the population has become more divided, or that certain groups have grown apart, but rather that political self-confidence has increased. People are more inclined to vote what they have always thought (Bovens, Dekker, & Tiemeijer, 2014). This is confirmed by the fact that nowadays party positions and ideology are still the most important factors that influence people to vote for a particular political party (I&O Research, 2012). The result is not a polarized society, but rather political polarization.

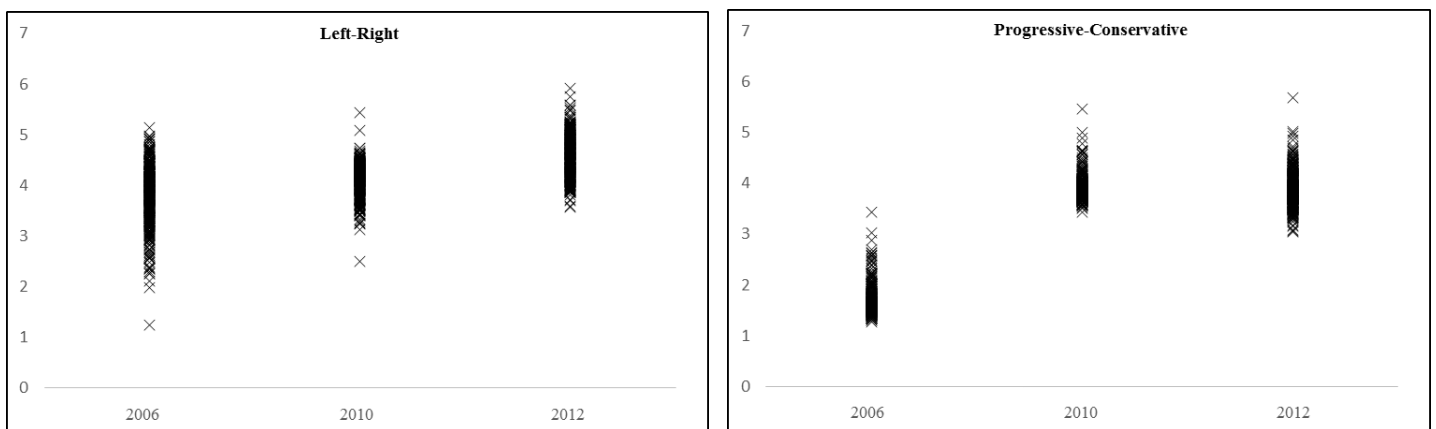
The central question of this research is whether the two major concepts of income inequality and political polarization can be linked. Is there a significant relation between the actual income inequality and the observed polarization of politics? This link does not seem to exist at a national level, as the national Gini coefficient has remained stable while politics polarized further. On the other hand, people have increasingly come to believe that reducing disparities in income is important (Bijl, Boelhouwer, & Wennekers, 2017).

Figure 2. Spread of Income Inequality of Dutch Municipalities (Gini coefficient)



This research, however, uses disaggregated data at the local level. As Figure 2 indicates, the level of the Gini coefficient fluctuates much from one municipality to the other. The same goes for political polarization,² as illustrated by Figure 3. Furthermore, by targeting municipalities the number of observations increases drastically. This local approach does require two assumptions. First, people must believe that national politics can and does have an influence on income inequality. Given the multitude of tax measures the government has at its disposal to correct income disparities this is not unimaginable. Research also indicates that citizens regard economic prosperity primarily as a national matter (De Blok, et al., 2016). The second assumption is that when voters vote, they have local income inequality at the back of their minds, at least partially. This assumption is more complicated than the first one, as other levels of income inequality will be relevant as well. After all, the news stories about (inter)national businessmen with exorbitantly high salaries are well known. However, it is sufficient if the local income inequality is at least of some relevance. This is plausible, as inequality will often reveal itself in one's own surroundings: one's neighbor with his expensive car or that single mother from your child's school who receives a social assistance benefit.

Figure 3. Spread of Political Polarization of Dutch Municipalities



This research is unique in the sense that it presents a new database. The two important variables, the polarization rate and the Gini coefficient of the Dutch municipalities, are currently not publically accessible. The disaggregated Gini coefficients are manually constructed based on already available information of local household incomes. The polarization rate is a new variable, created for the purpose of this study, combining the ideological positions of political parties and the local results of parliamentary elections. A left-right polarization rate and a

² When political polarization takes a value of 0 there is no polarization at all. A value of 10 represents full polarization. "Left-right" and "progressive-conservative" refer to the different scales that are being used. A more extensive explanation is provided in the Data section.

progressive-conservative polarization rate are distinguished. Using the panel dataset, the results are obtained by regression analysis with multiple fixed effects.

The results reveal that in a model with controls and multiple fixed effects the left-right polarization rate increases by 0.06 once the Gini coefficient increases by 0.01. These results imply that if income inequality in the city of Rotterdam increases to the level of Amsterdam, we expect the left-right polarization to increase from 3.92 to 4.00.³ These findings are caused by the increased support for more rightist parties. Since the political distribution on the left wing remains unchanged, the entire political spectrum expands towards the right. The results become only just insignificant once clustered standard errors are used. With regard to the progressive-conservative polarization no significant relationship with income inequality is found.

2 Literature review

While the international literature on both the causes of political polarization and the effects of income inequality has increased substantially over the past decade, these concepts have not often been linked in academic work to date. At present, most of the research on voter behavior and the causes of political polarization in the West focuses on globalization. The starting point for this research is the influential paper by Autor, Dorn and Hanson (2013) on the labor market effects of the rising Chinese import competition in the US (Autor, Dorn, & Hanson, 2013). The methodological approach that the authors adopt to quantify the effects of trade on the labor market can also be used to study other relationships. Exactly this was done in a paper that establishes the link between increased import exposure and the voting behavior in the Brexit referendum of 2016. Imports from China into the United Kingdom (UK) were instrumented with Chinese exports to the US. The results demonstrate that British regions that were systematically hit harder by economic globalization were more likely to vote in favor of the UK leaving the European Union. At the individual level the results suggest that the impact of import competition is not restricted to a specific category of voters, such as the unemployed. Instead, individual voters seem to respond broadly to the general economic situation of their region, regardless of their own specific condition (Colantone & Stanig, 2018A). The same

³ In 2010, the Gini coefficient of Rotterdam was 0.271; and of Amsterdam, 0.285. A 0.014 increase in the Gini coefficient would lead to a $0.014 \times 5.752 = 0.081$ increase in the left-right polarization. As the left-right polarization rate in Rotterdam was 3.92 in 2010, we expect its new level to be 4.00.

authors obtain comparable results in a similar study that investigates the impact of globalization on the support for nationalistic and radical parties in fifteen Western European countries from 1988 to 2007. The Netherlands is one of these fifteen countries. The results indicate that, a stronger import shock leads to a general shift to the right in the electorate, regardless of the personal economic situation of the voter. (Colantone & Stanig, 2018B)

An analysis of individual-level data on Brexit voters in 173 regions in the UK illustrates that it is not only the exposure to globalization that boosted the “leave” votes, but also income inequality. The parameter for income inequality – the Gini coefficient – turned out to be positive and statistically significant. A one-point higher Gini coefficient in a certain region boosted the share of votes in favor of Brexit by approximately 0.9 percentage points. Likewise, more inequality led to a higher willingness to go out and vote, resulting in a higher voter turnout (Darvas, 2016). Apart from the fact that the Brexit referendum was an exceptional political event and that the British political system is unlike the Dutch, both Brexit papers do demonstrate that economic determinants influence voter behavior.

The other much-discussed political event in 2016 was the US presidential election. A recent paper provides evidence of the claim that the 2016 presidential election was in line with the increasing political polarization of the US. Again, using the instrument of Autor et al. (2013), the authors find that the rising import competition from China has contributed to the polarization of politics in the US. Congressional districts that are exposed to larger increases in penetration from China disproportionately removed moderate representatives from office. This resulted in a shift in congressional voting toward ideological extremes. Trade shocks to industries with sizable employment shares of white males resulted in a large positive impact on the likelihood that a Republican conservative would win office. The component of the overall trade shock that affected women and nonwhites did not have similar electoral consequences (Autor, Dorn, Hanson, & Majlesi, 2017).

In addition to the research on the effects of trade on political polarization in the US, there is also an increasing interest in the effects of inequality in the US. This is driven primarily by the observation that both income inequality and political polarization have increased dramatically

in the US over the past few decades.⁴ Research confirms that income inequality has a large, positive effect on political polarization. The results suggest that the Democrats become more liberal due to income inequality, while the political spectrum as a whole moves towards the right. This causes moderate Democrats to be replaced by Republicans, resulting in further polarization (Voorheis, McCarty, & Shor, 2016). The authors supplement this finding with additional results which demonstrate that greater inequality within electoral districts seems to push Republican legislators to the right, while greater inequality between the electoral districts seems to push Democratic legislators to the left. A further recent study points out that (although at the cross-national level) inequality within groups is the primary driver of levels and trends in inequality (VanHeuvelen, 2018). Combined with the paper of Voorheis, McCarty and Shor (2016) this could possibly explain why the entire political spectrum has shifted to the right in the US.

The relationship between income inequality and political polarization is also established by Duca and Saving (2016) who make clear that the Lorenz curve, which graphically illustrates income inequality of the population, is statistically more related to the polarization than the top 1% share of income. They, too, find that there seems to be reverse causality between political polarization and income inequality (Duca & Saving, 2016). This correlation between political polarization and income inequality has also been pointed out by earlier authors (McCarty, Poole, & Rosenthal, 2003).

