

# The Democratic Politics of Job loss

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## Abstract

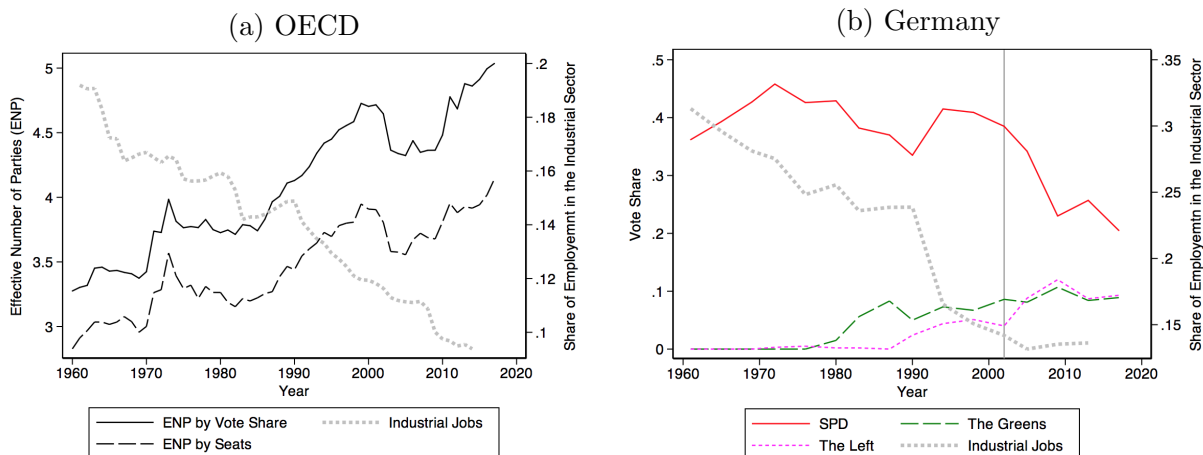
In this paper we argue that the disappearance of jobs that served as the backbone of a politically moderate working class fragmented parties on the left. First, we build a simple model of strategic platform competition to show that a decrease in the cohesiveness of the left vote fragments the parties on the left and shifts the enacted policy away from the median voter. Informed by the model, we then present evidence of these phenomena. We construct a new database on the fragmentation of political parties by vote and seat share in the parliament of 35 OECD countries from 1945 to 2017. We show that a 10 percent fall in industrial jobs is associated with an increase of 0.6 parties on the left. This effect is mostly present in Proportional Representation systems, among which the effect is stronger the more proportional the system. No effect on overall or right-parties fragmentation from changes in industrial jobs is observed, as expected. In order to test the extent to which these results are causal, we perform an instrumental variables estimation, which largely confirms the direction of our results. Finally, using the timing of scheduled elections to identify fixed-effects estimates, we provide suggestive evidence that left fragmentation shifts policy focus away from the median voter, as predicted by the model.

## 1 Introduction

Democratic politics the world over are convulsing from the disappearance of jobs that secured the livelihood of a politically moderate working class. Figure 1 shows that industrial jobs in OECD countries have declined dramatically, decreasing in Germany, for example, from 33 percent of total employment to 10 percent. Shrinking trade unions have attenuated the political power of organized labor, and rising structural unemployment in many countries has opened up fissures among traditional allies on the political left.

Our goal in this paper is to understand how post-industrial labor market fragmentation may be reconfiguring electoral politics in the democratic world. We view these demographic shifts against the background of the particularly successful postwar political economy of Europe in which

Figure 1: Industrial Jobs and Party Fragmentation



*Note.* Panel (a) includes only the 27 OECD countries that were a democracy previous to 1990. In panel (b), “The Left” is the PDS previous to 2005, and Die Linkspartei.PDS posterior to that. Also in panel (b), grey vertical line indicates the beginning of the implementation of the Hartz reforms.

industrial sector labor unions formed the backbone of center-left parties, that were politically moderated by their size and demographic centrality. Bargaining between employer and employee organizations varied in their degree of centralization, but the overwhelming picture of industrial relations in postwar Europe was one of a common interest in inclusive growth, underpinned by the economic viability of high industrial wages and stable employment (Katzenstein 1989; Thelen 2004, 2014; Swenson 2002, 2006; Iversen 2004, 2010; Iversen and Soskice; Iversen, Cusack, and Soskice). Although various configurations of parties in government favored more or less growth at the expense of more or less wage equality, decades-long industrial competitiveness was the political left’s ticket to the bargaining table (Iversen and Wren 1998). These arrangements also led to cartelization of the economy which ran the risk of externalizing the costs of high and stable wages onto consumers and taxpayers. But because the wage earners were themselves so large a percentage of the population, they largely internalized these costs in the form of wage restraint (Calmfors and Driffill 1985).