In the case of the European situation, Hernan Winkler (2018), senior economist at the World Bank, has provided evidence that a higher Gini coefficient at the local level increases the probability of an individual supporting a political party at the extremes of the ideological distribution. His paper uses data relating to 25 European countries from 2002 to 2014, including the Netherlands. In particular, a five percentage point increase in the Gini coefficient increases the likelihood that an individual will vote for a far-right or far-left party by approximately four percentage points. Winkler finds that increasing inequality leads on average to more support for left-wing parties. By contrast, inequality leads to more support for far-right parties among the elderly (Winkler, 2018).

⁴ See Figure 1 in the paper by McCarty, Poole & Rosenthal (2003) for the development of income inequality and political polarization in the US over time.

Even though the concepts of globalization and income inequality with respect to political polarization can be closely related, the main focus of this research will be the effect of inequality on voting behavior in the Netherlands. The academic works on the effects of income inequality on the Brexit referendum and the elections in the US are useful and relevant when explaining the Dutch case, but only to a limited extent. The political systems of the UK, the US and the Netherlands differ substantially. Just one difference is that the UK and the US have a first-past-the-post voting system, whereas the Netherlands is known for its proportional system. A consequence of this is that in the Netherlands politics is much more about parties than about individual politicians. Another distinction is that inequality in both the US and the UK is traditionally much higher than in the Netherlands (OECD, 2018).⁵

The Europe-oriented study by Winkler is in general applicable to the Dutch situation. My research contributes to his study in the sense that it focuses only on the Netherlands. Winkler analyzes a total of 251 regions throughout the whole of Europe, but only 12 of these regions are located in the Netherlands. My analysis contains data relating to all the Dutch municipalities at the start of 2012; at that moment, there were 415 of them.

3 Data

This section provides a brief overview of the main variables of interest. Almost all the data come from the Centraal Bureau voor de Statistiek (CBS) [Statistics Netherlands], the Dutch governmental institution that gathers statistical information about the Netherlands. The data is geographically disaggregated at the municipal level, which makes it possible to exploit variation across municipalities and over time. The observations cover the period between 2006 and 2012. During this period, several Dutch municipalities merged due to municipal reorganization. In 2006, the Netherlands consisted of 458 municipalities; whereas in 2012 only 415 municipalities remained (Decentraal Bestuur, 2018). It is therefore necessary to use a base year for the empirical analysis; the year 2012 is used for this purpose.⁶ Except for the election results, all observations use 1 January as the reference date.

⁵ In 2016, the Gini coefficient of the US was 0.391; of the UK, 0.351; and of the Netherlands, 0.285.

⁶ Given that at the start of the research period there were 43 municipalities more than at the end, it was necessary to merge some of the observations. This has been done based on a weighted average of the population of the municipalities involved in the relevant year of observation. Appendix A provides an overview of all the municipalities that merged during the research period.

3.1 Gini coefficient

Income inequality in the Dutch municipalities is measured by the Gini coefficient. This statistical coefficient was developed by the Italian Corrado Gini in 1912 and is the most commonly used measurement of inequality worldwide. It ranges from 0 – which represents complete equality, where everybody has the same income – to 1, complete inequality, where one person earns all the income (Milanovic, 2012).

The average standardized income of households is used as the basis for the calculation of the municipal Gini coefficient. Standardized income is spendable income corrected for differences in the size and composition of the different households. For the standardization of the spendable incomes the CBS uses equivalence factors that reflect the economies of scale of living in a larger household. For every municipality, the tenth percentiles of average standardized income are available. These percentiles can be used to calculate the Gini coefficient per municipality by the following formula:

$$GINI_{i,t} = 1 - \sum_{k=1}^n (X_{k,i,t} - X_{k-1,i,t})(Y_{k,i,t} + Y_{k-1,i,t})$$

where $GINI_{i,t}$ is the Gini coefficient in municipality i in year t . $X_{k,i,t}$ and $Y_{k,i,t}$ represent the cumulated proportion of the population respectively of the average standardized income for $k = 0, \dots, n$ with $X_0 = 0$, $X_n = 1$ and $Y_0 = 0$, $Y_n = 1$ (Brown, 1994).

Based on the household average standardized income over the entire research period, the average Gini coefficient for all the Dutch municipalities combined is 0.273. This is comparable to the national Gini coefficient as calculated by the Organization for Economic Cooperation and Development (OECD, see footnote 2). Overall, the city of Spijkenisse can be regarded the most equal, with a Gini coefficient of 0.245 in 2006. Blaricum, on the other hand, is the most unequal city of the dataset, with a coefficient of 0.388 in 2010. Schiermonnikoog and Rozendaal are the only municipalities for which there is no Gini coefficient available in any of the research years (Centraal Bureau voor de Statistiek, 2016). Table 1 provides a more comprehensive descriptive summary of the data.

3.2 Political polarization

In the US the DW-NOMINATE uses recorded (roll-call) votes in Congress to categorize elected officials on an ideological scale from liberal to conservative (Poole & Rosenthal, 1985).⁷ This scale is widely applied in political science and is the foundation for analyses of political polarization in the US – an example of which is the study by Autor, Dorn, Hanson, and Majlesi (2017). However, the Netherlands is not familiar with a similar comparative measure based on the actual voting of politicians. This could be explained by the circumstance that parties are of much more importance in the Netherlands than individual politicians. Nevertheless, there are several Voting Advice Applications (VAAs) which use parties' ideological positions to recommend to voters how to vote. KiesKompas is such a VAA and has a scientific basis. Since its introduction in 2006, the methodology of KiesKompas has been used for many VAAs throughout the world.

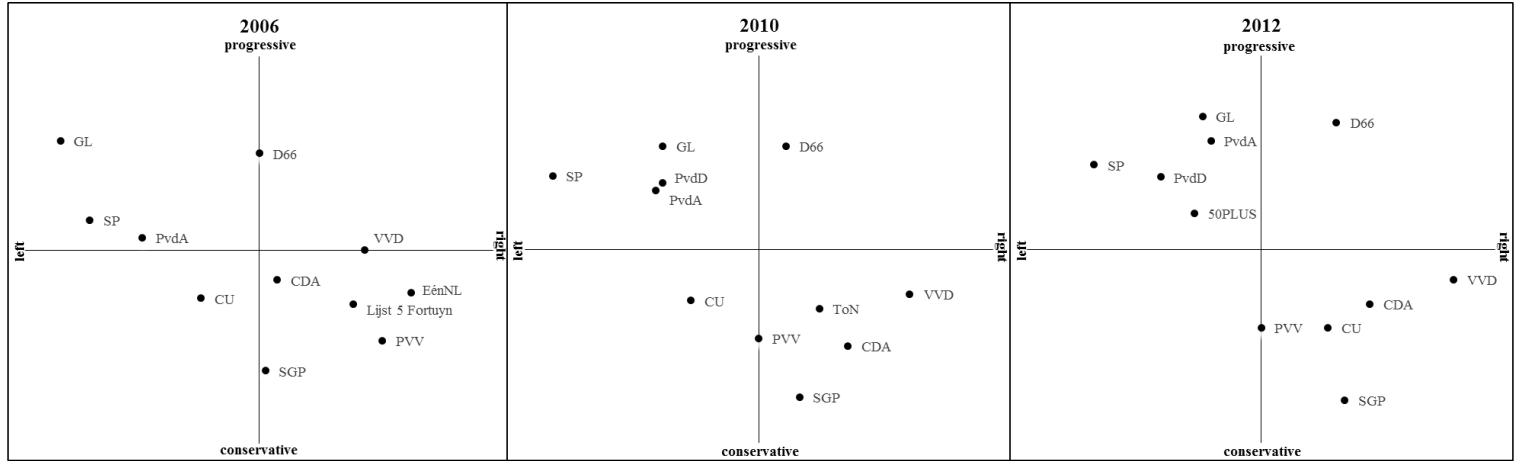
Unlike most VAAs, KiesKompas combines multiple methods to determine the ideological position of political parties. First, the leadership of political parties are asked to place themselves in an ideological space or on specific issues. They can also indicate what they deem to be the most salient issues. The parties have to back their stances with publicly available sources. Second, knowledgeable experts are asked to position parties on issues or on a continuum. Usually academic scholars are used as experts, although professionals such as journalists, civil servants, or lobbyists can also serve as experts. Third, KiesKompas analyzes political texts, such as election programs, to position the parties. Computer-based search techniques, such as word clusters or generated word lists, are used for this purpose (Krouwel & Van Elfrinkhof, 2014).

These three methods together result in the placement of parties on a multidimensional scale. On the X-axis the political parties are positioned from left to right. Parties located on the left side of the axis are in favor of extensive government policy to reach equality on economic issues such as employment, taxes and benefits. On the Y-axis the parties are positioned from progressive to conservative. Progressive parties oppose the use of extensive government policy to restrict the personal freedom of people on issues such as homosexuality, abortion and euthanasia (ProDemos, 2018). Figure 4 illustrates the ideological positions of the various

⁷ DW-NOMINATE is short for Dynamic Weighted Nominal Three-step Estimation. The procedure was developed by Poole and Rosenthal in the 1980s. Many authors have also used the procedure for other political bodies such as the United Nations General Assembly or the European Parliament.

parties that contested the general elections of 2006, 2010 and 2012. The exact positions on the Y- and X-axes were provided by KiesKompas. For an overview of which parties were included see Appendix B. The local election results come from the Kiesraad; this committee announces the official results of elections in the Netherlands (Kiesraad, 2018).

Figure 4. Ideological Positions of Dutch Political Parties



Source: KiesKompas (2018)

The exact ideological party positions combined with the local results for the national elections make it possible to construct a polarization rate for both the left-right scale and the progressive-conservative scale. In every municipality, the proportion of votes a certain party gets is multiplied by the party's position on one of the two axes:

$$Polarization = \frac{\sum_{j=1}^n (V_{j,i,t} K_{j,i,t})}{\sum_{j=1}^n (V_{j,i,t})}$$

in which $V_{j,i,t}$ is the proportion of votes party j gets in municipality i in year t . $K_{j,i,t}$ represents the corresponding value of party j on either the left-right or progressive-conservative scale of the KiesKompas in a certain municipality and year. This specific measure of the polarization rate has not been formulated in the Netherlands before and is therefore unique.

There are typically two ways in which a municipality can be politically polarized. It is possible that a relatively large proportion of voters voted for a party (or several parties) at one extreme of the political spectrum, while the rest of the voters voted for a relatively moderate party. It can then be said that the municipality tends towards this particular side of the political spectrum. Obviously, the same can happen in the case of the other side of the political spectrum.

It is also possible that a large proportion of voters voted for parties that are both on the opposing two extremes of the political spectrum. Since, in this last case, when taking weighted averages the risk exists that one side of the political spectrum cancels the other side out, this paper uses the absolute numbers of the ideological position of the parties. The result is a 0-to-10 scale of polarization, in which 0 means no polarization at all and 10 means complete polarization. No polarization means that all voters voted for centrist parties. Complete polarization means that half of the voters voted for an extremist party, whereas the other half voted for the extremist party on the opposing side of the spectrum.

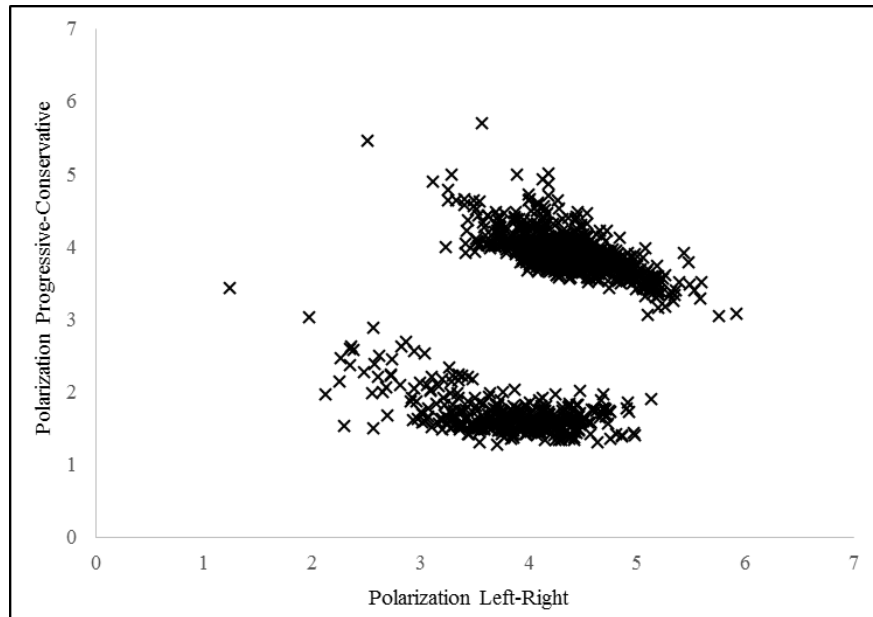
On the left-right scale the average polarization rate of all Dutch municipalities is 4.18. The city of Urk is the least polarized, with a polarization rate of 1.24 in 2006. This is caused by the fact that the three Christian parties in Urk together accounted for 93.8% of all the votes. These three Christian parties (CDA, CU and SGP) are all rather moderate with respect to the left-right scale. The city of Laren is the most polarized, with a rate of 5.92 in 2012. This can be explained by the large proportion of votes the parties on both sides of the spectrum, the VVD and SP, received: 58.8%.

On the progressive-conservative scale the average polarization rate of all Dutch municipalities is 3.16. Over the research period, the city of Laren had the lowest polarization rate, with a value of 1.28 in 2006. This is due to the moderate CDA and VVD parties that received 63.6% of the votes. Ironically, the city of Urk had the highest level of polarization in 2012, with a rate 5.70. This is caused by the support for the conservative SGP: 51.3% of the votes.

The level of polarization in the Netherlands seems to have increased over the years. From 2006 to 2010 progressive-conservative polarization rose sharply from 1.68 to 3.90, and finally settled at 3.89 in 2012. Left-right polarization increased from 3.82 in 2006 to 4.14 in 2010, and to 4.59 in 2012. For a more elaborate overview of the data see Table 1.

Figure 5 illustrates that the two different polarization rates do in fact represent non-identical matters. The polarization rates are positively nor negatively related in a clear way. This is in accordance with expectations, since, as mentioned before, left-right polarization relates to socioeconomic issues. Progressive-conservative polarization, on the other hand, relates to non-material issues.

Figure 5. Relationship between Left-Right and Progressive-Conservative Polarization



3.3 Control variables

Several other (control) variables are included in the empirical specification. The decisions on which controls to include are based on earlier research, such as Darvas (2016), Voorheis, McCarty and Shor (2016) and Winkler (2018). The most important controls will be briefly explained in this subsection.⁸ First, for every municipality the population is divided into different age-groups. The largest proportion of people is between 25 and 45 years old. Similarly, the population is divided into groups based on people their migration background. It emerged that most people have a Dutch background, with both parents being born in the Netherlands. Approximately 7.5% of Dutch citizens have a migration background in a Western country, as a result of at least one parent being born abroad.⁹ Approximately 5.4% of Dutch citizens have a non-Western migration background.¹⁰ The total population in a municipality is included as a (control) variable as well. The variable for the average income measures the total average income of the previous year of a municipality. The average income over the years 2006, 2010 and 2012 was € 29,112 (Centraal Bureau voor de Statistiek, 2018C). A variable that measures the percentage of people in a municipality who receive a social assistance benefit is added too. People who receive an old-age pension are not included in this group. The

⁸ An explanation of why it is necessary to include control variables is provided in the Methodology section.

⁹ Western can be regarded as referring to countries in Europe (except for Turkey), Northern-America and Oceania. Based on their socioeconomic and social-cultural position, Indonesia and Japan are also regarded as Western.

¹⁰ Non-Western can be regarded as referring to countries in Africa, Latin-America, and Asia (except for Indonesia and Japan). Turkey is also regarded as non-Western.

percentage of social benefit recipients is available only for the years 2010 and 2012 (Centraal Bureau voor de Statistiek, 2018B). The unemployment rate measures the proportion of the total workforce that does not have a job, but is willing to work (Centraal Bureau voor de Statistiek, 2018A). Voter turnout represents the share of people who turned out to vote. For a full descriptive summary of the variables see Table 1.

Table 1. Descriptive Statistics

	2006		2010		2012		Total				
	Mean	StDev	Mean	StDev	Mean	StDev	Mean	StDev	Min	Max	N
Polarization Left-Right	3.815	0.568	4.143	0.309	4.590	0.400	4.182	0.542	1.238	5.917	1245
Polarization Progressive-Conservative	1.678	0.271	3.896	0.224	3.894	0.335	3.156	1.082	1.278	5.695	1245
Gini	0.265	0.009	0.273	0.013	0.275	0.013	0.273	0.013	0.245	0.388	909
Age 0-5 (%)	0.060	0.008	0.054	0.009	0.052	0.008	0.056	0.009	0.030	0.107	1245
Age 5-10 (%)	0.064	0.008	0.063	0.008	0.060	0.008	0.062	0.008	0.036	0.107	1245
Age 10-15 (%)	0.065	0.007	0.064	0.007	0.064	0.007	0.064	0.007	0.039	0.103	1245
Age 15-20 (%)	0.062	0.007	0.063	0.006	0.062	0.006	0.062	0.006	0.031	0.101	1245
Age 20-25 (%)	0.051	0.012	0.052	0.013	0.054	0.013	0.052	0.013	0.023	0.169	1245
Age 25-45 (%)	0.272	0.023	0.248	0.036	0.237	0.026	0.252	0.029	0.145	0.379	1245
Age 45-65 (%)	0.278	0.024	0.293	0.024	0.295	0.024	0.289	0.025	0.160	0.366	1245
Age 65-80 (%)	0.112	0.018	0.123	0.019	0.133	0.021	0.123	0.021	0.054	0.196	1245
Age 80+ (%)	0.035	0.010	0.040	0.010	0.043	0.010	0.039	0.011	0.012	0.095	1245
Dutch Background (%)	0.876	0.074	0.870	0.077	0.867	0.078	0.871	0.076	0.495	0.976	1245
Western Migration Background (%)	0.074	0.043	0.076	0.042	0.077	0.041	0.075	0.042	0.011	0.473	1245
Non-Western Migration Background (%)	0.050	0.048	0.054	0.051	0.056	0.052	0.054	0.051	0.008	0.370	1245
Voter Turnout (%)	0.828	0.038	0.780	0.057	0.774	0.069	0.794	0.061	0.626	1.503	1245
Unemployment (%)	0.044	0.009	0.044	0.008	0.050	0.010	0.046	0.009	0.031	0.105	1245
Social Benefit Recipients (%)			0.012	0.008	0.014	0.009	0.013	0.009	0	0.608	824
Population	39323	60278	39940	61916	40314	63378	39859	61822	932	790110	909
Average Income	26612	3516	29968	3980	30745	4045	29112	4249	20900	54000	1243

4 Methodology

The only effect of inequality that will be discussed in this paper is the effect of income inequality. Even though other types of inequality, such as inequality of opportunity, are of great relevance too, they are much harder to quantify. Furthermore, these types of inequality will often, though not necessarily, have differences in income as a consequence. Inequality of educational opportunity, for example, affects the future earnings of students (Chetty, et al., 2011). More importantly, there is virtually no systematic reliable data available at the disaggregated level for other forms of inequality.