Labor unions formed the core of a formidable and consistent voting bloc for the political left because of significant unionization rates. While some scholarly attention is directed to bargaining among market players, it was left-leaning parties in coalition governments with access to levers of policy that anchored postwar European industrial relations (Budge and Laver 1992; Laver and Schofield 1998; Laver and Shepsle 1996; Hallerberg, Strauch, and von Hagen 2009; Martin and Vanberg 2011). Unions were key electoral mobilizers for the parties of the left, and in turn the regularity of left-party participation in coalition governments lent heft and stability to labor’s voice in industrial relations.

Proportional representation electoral rules can be understood to have supported left-leaning parties' accountability to unionized workers. The contrast is with plurality electoral systems, under which parties are forced to aim at broader coalitions than industrial workers alone. The governments and policies produced by these systems would, in principle, be similar to the extent that industrial workers encompass the median voter. Fragmentation of worker interests and their organizations could produce a corresponding fragmentation of their political loyalties. This paper finds both theoretically and empirically that the decline in industrial employment is multiplying parties on the left at the expense of party size.

We first construct a simple formal model to characterize the incentives of parties competing for voters with party platforms in a proportional system.<sup>1</sup> We restrict our discussion to programmatic, rather than clientelist, platforms.<sup>2</sup> Four parties compete by proposing binding policy platforms in a one-dimensional space, and we study how these platforms change as the cohesiveness of the left vote decreases, made precise in the next section. The formal model forces us to generate internally consistent implications about equilibrium party platforms, and the mechanisms by which they produce equilibrium fragmentation and policy outcomes, on the basis of which we generate empirically testable propositions.

The basic story that the model illuminates is well illustrated in the Germany case of Figure 1(b). When the industrial jobs first start disappearing, the traditional left party (in this case, the SPD) sticks to organized workers, leaving disaffected workers in the center to be taken by a non-traditional party (in this case, the Green party). This first stage (1970-1990 in Germany) fragments the left by decreasing the vote share of the SPD and by giving rise to the Greens.<sup>3</sup> When industrial jobs fall below a threshold, the traditional party finds it optimal to take the center, leaving the organized labor up for grabs for a non-traditional party (in this case, the Left or Die Linke). This second stage starts with a sharp decrease in industrial jobs at the start of the nineties, followed by a move to the center from Schroder's SPD with the 2002's Hartz reforms<sup>4</sup> (grey vertical line in Figure 1(b)), and the rise of the Left party, nearly doubling the seats in parliament of this faction (30-32 to 54). These trends are not unique to Germany, and in this paper we provide systematic evidence across OECD democracies revealing that the decline in industrial employment fragments parties on the left. In particular, we show that a 10 percent fall in industrial jobs is associated with

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<sup>1</sup>The formal literature on multi-party platform competition in non-majoritarian systems is scarce. See Buisseret (2017) for a notable exception.

<sup>2</sup>In the sense of Stokes et al. (2013)

<sup>3</sup>A confounding factor giving rise to the greens in this era is the rise of environmentalism. Here we use Germany simply as a stylized example; our main results come from a panel comparison that takes into account seasonal trends such as environmentalism.

<sup>4</sup>A series of reform recommendations to the labor market, Hartz I Hartz IV, mainly focused on the federal government's engagement with the unemployed, most controversial of which was Hartz IV which reduced the long-term unemployment benefits, seen by many as politically bold coming from the left.

an increase of 0.6 (effective) parties on the left, although only in non-SMD systems, with higher intensity the more proportional the electoral system, and mostly in parliamentary democracies.