Not all the elections held in the Netherlands over the past decade are taken into account. More specifically, only election results for the Tweede Kamer [House of Representatives] are

examined. The elections for municipalities, provinces and water boards are inappropriate to use, since each municipality, province or water board has its own parties and election programs. This makes comparison at the national level impossible. The election of the Eerste Kamer [Senate] would have been comparable at a nationwide basis, if this political body were not elected indirectly. The senators are elected not by the citizens, but by the political bodies of the provinces. This means that no election results are available at the local level for this political body.

This research covers the Dutch elections for the House of Representatives for the years 2006, 2010 and 2012. The KiesKompas was developed in 2006, with the result that it is impossible to include elections prior to 2006. Unfortunately, due to the present unavailability of data on the average standardized income percentiles, this research will also not include the most recent general election of 2017.

The results are obtained through an ordinary least squares regression. The controls for the population and the average income, neither of which are in percentages, are converted into natural logarithms. This is done for the purpose of easy interpretation. The two main regressions for the left-right and progressive-conservative polarization are of the following form:

$$Polarization\ Left - Right_{i,t} = \beta_0 + \beta_1 Gini_{i,t} + \beta_2 \mathbf{X}'_{i,t} + \alpha_i + \alpha_t + \varepsilon_{i,t}$$

$$Polarization\ Progressive - Conservative_{i,t} = \beta_0 + \beta_1 Gini_{i,t} + \beta_2 \mathbf{X}'_{i,t} + \alpha_i + \alpha_t + \varepsilon_{i,t}$$

in which the dependent variable $Polarization\ Left - Right_{i,t}$ or $Polarization\ Progressive - Conservative_{i,t}$ will be regressed on the main variable of interest: the Gini coefficient of municipality i in year t . $\mathbf{X}'_{i,t}$ measures the set of control variables. The coefficient for α_i captures the fixed effects of the municipalities and α_t captures the fixed effects of the different years.

If political polarization were regressed only on the Gini coefficient bias would probably occur. In this case other, unobserved, determinants of political polarization will most likely also be correlated with income inequality. It may, for example, be the case that the number of unemployed affects both inequality and polarization (through voter behavior). Given that the

unemployment rate is positively related to inequality (more unemployment leads to a higher Gini coefficient) and also to polarization (the unemployed are inclined to vote for more extremist parties (Nederlandse Omroep Stichting, 2017)), the risk exists that the importance of the effect of the inequality is overestimated. This could lead to policy recommendations that are not supported by proper evidence. This omitted variable bias must therefore be avoided. The most straightforward solution to address the potential bias is to include the unemployment rate in the regression. As mentioned before, for this research the decisions on which control variables to include are based on earlier research.

Another way in which this study controls for potential bias is the inclusion of fixed effects. This is done by adding dummy variables for all the different municipalities and years. The fixed effects for the municipality can control for municipality-specific, time-invariant variables that affect political polarization. A traditionally corrupt local government would be an example in this regard. By adding a dummy, the corruption is treated as a given. The fixed effects for the different years may capture national shocks that affect all the municipalities at the same time; year-specific, country-invariant unobservables. The economic crisis of 2008 is an obvious example.

Reverse causality – meaning that inequality not only affects polarization, but also vice versa – does not seem to be a real threat to the accuracy of the regression estimates in this case. Income policy is designed and implemented by political parties. This is a long-term process in which it matters which parties are in power. At a given level of polarization, a left-wing political party will advocate a different policy than a right-wing political party. Moreover, the reference date for virtually all the data is 1 January of every year. This date never coincides with the days on which elections were held. In 2006 the elections took place on 22 November, in 2010 they took place on 9 July, and in 2012 on 12 September. There is no likely way in which the outcome of an election will have an effect on income inequality (much) earlier in the same year.

A final way in which the regression estimates may be biased, is when the data are measured with error. This occurs when the observations of the variables of interest are imprecise. In general, data from Statistics Netherlands is considered to be highly reliable. Since measurement error in the dependent variable is often unrelated to the independent variable, this type of error is not seen as a serious threat to the credibility of the results. The situation is different when the independent variable – in this case the Gini coefficient – is measured with error. This type

of error will result in a bias towards zero of the estimated effect (Stock & Watson, 2014B). Bias towards zero means that quantifying an effect of income inequality on political polarization becomes more difficult. In that sense, in the worst case the impact of income inequality on political polarization is overlooked.

5 Results

5.1 Left-Right Polarization

Prior to the statistical analysis of the impact of income inequality on political polarization, Figure 6 plots the relationship between political polarizations on the left-right scale and the Gini coefficient. The figure illustrates that there is a weak positive relationship between the two.

Figure 6. Relationship between Polarization and Income Inequality

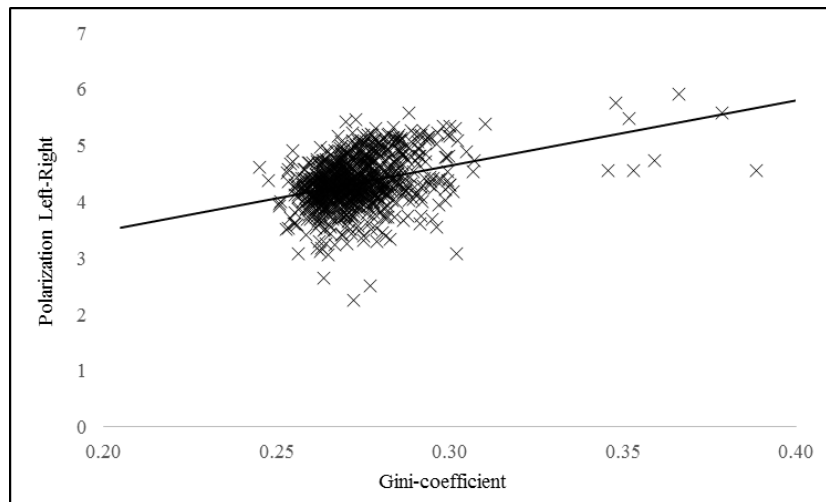


Table 2 presents the regression estimates of the main equation in which polarization on the left-right scale is the dependent variable. The coefficient estimate in column 1 demonstrates a significant and positive relationship between the Gini coefficient and political polarization. In column 2 multiple control variables are added to the model of column 1. The impact of the Gini coefficient becomes smaller, but remains highly significant. The coefficient estimate in column 2 implies that a 0.01 higher Gini coefficient – for example, from a value of 0.26 to 0.27 – leads to an increase of the polarization rate by approximately 0.07.¹¹ When, in column 3, there are fixed effects for both the municipality and the year added to the model, the significance of the Gini coefficient disappears. The estimate also changes sign. However, once

¹¹ Note that the Gini coefficient ranges from 0 to 1; an increase of 0.01 is therefore relatively high.

the set of control variables is included in the fixed effects model, the coefficient for the Gini becomes positive and significant again. The size of the variable for income inequality is now comparable to the earlier models. The coefficient estimate in column 4 implies that an increase of the Gini coefficient by 0.01, results in a 0.06 higher political polarization. This rise in polarization is relatively modest if one takes into account that the polarization of the municipalities ranges from 1.24 (city of Urk) to 5.92 (city of Laren) for this specific scale. Note that the explanatory power of the model in column 4 is rather high.

The fixed effects model of column 4 is further restricted in column 5. This model uses clustered standard errors, instead of ordinary standard errors. The standard errors are clustered at the municipality level, to control for autocorrelation in the regression errors. Autocorrelation in the errors occurs if some of the omitted factors that are determinants of the polarization rate are correlated with themselves at different years. The clustered standard errors allow the regression errors to have an arbitrary correlation within a cluster, or grouping, but assume that the regression errors are uncorrelated across clusters (Stock & Watson, 2014A). Clustering causes the standard errors of the regression output to increase. As more is demanded of the dataset, it becomes harder to find significant effects. This explains why the significance of the Gini coefficient disappears in column 5. Where the coefficient was significant at the 7% level in the model of column 4, it is only significant at the 24% level in column 5.

The output in Table 2 also illustrates that there are a handful of control variables that have an impact on political polarization. Variables such as the unemployment rate, social benefit recipients, and the total population affect the polarization rate. As mentioned before, there are no observations available for the social benefit recipients in the year 2006. Therefore, once this control is included the number of observations decreases considerably. An analysis of the effect of this variable demonstrates, however, that it is important to include this control in the regression. Column 2 of Appendix C illustrates that once the percentage of social benefit recipients is left out of the regression equation, the coefficient of the Gini is overestimated. Excluding the control might therefore result in omitted variable bias.