The larger question at stake is how political fragmentation on the left may reshape coalition governments policies. In the optimistic view, party fragmentation should have minimal effects. Parties in coalition, no matter their number and dispersion of preferences, should be able to bargain away externalities of their respective policy differences (Powell; Kalandrakis and Powell; Martin and Vanberg; Hallerberg, Strauch, and von Hagen). To the extent this is true, coalition governments with many small parties should be as capable of aiming at economy-strengthening policies as governments with few, centrist parties. Pessimists worry about imperfect bargaining if smaller, more intense groups of voters hold their parties electorally accountable (Persson, Roland, and Tabellini 2006; Bawn and Rosenbluth 2007).

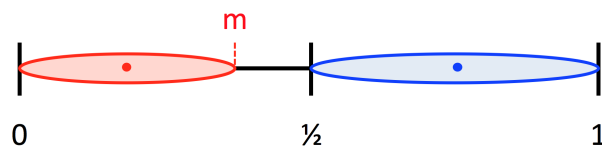
The model informs us that, to the extent that campaign proposals can be enforced, fragmentation on the left shifts the equilibrium policy away from the median voter, by way of the electoral competition brought about by the fall in industrial jobs. Using the timing of scheduled elections to exploit changes in party fragmentation at arbitrary dates and identify difference-in-difference estimates, we provide suggestive evidence of this phenomenon. We find that spending on social protection and environmental protection, bastions of the left, increases with left fragmentation when the left is government and decreases when the right is, signs of policy changes to benefit one or the other pole. Additionally, spending on public goods such as community services, defense and government researchers decreases with left fragmentation. Policy outcomes are more difficult to measure because some of them take longer to manifest. Here we find that, when the left is in government, one additional left party causes an increase of 1 percent in the share of workers who are unemployed, an effect similar across women, youth, and long-term unemployed, perhaps a consequence of organized labor's forcing hand on employment benefits and protections at the expense of displaced workers who find it hard to get a new job due to high employment costs.

The paper is organized as follows. Section 2 presents a simple formal model of platform competition that guides our intuition. Section 3 discusses the data, research design and empirical results. Section 4 concludes.

## 2 Model

For fragmentation to occur, some parties must lose vote share to others, and it is not a-priori clear that strategic party leaders will allow this to happen as vote cohesiveness decreases. In this section we present a simple model of programmatic platform competition to study this formally.

Figure 2: Policy and voter space



## 2.1 Set up

Consider a model of electoral competition through platform proposals on a one-dimension space. In order to simulate in closest fashion the Western European party system, suppose there are four parties (candidates), non-traditional left (NTL), traditional left (TL), traditional right (TR) and non-traditional right (NTR) who propose platforms, and a continuum of voters distributed in the unit interval  $[0, 1]$  with median  $\frac{1}{2}$  who choose to vote for a party. Hotelling-Downs models which include more than two parties have the inconvenience that they have either no or multiple equilibria. In order to generate useful implications, we make two simplifications. First, Left and Right parties differ in the policies available to them, where Left parties (NTL and TL) can only propose policies up to the center ( $\frac{1}{2}$ ) and Right parties (NTR and TR) only above it. Second, within left and right, traditional and non-traditional parties differ in two aspects: (i) voters hold a bias towards traditional parties,  $b_L$  and  $b_R$ , and (ii) traditional parties choose platforms first.<sup>5</sup> To focus on the left, in this paper we will further assume that the non-traditional right party is a *far-right* party, which we capture by restricting its platform set to  $[\frac{3}{4}, 1]$ .<sup>6</sup>

The preferences for a voter of ideal point  $i$  can be represented by  $|i - p|$  if voting for a non-traditional party with platform  $p$  and  $|i - p| + b_j$  if voting for traditional party  $j \in L, R$  with platform  $p$ . Notice this assumes that voters vote sincerely –for their most preferred choice– rather than strategically –for the resulting policy. As baseline, we assume parties wish to maximize their vote share –that is, we assume a *perfectly* proportional type of electoral system–, and have no policy preference. We assume this baseline electoral system because, as it will become evident in the results section, in a winner-take-all system changes in the cohesiveness of voters does not affect fragmentation, if anything only the number of districts going to the left or the right.