Table 2. Estimates on Left-Right Polarization

	Left-Right Polarization				
	(1)	(2)	(3)	(4)	(5)
Gini	11.575*** (1.032)	7.306*** (1.334)	-0.441 (3.790)	5.752* (3.057)	5.752 (4.821)
Age 0-5 (%)		7.078 (14.543)		-31.381** (14.431)	-31.381 (19.894)
Age 5-10 (%)		-7.714 (14.490)		-14.591 (14.066)	-14.591 (20.803)
Age 10-15 (%)		40.914*** (14.351)		0.981 (14.209)	0.981 (19.780)
Age 15-20 (%)		-4.551 (14.460)		-1.721 (14.717)	-1.721 (20.560)
Age 20-25 (%)		13.614 (14.083)		0.134 (14.137)	0.134 (19.181)
Age 25-45 (%)		12.545 (13.993)		0.233 (13.840)	0.233 (18.635)
Age 45-65 (%)		13.456 (14.032)		-0.138 (13.383)	-0.138 (17.931)
Age 65-80 (%)		14.154 (14.056)		1.848 (13.797)	1.848 (19.422)
Age 80+ (%)		6.996 (14.144)		19.936 (15.152)	19.936 (22.215)
Dutch Background (%)		0.588 (23.962)		-13.937 (23.052)	-13.937 (34.909)
Western Migration Background (%)		-1.060 (23.982)		-11.961 (23.424)	-11.961 (37.528)
Non-Western Migration Background (%)		1.041 (23.949)		-9.872 (23.394)	-9.872 (35.145)
Voter Turnout (%)		-0.427 (0.335)		-4.798*** (1.541)	-4.798* (2.826)
Unemployment (%)		13.638*** (2.697)		-21.016*** (4.489)	-21.016*** (6.361)
Social Benefit Recipients (%)		-20.302*** (3.445)		-67.697*** (12.497)	-67.697*** (18.795)
Population		0.069*** (0.024)		9.851*** (1.838)	9.851*** (2.771)
Average Income		0.917*** (0.172)		-5.702*** (1.660)	-5.702** (2.664)
Fixed Effects Municipality	No	No	Yes	Yes	Yes
Fixed Effects Year	No	No	Yes	Yes	Yes
Clustered Standard Errors	No	No	No	No	Yes
N	909	809	909	809	809
R ²	0.122	0.389	0.716	0.877	0.877

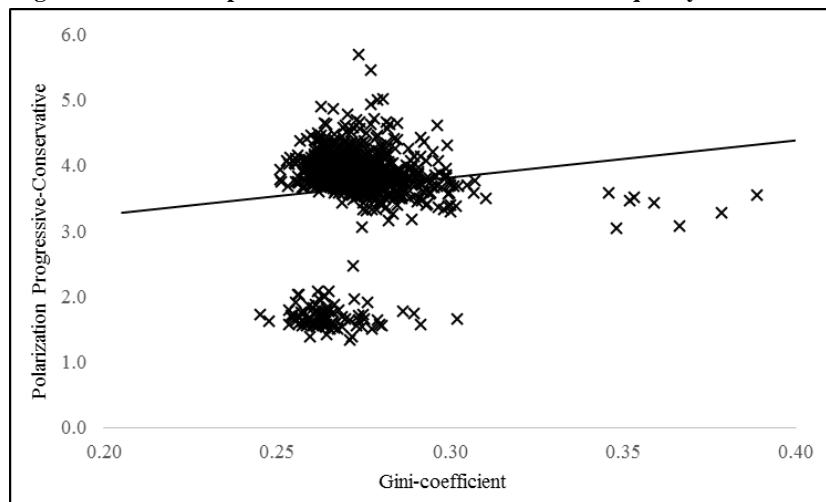
Notes. Standard errors in parentheses. Clustered standard errors are clustered at the municipality level. Significance at the 1% level is denoted by ***; ** denotes significance at the 5% level; and * significance at the 10% level.

The robustness of the results is explored in Appendix D. In columns 1 and 2 of the appendix only fixed effects for the years are used. The significance and size of the coefficients are similar to the results in Table 2. Columns 3 and 4 of the appendix only use fixed effects for the municipalities. The coefficient of the model of column 4, with the control variables, is significant at the 5% level, but not at the 1% level. The magnitude of the coefficient is similar to the baseline model in Table 2. Once clustered standard errors are applied to the model of column 4 in the appendix, the significance evaporates again. This is in line with the main results of Table 2.

5.2 Progressive-Conservative Polarization

Figure 7 plots the relationship between political polarization on the progressive-conservative scale and the Gini coefficient. The (weak) positive relationship of Figure 6 is not equally visible in this figure. There seems to be a very weak positive relationship between the Gini coefficient and political polarization on this specific scale. What is more striking is the gap between the two clouds of observations we observe. This gap is mainly, but not solely, caused by missing data for the Gini coefficient for some dozens of municipalities in the year 2006.¹² The other explanation is the major shift from 2006 to 2010 in progressive-conservative polarization.

Figure 7. Relationship between Polarization and Income Inequality



¹² The results are not influenced by the fact that observations for the Gini coefficient are missing in quite a few municipalities in 2006. The year 2006 is not included in the models of columns 2, 4 and 5 in Tables 2 and 3, and the Appendices. The reason for excluding this year is the fact that no observations are available for social benefit recipients in 2006. As illustrated in Appendix C, the percentage of social benefit recipients is important to include in the regression, as exclusion leads to overestimation of the Gini coefficient.

Table 3. Estimates on Progressive-Conservative Polarization

	Progressive-Conservative Polarization				
	(1)	(2)	(3)	(4)	(5)
Gini	5.684*** (1.826)	-4.409*** (0.879)	-0.877 (2.376)	-0.878 (2.462)	-0.878 (4.093)
Age 0-5 (%)		10.137 (9.584)		22.222* (11.621)	22.222 (17.719)
Age 5-10 (%)		-8.151 (9.549)		15.340 (11.327)	15.340 (18.375)
Age 10-15 (%)		-6.175 (9.457)		5.019 (11.443)	5.019 (15.418)
Age 15-20 (%)		-3.384 (9.530)		2.001 (11.852)	2.001 (17.132)
Age 20-25 (%)		-0.0439 (9.281)		2.603 (11.385)	2.603 (15.726)
Age 25-45 (%)		-9.518 (9.222)		-3.411 (11.145)	-3.411 (14.760)
Age 45-65 (%)		-8.403 (9.248)		-7.968 (10.777)	-7.968 (14.926)
Age 65-80 (%)		-6.008 (9.263)		-11.097 (11.111)	-11.097 (17.166)
Age 80+ (%)		-2.194 (9.321)		-33.432*** (12.202)	-33.432* (19.794)
Dutch Background (%)		5.232 (15.791)		25.825 (18.564)	25.825 (27.734)
Western Migration Background (%)		5.985 (15.805)		19.129 (18.863)	19.129 (29.560)
Non-Western Migration Background (%)		4.480 (15.783)		23.372 (18.839)	23.372 (27.405)
Voter Turnout (%)		0.469** (0.221)		4.428*** (1.241)	4.428* (2.320)
Unemployment (%)		0.862 (1.778)		17.482*** (3.615)	17.482*** (5.090)
Social Benefit Recipients (%)		6.328*** (2.270)		38.875*** (10.064)	38.875*** (15.057)
Population		-0.036** (0.016)		-5.679*** (1.480)	-5.679*** (2.095)
Average Income		-0.444*** (0.113)		0.104 (1.337)	0.104 (2.252)
Fixed Effects Municipality	No	No	Yes	Yes	Yes
Fixed Effects Year	No	No	Yes	Yes	Yes
Clustered Standard Errors	No	No	No	No	Yes
N	909	809	909	809	809
R ²	0.011	0.340	0.960	0.820	0.820

Notes. Standard errors in parentheses. Clustered standard errors are clustered at the municipality level. Significance at the 1% level is denoted by ***; ** denotes significance at the 5% level; and * significance at the 10% level.

The dependent variable in Table 3 is the progressive-conservative scale of political polarization. The coefficient estimate in column 1 demonstrates a significant and positive relationship between the Gini coefficient and political polarization. Once control variables are introduced to the model in column 2, the strong significance remains, but the coefficient for the Gini switches sign. The relationship between income inequality and polarization is no longer positive; it has become negative. This differs from the results that were established for the left-right polarization. According to column 2, a 0.01 increase in the Gini coefficient reduces the polarization rate by 0.04. The moment fixed effects are included in the model, the Gini coefficient becomes insignificant. Income inequality no longer seems to affect political polarization. Logically, the significance stays away when the more restrictive model with clustered standard errors is used. As Appendix E illustrates, the results are robust to the same tests that were executed for the left-right polarization in Appendix D.

Just as was the case for the left-right polarization, there are a handful of control variables that do significantly impact the progressive-conservative polarization. Surprisingly these are roughly the same control variables as in Table 2: the unemployment rate, the social benefit recipients and the total population. They are also roughly comparable in size. Something that does differ is the sign of these variables. Coefficients that were positively related to the left-right polarization are negatively related to the progressive-conservative polarization, and vice versa. This illustrates that the left-right scale and the progressive-conservative scale do in fact capture very different aspects of the political spectrum, as already illustrated graphically by Figure 5.

5.3 What group of voters is driving the results?

As mentioned in the Data section, there are a number of ways in which political polarization can increase. Table 4 gives an overview of the ways in which voting behavior on the left and

Table 4. Effects of Voter Behavior on Polarization

Situation	Left	Right	→	Left-Right Polarization
1	+	+	→	+
2	+	-	→	depends
3	+	=	→	+
4	-	+	→	depends
5	-	-	→	-
6	-	=	→	-
7	=	+	→	+
8	=	-	→	-
9	=	=	→	=

right side of the political spectrum might influence the polarization rate. A similar table can be drawn up for the progressive-conservative polarization. In situations 3 and 7 a relatively large proportion of voters voted for a party (or several parties) at one extreme of the political spectrum, while the rest of the voters voted for relatively moderate parties. As a result, the polarization rate increases and the municipality tends towards this particular side of the political spectrum. Another scenario could be that a large proportion of voters voted for parties at both opposing extremes of the political spectrum, leading to an increase in polarization. This is illustrated by case 1 in Table 4.