In order to capture changes in the cohesiveness of voters, assume that initially all voters left-of-center vote together, as if their ideal point was its mean,  $\frac{1}{4}$ , and all those right-of-center do the same, in  $\frac{3}{4}$ .<sup>7</sup> As the left loses cohesiveness, we will assume that the center-most left voters separate

<sup>5</sup>Sequential platform proposal simplifies the exposition because, if they were simultaneous, only mixed strategy equilibria would exist.

<sup>6</sup>These simplifications do not change the results regarding left party fragmentation, only the vote share of each left party and both combined, and the corresponding policy implemented by parliament. We will leave the full development of the model for a different, theory-oriented paper.

<sup>7</sup>We can either assume they all share the same ideal point,  $\frac{1}{4}$  or  $\frac{3}{4}$ , or we can assume that ideal points are uniformly

while the left-most voters remain in the unified group. Define  $m$  the center-most left voter who is part of the unified group or, equivalently, the *size of the left base*, initially  $\frac{1}{2}$ .  $m$  summarizes the degree of cohesiveness. Figure 2 illustrates this. Finally, the parliament’s policy choice is the weighted average of the platform proposals of each party elected to parliament, weighted by their seat (vote) share, as if a minority or a grand coalition governed. We will also compare this policy choice with that resulting from having only one side of the aisle choosing the policy.

Given the sequential nature of the platform proposals, the equilibrium concept we will use is sub-game perfect equilibrium. We will study equilibrium party platforms, party fragmentation and the parliament’s policy choice as  $m$  decreases.

Notice that this is not a good model to explain the rise in far-right vote share of the past years. The current model is set up to allow us to isolate the left phenomenon. In fact, depending on the equilibrium platforms of left parties, it is not clear whether the loss of cohesiveness in the left vote will generate more or less incentives for right parties to take the center. Thus, a necessary extension to capture the far-right phenomenon would be to change the cohesiveness of the right vote as well, perhaps splitting the unified group in two, and study (a) whether in equilibrium the traditional right would prefer to moderate and (b) at what point they loose the far-right vote. We leave this for future research.

## 2.2 Equilibrium Analysis

First, for any  $m$ , the equilibrium involves the traditional right party proposing  $\frac{3}{4} - b_R$  and the non-traditional one  $\frac{3}{4}$ , the former getting elected. The traditional right secures winning the right vote, and its position is unique because it captures, or threatens to capture, part of the center vote in equilibrium. The non-traditional right, despite loosing, has an equilibrium platform proposal which keeps the traditional right in line; otherwise the traditional right would propose the median and the non-traditional right would take the right vote, which would not be an equilibrium. The higher the bias  $b_R$ , the more centered the traditional right and the more center vote they would take.

The left parties’ platform for different sizes of the left base,  $m$ , depends on the specific value of  $m$  and  $b$ . To illustrate, Proposition 1 fully characterizes the equilibrium strategies for a symmetric and *small* bias  $b_L = b_H = b$ .<sup>8</sup>

**Proposition 1.** *For  $b < \frac{1}{16}$ , the equilibrium strategies TL and NTL for the traditional and non-*

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distributed in the unit interval but some external mechanism, e.g. union’s power, makes them all vote together.

<sup>8</sup>In the appendix we discuss the equilibrium for a general bias, where while strategies are more convoluted conclusions remain almost identical.

traditional parties respectively are

$$\begin{aligned}
 TL &= \begin{cases} [\frac{m}{2} - b, \frac{m}{2} + b] & \text{if } m \in [\frac{1}{4}, \frac{1}{2}] \\ m + b & \text{if } m \in [\frac{1}{4} - b, \frac{1}{4}] \\ \frac{1}{4} & \text{if } m \in [0, \frac{1}{4} - b] \end{cases} \\
 NTL &= \begin{cases} [\max\{\frac{1}{4} + b, \min\{TL + b, \frac{1}{2}\}\}, \max\{\min\{TL + b, \frac{1}{2}\}, \min\{2m - b - TL, \frac{1}{2}\}\}] & \text{if } m \in [\frac{1}{4}, \frac{1}{2}] \\ [\max\{0, m + b - TL\}, TL - b] & \text{if } m \in [\frac{1}{4} - b, \frac{1}{4}] \\ TL + b \text{ if } TL \leq \frac{1}{4} \text{ or } TL - b \text{ if } TL > \frac{1}{4} & \text{if } m \in [0, \frac{1}{4} - b] \end{cases} \\
 TR &= \frac{3}{4} - b_R \\
 NTR &= \frac{3}{4}
 \end{aligned}$$

*Proof.* All proofs are in the appendix. □

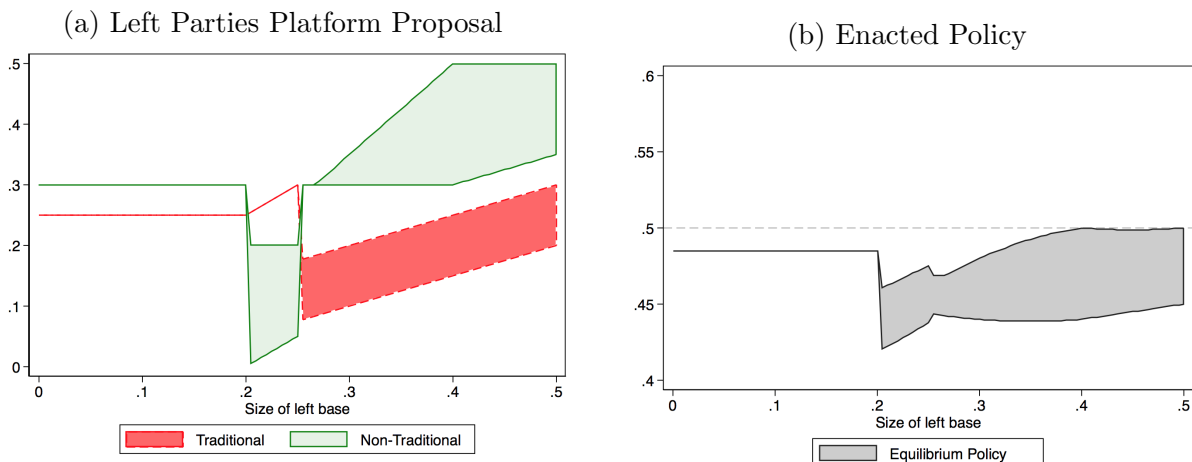
As  $m$  decreases from the median, first the non-traditional takes the center and the traditional left extremes its proposal to cater to the unified group. This continues until the unified group ceases to be attractive for the traditional party,  $m = \frac{1}{4}$ . This partly mimics the fact that the green party (moderate left party) appeared first in the German political scene followed only later by the rise of the far-left party, similar to other European experiences.

As soon as the traditional left moderates, the non-traditional left takes the unified group. This is an equilibrium until the unified group is small enough so that its cohesiveness ceases to matter. At this point, that is for all  $m < \frac{1}{4} - b$ , the unique equilibrium involves both parties playing a “median voter” type of game on the space of left voters, with the traditional right threatening to take center votes from the right. Absent a bias, the unique equilibrium would be the proposals of  $\frac{1}{4}$  –the median left voter–, while a positive bias has the unique equilibrium of the traditional left proposing  $\frac{1}{4}$  (or slightly less) after which the non-traditional proposes  $\frac{1}{4} + b$ .

Notice that while industrial jobs and thus organized labor have sharply decreased, they have not disappeared completely: as shown in figure 1(a), in the average OECD country industrial jobs have halved. The model tells us what happens when the left base halves, but also what happens when it continues to decrease until disappearance. Here we will focus on the first half of the story of the model to learn about what has happened thus far, while keeping in mind what it predicts future developments should look like. Proposition 2 summarizes the trajectory of traditional left’s platform and the resulting policy enacted by parliament as the left cohesiveness decreases.

**Proposition 2.** *As the left base halves, the traditional left’s policy platform first shifts to the left, to then moderate when it ceases to target the unified group. When they moderate, the non-traditional left targets the unified group. Altogether, this causes that a decrease in  $m$  weakly decreases (shifts*

Figure 3: Equilibrium platform proposals and policy.