The main results of Table 2 indicate whether income inequality has an effect on the left-right polarization rate. It does not demonstrate whether it is the left wing or the right wing that is causing the polarization, or possibly both. By estimating the effects of income inequality on the left and right side of the political spectrum separately, it is possible to deduce what group of voters is in fact driving the main results of Table 2. The same procedure can obviously be performed for the progressive-conservative scale of Table 3.

Table 5 displays the estimates of the case in which the left-right scale is the base. The results of column 2 suggest that the political parties that are more to the left of the political spectrum do not gain a significant number of extra votes when the Gini coefficient increases. The political distribution on the left stays approximately the same. On the other hand, parties that are to the right of the political spectrum do receive more support as the Gini coefficient increases. Column 5 demonstrates that a 0.01 increase in the Gini coefficient leads to a shift to the right of 0.09. If the more restrictive clustered standard errors are used, the results only become insignificant at the 11% level. As the left wing remains unchanged and the right wing has moved towards the right, the results align with situation 7 in Table 4. The weak positive relation between income inequality and the left-right polarization can therefore be explained by the fact that the support for more extreme right-wing parties has increased. In total the political spectrum expands toward the right.

The dependent variables in Table 6 are the separate progressive and conservative sides of the progressive-conservative scale of political polarization. The coefficient estimates for the Gini are all insignificant. These results suggest that support for more progressive or more conservative parties does not depend on income inequality. In terms of Table 4 the discoveries point to a situation 9. The findings are in accordance with the main results, as in

Table 5. Estimates on Separate Sides of the Political Spectrum

	Left			Right		
	(1)	(2)	(3)	(4)	(5)	(6)
Gini	0.623 (2.631)	4.067 (2.919)	4.067 (4.883)	1.440 (3.820)	8.772** (3.656)	8.772 (5.462)
Age 0-5 (%)		3.118 (13.778)	3.118 (20.359)		-60.304*** (17.259)	-60.304*** (23.054)
Age 5-10 (%)		-6.660 (13.429)	-6.660 (17.586)		-21.765 (16.822)	-21.765 (22.938)
Age 10-15 (%)		5.505 (13.567)	5.505 (15.600)		12.711 (16.994)	12.711 (23.116)
Age 15-20 (%)		-10.764 (14.051)	-10.764 (17.109)		33.620* (17.601)	33.620 (24.967)
Age 20-25 (%)		-5.807 (13.498)	-5.807 (17.347)		2.955 (16.908)	2.955 (23.548)
Age 25-45 (%)		21.080 (13.213)	21.080 (21.613)		0.185 (16.552)	0.185 (22.045)
Age 45-65 (%)		12.385 (12.777)	12.385 (20.520)		-18.540 (16.006)	-18.540 (21.033)
Age 65-80 (%)		1.669 (13.173)	1.669 (19.410)		-13.467 (16.501)	-13.467 (20.876)
Age 80+ (%)		-28.484** (14.466)	-28.484 (17.819)		20.852 (18.121)	20.852 (24.459)
Dutch Background (%)		20.279 (22.009)	20.279 (35.682)		26.527 (27.569)	26.527 (39.856)
Western Migration Background (%)		11.813 (22.364)	11.813 (40.168)		22.687 (28.015)	22.687 (42.084)
Non-Western Migration Background (%)		6.038 (22.335)	6.038 (36.065)		11.055 (27.979)	11.055 (40.802)
Voter Turnout (%)		4.176*** (1.471)	4.176 (3.389)		10.532*** (1.843)	10.532*** (2.927)
Unemployment (%)		-6.872 (4.286)	-6.872 (4.455)		-10.168* (5.368)	-10.168 (8.099)
Social Benefit Recipients (%)		-26.448** (11.931)	-26.448** (13.213)		-26.588* (14.946)	-26.588 (20.693)
Population		4.752*** (1.755)	4.752 (3.512)		14.083*** (2.199)	14.083*** (3.329)
Average Income		-3.882** (1.585)	-3.882* (2.177)		-2.292 (1.985)	-2.292 (2.645)
Fixed Effects Municipality	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects Year	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	No	No	Yes	No	No	Yes
N	909	809	809	909	809	809
R ²	0.975	0.980	0.980	0.930	0.896	0.896

Notes. Standard errors in parentheses. Clustered standard errors are clustered at the municipality level. Significance at the 1% level is denoted by ***; ** denotes significance at the 5% level; and * significance at the 10% level.

Table 6. Estimates on Separate Sides of the Political Spectrum

	Progressive			Conservative		
	(1)	(2)	(3)	(4)	(5)	(6)
Gini	-1.290 (1.254)	0.039 (1.248)	0.039 (1.849)	0.621 (2.517)	4.073 (2.764)	4.073 (4.984)
Age 0-5 (%)		-5.923 (5.890)	-5.923 (8.221)		0.340 (13.048)	0.340 (18.075)
Age 5-10 (%)		-1.810 (5.741)	-1.810 (7.841)		-1.056 (12.718)	-1.056 (17.325)
Age 10-15 (%)		7.828 (5.799)	7.828 (7.804)		6.215 (12.848)	6.215 (16.214)
Age 15-20 (%)		2.061 (6.006)	2.061 (8.285)		-21.076 (13.307)	-21.076 (17.170)
Age 20-25 (%)		-1.386 (5.770)	-1.386 (8.089)		-16.998 (12.783)	-16.998 (16.677)
Age 25-45 (%)		0.624 (5.648)	0.624 (8.135)		-0.236 (12.514)	-0.236 (18.425)
Age 45-65 (%)		-7.717 (5.468)	-7.717 (8.013)		-6.180 (12.101)	-6.180 (16.770)
Age 65-80 (%)		-4.640 (5.631)	-4.640 (8.198)		-8.193 (12.475)	-8.193 (17.028)
Age 80+ (%)		-12.593** (6.184)	-12.593 (9.117)		-43.246*** (13.700)	-43.246*** (20.686)
Dutch Background (%)		17.457* (9.408)	17.457 (13.995)		26.005 (20.843)	26.005 (31.547)
Western Migration Background (%)		13.344 (9.560)	13.344 (14.684)		20.615 (21.180)	20.615 (32.833)
Non-Western Migration Background (%)		15.293 (9.547)	15.293 (14.463)		28.531 (21.153)	28.531 (32.083)
Voter Turnout (%)		2.450*** (0.629)	2.450** (1.031)		2.316* (1.393)	2.316* (2.578)
Unemployment (%)		5.868*** (1.832)	5.868** (2.556)		4.856 (4.059)	4.856 (4.647)
Social Benefit Recipients (%)		18.912*** (5.100)	18.912*** (7.260)		-1.990 (11.300)	-1.990 (13.206)
Population		-3.099*** (0.750)	-3.099*** (1.144)		0.759 (1.662)	0.759 (2.645)
Average Income		2.029*** (0.678)	2.029** (0.932)		-4.523*** (1.501)	-4.523*** (2.395)
Fixed Effects Municipality	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects Year	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	No	No	Yes	No	No	Yes
N	909	809	809	909	809	809
R ²	0.996	0.993	0.993	0.958	0.967	0.967

Notes. Standard errors in parentheses. Clustered standard errors are clustered at the municipality level. Significance at the 1% level is denoted by ***; ** denotes significance at the 5% level; and * significance at the 10% level.

the principal regression of Table 3 no significant relationship was found between income inequality and progressive-conservative polarization.

6 Discussion

As is the case with any scientific contribution, this study has its limitations. First, this research could possibly be improved by taking other forms of income inequality into account. Here, the Gini coefficient is used, since it is the most common measure of income inequality worldwide. However, as illustrated in Figure 1, the Gini coefficient has remained rather stable over time in the Netherlands. Another approach to measure income inequality could have been the ratio between the bottom 10% incomes and the top 10% incomes. A study by the Wetenschappelijke Raad voor het Regeringsbeleid [Scientific Council for Government Policy] indicates that the above-mentioned ratio, unlike the Gini coefficient, has changed significantly over the past few decades (Salverda, 2014). A major disadvantage of this measure of income inequality is that it totally ignores the income distribution within the other eight decile groups. Moreover, the ratio is sensitive to income changes at the bottom 10% that are large in relative terms, but small in absolute terms. It is therefore less applicable to a country with an active income policy, such as the Netherlands.

A second way in which this research could be improved, is by including wealth inequality in the regression. A recent study using data from the OECD demonstrates that wealth inequality in the Netherlands is among the highest in the world, just after the US. The richest 10% of households hold a total of 68% of the wealth (Reuten, 2018). It is reasonable to argue that this also affects political polarization. Other authors, however, make the point that the above data fail to take Dutch pensions and capital insurances into account. Including these two variables would yield much lower wealth inequality (Kooiman & Lejour, 2016). The practical reason for not including wealth inequality in the regression is that data at the disaggregated level is available only for 2012.

Figure 5 and the main results demonstrate that the two different polarization rates do represent non-identical matters. It is, however, unclear why income inequality does impact the left-right polarization significantly, but not the progressive-conservative polarization. A possible explanation may be that both income inequality and the left-right polarization consist of socioeconomic aspects. This link is not clearly present for the progressive-conservative

polarization, since this measure of political polarization relates to non-material matters. Further research into what is causing the significant differences between the impacts of income inequality on political polarization is desirable.

In general, this study could be improved with the use of more data and data of a better quality. As mentioned before, there are certain gaps in the observations relating to the Gini coefficient in 2006. Although it is assumed that these missing observations are random, it is always better to work with more data. It would also be interesting to undertake similar research in a few years, when the election of 2017 (and perhaps subsequent elections) can be included in the dataset. A longer research period would also make it possible to study variations in income inequality over time within municipalities, not just between them. This might lead to useful insights.

7 Conclusion

The central question of this research is whether there is a significant relation between income inequality and political polarization. In order to answer this question, two different measures of the polarization rate were constructed. The left-right polarization rate captures the ideological spread of parties on socioeconomic issues, such as the tax burden. On the other hand, the progressive-conservative polarization rate relates to the ideological spread of political parties on non-material matters such as euthanasia.

In a model with municipality and year fixed effects and various control variables, the results demonstrate that income inequality positively impacts polarization on the left-right axis of the political spectrum. A 0.01 increase in the Gini coefficient yields a 0.06 higher polarization. The results are significant at the 7% level. Compared with the significant differences in polarization in the Dutch municipalities, these findings are relatively modest in size. Once the most restricted model with clustered standard errors is used, the results become insignificant. Other variables, such as the unemployment rate, social benefit recipients and the total population seem to be more significant determinants of left-right polarization.

Based on the results, the Gini coefficient does not seem to affect progressive-conservative polarization. The significant findings that are present in the regression model without fixed effects completely disappear when the municipality and year fixed effects are incorporated into

the model. Just as was the case for the left-right polarization, there are a handful of variables that do in fact significantly impact the polarization rate. Once again, these variables include unemployment rate, social benefit recipients, and the total population.

An analysis of the mechanisms underlying the (modest) relationship between income inequality and left-right polarization indicates that the results are driven primarily by increased support for parties to the right of the political spectrum. The larger income inequality, the higher the number of votes cast for parties to the right of the political spectrum. On the left, the political distribution remains virtually unchanged when the Gini coefficient changes. As a consequence, the whole political spectrum expands to the right and the polarization rate increases. No significant underlying mechanism is found for progressive-conservative polarization. Neither the progressive nor the conservative parties benefit from changes in income inequality. These results are in accordance with the main results, as income inequality does not impact the progressive-conservative polarization rate.

References

- Alvaredo, F., Chancel, L., Piketty, T., Saez, E., & Zucman, G. (2017, December 14). *World Inequality Report 2018*. Paris School of Economics, World Inequality Lab, Paris.
- Autor, D. H., Dorn, D., & Hanson, G. H. (2013, October). The China Syndrome: Local Labor Market Effects of Import Competition in the United States. *American Economic Review*, 103(6), 2121-2168.
- Autor, D., Dorn, D., Hanson, G., & Majlesi, K. (2017, December). Importing Political Polarization? The Electoral Consequences of Rising Trade Exposure. *NBER Working Paper No. 22637*.
- Bijl, R., Boelhouwer, J., & Wennekers, A. (2017). *De sociale staat van Nederland 2017*. Den Haag: Sociaal en Cultureel Planbureau.
- Bovens, M., Dekker, P., & Tiemeijer, W. (2014). *Gescheiden werelden? Een verkenning van sociaal-culturele tegenstellingen in Nederland*. Den Haag: Sociaal en Cultureel Planbureau.
- Brown, M. C. (1994, May). Using Gini-Style Indices to Evaluate the Spatial Patterns of Health Practitioners: Theoretical Considerations and an Application Based on Alberta Data. *Social Science and Medicine*, 38(9), 1243-1256.
- Centraal Bureau voor de Statistiek. (2016, December 16). *Inkomen particuliere huishoudens met inkomen, kenmerken, regio, 2005-2014*. Retrieved from CBS.nl: <http://statline.cbs.nl/StatWeb/publication/?VW=T&DM=SLNL&PA=80594ned&LA=NL>

- Centraal Bureau voor de Statistiek. (2017, September 14). *Inkomensongelijkheid en herverdeling 2001-2015*. Retrieved from CBS.nl: <https://www.cbs.nl/nl-nl/nieuws/2017/37/inkomensongelijkheid-en-herverdeling-2001-2015>
- Centraal Bureau voor de Statistiek. (2018A, February 16). *Arbeidsdeelname; regionale indeling 2017*. Retrieved from CBS.nl: <https://opendata.cbs.nl/statline/#/CBS/nl/dataset/83933NED/table>
- Centraal Bureau voor de Statistiek. (2018B, April 30). *Personen met een uitkering; uitkeringsontvangers per regio*. Retrieved from CBS.nl: <https://opendata.cbs.nl/statline/#/CBS/nl/dataset/80794ned/table>
- Centraal Bureau voor de Statistiek. (2018C, May 31). *Regionale kerncijfers Nederland*. Retrieved from CBS.nl: <https://opendata.cbs.nl/statline/#/CBS/nl/dataset/70072ned/table>
- Chetty, R., Friedman, J. N., Hilger, N., Saez, E., Schanzenbach, D. W., & Yagan, D. (2011, November 1). How Does Your Kindergarten Classroom Affect Your Earnings? Evidence from Project Star. *The Quarterly Journal of Economics*, 126(4), 1593-1660.
- Colantone, I., & Stanig, P. (2018A). Global Competition and Brexit. *American Political Science Review*, 112(2), 201-218.
- Colantone, I., & Stanig, P. (2018B, April 18). The Trade Origins of Economic Nationalism: Import Competition and Voting Behavior in Western Europe. *American Journal of Political Science*, 1-18.
- Darvas, Z. (2016, July 13). *Brexit vote boosts case for inclusive growth*. Retrieved from Bruegel: <http://bruegel.org/2016/07/brexit-vote-boosts-case-for-inclusive-growth/>
- De Blok, L., Van der Brug, W., Dekker, P., Denters, B., Jacobs, K., Van der Kolk, H., . . . Van der Waal, J. (2016). *Democratie dichterbij: Lokaal Kiezersonderzoek 2016*. Den Haag: Ministerie van Binnenlandse Zaken en Koninkrijksrelaties.
- Decentraal Bestuur. (2018). *Kerncijfers Gemeenten*. Retrieved August 4, 2018, from [decentraalbestuur.nl: http://www.decentraalbestuur.nl/gemeenten](http://www.decentraalbestuur.nl/gemeenten)
- Duca, J. V., & Saving, J. L. (2016, September). Income Inequality and Political Polarization: Time Series Evidence over Nine Decades. *Review of Income and Wealth*, 62(3), 445-466.
- Haegens, K. (2017, December 14). *Monsterstudie toont aan: ongelijkheid neemt wereldwijd extreme vormen aan*. Retrieved from Volkskrant.nl: <https://www.volkskrant.nl/economie/monsterstudie-toont-aan-ongelijkheid-neemt-wereldwijd-extreme-vormen-aan~bfdb5089/>
- I&O Research. (2012, November 20). *Motieven die het stemgedrag van Nederlandse kiezers bepalen*. Retrieved from [ioresearch.nl: https://ioresearch.nl/home/nieuws/motieven-die-het-stemgedrag-van-nederlandse-kiezers-bepalen-2#.W2lmD9UzaUI](https://ioresearch.nl/home/nieuws/motieven-die-het-stemgedrag-van-nederlandse-kiezers-bepalen-2#.W2lmD9UzaUI)
- Kiesraad. (2018, August 2). *Databank Verkiezingsuitslagen*. Retrieved from [Verkiezingsuitslagen.nl: https://www.verkiezingsuitslagen.nl/](https://www.verkiezingsuitslagen.nl/)
- Kooiman, T., & Lejour, A. (2016). *Vermogensongelijkheid in Nederland, 2006-2013*. Den Haag: Centraal Planbureau.

- Krouwel, A., & Van Elfrinkhof, A. (2014, May). Combining Strengths of Methods of Party Positioning to Counter Their Weaknesses: the Development of a New Methodology to Calibrate Parties on Issues and Ideological Dimensions. *Quality and Quantity*, 48(3), 1455-1472.
- McCarty, N., Poole, T. K., & Rosenthal, H. (2003, January 27). *Political Polarization and Income Inequality*. Retrieved from SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1154098
- Milanovic, B. (2012). Global Income Inequality by the Numbers: In History and Now. *Policy Research Working Paper No. 6259*, 1-28.
- Nederlandse Omroep Stichting. (2017, March 3). *Jong of oud, man of vrouw; wie stemde op welke partij?* Retrieved from NOS.nl: <https://nos.nl/artikel/2163382-jong-of-oud-man-of-vrouw-wie-stemde-op-welke-partij.html>
- OECD. (2018). Income Inequality. Retrieved Juli 7, 2018, from <https://data.oecd.org/inequality/income-inequality.htm>
- Poole, K. T., & Rosenthal, H. (1985, May). A Spatial Model for Legislative Roll Call Analysis. *American Journal of Political Science*, 29(2), 357-384.
- ProDemos. (2018). *Indeling van partijen*. Retrieved September 2, 2018, from ProDemos.nl: <https://prodemos.nl/kennis-en-debat/publicaties/informatie-over-politiek/politieke-partijen/indeling-van-partijen/>
- Reuten, G. (2018). De Nederlandse vermogensverdeling in internationaal perspectief. *Tijdschrift voor Politieke Economie*, 12(2), 1-7.
- Salverda, W. (2014). De tektoniek van de inkomensongelijkheid in Nederland. In M. Kremer, M. Bovens, E. Schrijvers, & R. Went, *Hoe ongelijk is Nederland?* (pp. 39-58). Amsterdam: Amsterdam University Press.
- Stock, J. H., & Watson, M. W. (2014A). The Fixed Effects Regression Assumptions and Standard Errors for Fixed Effects Regression. In *Introduction to Econometrics* (pp. 411-414). Harlow: Pearson Education Limited.
- Stock, J. H., & Watson, M. W. (2014B). Threats to Internal Validity of Multiple Regression Analysis. In *Introduction to Econometrics* (pp. 365-376). Harlow: Pearson Education Limited.
- VanHeuvelen, T. (2018, June 1). Within-Group Earnings Inequality in Cross-National Perspective. *European Sociological Review*, 34(3), 286-303.
- Voorheis, J., McCarty, N., & Shor, B. (2016, March 16). *Unequal Incomes, Ideology and Gridlock: How Rising Inequality Increases Political Polarization*. Retrieved from SSRN: http://www.bradfordstephenjones.com/uploads/7/2/0/4/72043741/polarization_draft_s_hared_031616.pdf
- Winkler, H. (2018). *The Effect of Income Inequality on Political Polarization: Evidence from European Regions, 2002-2014*. Retrieved from Society for the Study of Economic Inequality: http://www.ecineq.org/ecineq_nyc17/FILESx2017/CR2/p11.pdf

Appendix A. Municipalities That Merged

	Former Municipality	New Municipality
2007	Binnenmaas and 's Gravendeel	Binnenmaas
2007	Obdam and Wester-Koggenland	Koggenland
2007	Bergschenhoek, Berkel en Rodenrijs and Bleiswijk	Lansingerland
2007	Haelen, Heythuysen, Hunsel and Roggel en Neer	Leudal
2007	Heel, Maasbracht and Thorn	Maasgouw
2007	Medemblik, Noorder-Koggenland and Wognum	Medemblik
2007	Liemeer, Nieuwkoop and Ter Aar	Nieuwkoop
2007	Ambt Montfort and Roerdalen	Roerdalen
2007	Roermond and Swalmen	Roermond
2009	Bennebroek and Bloemendaal	Bloemendaal
2009	Alkemade and Jacobsvoude	Kaag en Braassem
2010	Horst aan de Maas, Sevenum and Meerlo-Wanssum	Horst aan de Maas
2010	Reiderland, Scheemda and Winschoten	Oldambt
2010	Helden, Kessel, Maasbree and Meijel	Peel en Maas
2010	Venlo and Arcen en Velden	Venlo
2010	Moordrecht, Nieuwekerk aan den IJssel and Zevenhuizen-Moerkapelle	Zuidplas
2011	Bodegraven and Reeuwijk	Bodegraven-Reeuwijk
2011	Abcoude and De Ronde Venen	De Ronde Venen
2011	Eijsden and Margraten	Eijsden-Margraten
2011	Andijk, Medemblik and Wervershoof	Medemblik
2011	Lith and Oss	Oss
2011	Breukelen, Loenen and Maarssen	Stichtse Vecht
2011	Bolsward, Nijefurd, Sneek, Wonseradeel and Wymbritseradeel	Súdwest Fryslân
2012	Anna Paulowna, Niedorp, Wieringen and Wieringermeer	Hollands Kroon

Appendix B. Political Parties Included in the KiesKompas

	2006	2010	2012
Christen-Democratisch Appèl (CDA)	Yes	Yes	Yes
ChristenUnie (CU)	Yes	Yes	Yes
Democraten 66 (D66)	Yes	Yes	Yes
EénNL	Yes	No	No
GroenLinks (GL)	Yes	Yes	Yes
Lijst 5 Fortuyn	Yes	No	No
Partij van de Arbeid (PvdA)	Yes	Yes	Yes
Partij voor de Dieren (PvdD)	No	Yes	Yes
Partij Voor de Vrijheid (PVV)	Yes	Yes	Yes
Staatskundig Gereformeerde Partij (SGP)	Yes	Yes	Yes
Socialistische Partij (SP)	Yes	Yes	Yes
Trots op Nederland (ToN)	No	Yes	No
Volkspartij voor Vrijheid en Democratie (VVD)	Yes	Yes	Yes
50PLUS	No	No	Yes

Appendix C. Effect of Social Benefit Recipients

	Polarization Left-Right		Polarization Progressive-Conservative	
	(1)	(2)	(3)	(4)
Gini	5.752*	7.607**	-0.878	-2.007
	(3.057)	(3.088)	(2.462)	(2.440)
Social Benefit Recipients (%)	-67.697***		38.875***	
	(12.497)		(10.064)	
Other Controls	Yes	Yes	Yes	Yes
Fixed Effects Municipality	Yes	Yes	Yes	Yes
Fixed Effects Year	Yes	Yes	Yes	Yes
Clustered Standard Errors	No	No	No	No
N	809	814	809	814
R ²	0.877	0.867	0.820	0.811

Notes. Standard errors in parentheses. Significance at the 1% level is denoted by ***; ** denotes significance at the 5% level; and * significance at the 10% level.

Appendix D. Robustness of Estimates on Left-Right Polarization

	Left-Right Polarization				
	(1)	(2)	(3)	(4)	(5)
Gini	9.996*** (0.913)	8.485*** (1.144)	21.434*** (4.505)	6.412** (3.168)	6.412 (5.218)
Age 0-5 (%)		-8.720 (12.481)		-28.075* (14.950)	-28.075 (20.462)
Age 5-10 (%)		15.520 (12.476)		-18.806 (14.563)	-18.806 (21.548)
Age 10-15 (%)		12.094 (12.398)		0.843 (14.734)	0.843 (20.157)
Age 15-20 (%)		13.370 (12.420)		-9.754 (15.183)	-9.754 (21.186)
Age 20-25 (%)		4.759 (12.064)		-2.138 (14.653)	-2.138 (19.918)
Age 25-45 (%)		15.311 (11.977)		-9.760 (14.223)	-9.760 (18.897)
Age 45-65 (%)		12.632 (12.009)		-0.239 (13.877)	-0.239 (18.264)
Age 65-80 (%)		10.471 (12.031)		15.859 (14.054)	15.859 (19.422)
Age 80+ (%)		9.193 (12.105)		36.414** (15.393)	36.414 (22.172)
Dutch Background (%)		1.327 (20.507)		-6.864 (23.865)	-6.864 (35.069)
Western Migration Background (%)		0.309 (20.524)		2.7687 (24.125)	2.7687 (36.983)
Non-Western Migration Background (%)		2.228 (20.496)		2.367 (24.145)	2.367 (35.062)
Voter Turnout (%)		0.255 (0.290)		-5.185*** (1.596)	-5.185* (2.300)
Unemployment (%)		-3.204 (2.512)		-12.745*** (4.378)	-12.745** (5.828)
Social Benefit Recipients (%)		-9.345*** (3.017)		-61.645*** (12.907)	-61.645*** (18.885)
Population		0.054*** (0.020)		12.808*** (1.821)	12.808*** (2.757)
Average Income		0.279* (0.152)		-0.747 (1.438)	-0.747 (2.270)
Fixed Effects Municipality	No	No	Yes	Yes	Yes
Fixed Effects Year	Yes	Yes	No	No	No
Clustered Standard Errors	No	No	No	No	Yes
N	909	809	909	809	809
R ²	0.350	0.553	0.507	0.868	0.868

Notes. Standard errors in parentheses. Clustered standard errors are clustered at the municipality level. Significance at the 1% level is denoted by ***; ** denotes significance at the 5% level; and * significance at the 10% level.

Appendix E. Robustness of Estimates on Progressive-Conservative Polarization

	Progressive-Conservative Polarization				
	(1)	(2)	(3)	(4)	(5)
Gini	-5.678*** (0.677)	-4.546*** (0.878)	61.575*** (8.414)	-0.666 (2.472)	-0.666 (4.008)
Age 0-5 (%)		11.980 (9.576)		23.281** (11.677)	23.281 (17.691)
Age 5-10 (%)		-10.861 (9.573)		13.989 (11.365)	13.989 (18.261)
Age 10-15 (%)		-2.813 (9.513)		4.975 (11.498)	4.975 (15.643)
Age 15-20 (%)		-5.474 (9.530)		-0.574 (11.849)	-0.574 (17.238)
Age 20-25 (%)		0.594 (9.257)		1.875 (11.435)	1.875 (15.821)
Age 25-45 (%)		-9.840 (9.189)		-6.614 (11.099)	-6.614 (15.116)
Age 45-65 (%)		-8.307 (9.214)		-7.800 (10.829)	-7.800 (15.127)
Age 65-80 (%)		-5.579 (9.231)		-6.607 (10.968)	-6.607 (16.806)
Age 80+ (%)		-2.450 (9.288)		-28.150** (12.013)	-28.150** (18.158)
Dutch Background (%)		5.146 (15.735)		28.092 (18.624)	28.092 (28.085)
Western Migration Background (%)		5.825 (15.748)		23.850 (18.827)	23.850 (29.573)
Non-Western Migration Background (%)		4.441 (15.726)		27.294 (18.842)	27.294 (27.605)
Voter Turnout (%)		0.389* (0.222)		4.304*** (1.246)	4.304* (2.298)
Unemployment (%)		2.827 (1.927)		20.133*** (3.417)	20.133*** (5.087)
Social Benefit Recipients (%)		5.050** (2.315)		40.815*** (10.072)	40.815*** (14.860)
Population		-0.035** (0.016)		-4.731*** (1.421)	-4.731** (1.986)
Average Income		-0.370*** (0.116)		1.692 (1.122)	1.692 (1.773)
Fixed Effects Municipality	No	No	Yes	Yes	Yes
Fixed Effects Year	Yes	Yes	No	No	No
Clustered Standard Errors	No	No	No	No	Yes
N	909	809	909	809	809
R ²	0.871	0.405	0.381	0.818	0.818

Notes. Standard errors in parentheses. Clustered standard errors are clustered at the municipality level. Significance at the 1% level is denoted by ***; ** denotes significance at the 5% level; and * significance at the 10% level.