Note. Panel (b) plots policy when the left participates in government, whether in a minority or grand coalition.  $b_L = \frac{1}{20}$ .

to the left) the equilibrium policy that is enacted by a parliament with the left participating in government, as it relates to a parliament where the left did not.

An illustration of the equilibrium strategies of the left parties and parliament's policy choice as a function of the size of the unified voters  $m$  in panel (a) and (b) of Figure 3. Importantly, panel (b) shows the trajectory of the policy when all parties have a say in government, including the left, for example when grand coalition or a minority government is formed. If the left governed alone, the trajectory of the policy would be the same, but farther to the left. If the left was not in government, the enacted policy would be to the right of the median, but would change only discretely at the  $1/2$  mark.

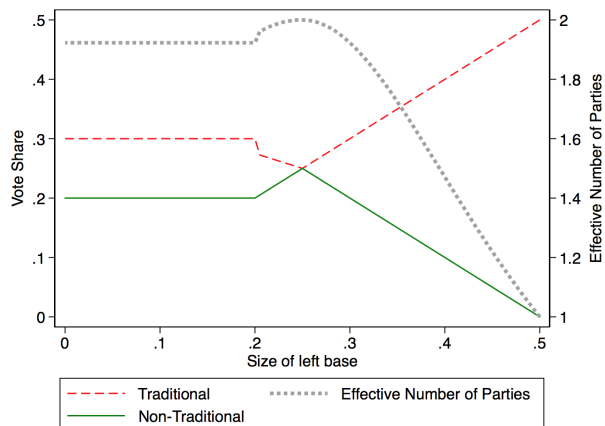
To end, proposition 3 addresses the effect of cohesiveness on party fragmentation.

**Proposition 3.** *Party fragmentation is lowest at  $m = \frac{1}{2}$ . As  $m$  decreases, the non-traditional left party vote share increases, thus increasing party fragmentation, until the left base is halved. At this point, the traditional left party decides to moderate, i.e. leave the unified voters for center voters, and the non-traditional take over the unified group, which depending on the size of the bias may increase the traditional party's vote share and consequently decrease slightly party fragmentation.*

Party fragmentation is determined by the cohesiveness of the left vote and the strategic platform choices of the left parties. The traditional left party wishes to keep as much vote share as possible and strategically uses its favorable bias in order to keep as many votes as possible. Despite this, and even for very large biases, the non-traditional left always grabs an increasing share of left voters as they become more dispersed. At the point of traditional left moderation, a discontinuous jump in



Figure 4: Equilibrium Vote Share and Fragmentation.



Note. Parameter value:  $b_L = \frac{1}{20}$ .

strategy changes this trajectory, but only for a small range of  $m$ , after which fragmentation remains constant, always higher than that of the initial, unified situation. Finally, notice that in a winner-take-all system no fragmentation would occur, either the traditional right or the traditional left would win each district depending on the district’s voter distribution (see Cox (1997)). Therefore, we should expect fragmentation only in multi-member districts, and our conjectured policy effects should be clearer among countries with these systems. An illustration of the left parties’ vote share and resulting party fragmentation in Figure 4.

### 3 Empirical Evidence

Figure 1 shows that fragmentation has on average increased as industrial jobs have halved. In this section we provide systematic evidence that indeed a decrease in the share of industrial jobs is associated with an increase in left party fragmentation, a relation that is at least partly causal. At the end, we provide suggestive evidence that left fragmentation has resulted in a policy shift away from the median, as predicted by the model.

We first describe the data, then the research designs and corresponding threats to identification, to finally present the results.

### 3.1 Data

We collect data on electoral rules, electoral results of legislative elections, and economic performance of the 35 OECD countries for 1945 to 2017.<sup>9</sup>

For every election held democratically in this sample, we record the rules regarding: parliamentary or presidential system, district system (majoritarian, proportional or mixed), district magnitude, PR formula (Danish, Hare, Sainte-Lague, LR-Droop, DHont, LR-Imperiali, Imperiali highest averages), list system (Open or preferential, Closed), PR legal threshold (minimum percentage of votes required for a party to be admitted into parliament), number of districts, and number of seats available or filled.

For every election we record whether the election was scheduled beforehand or called early, the number of rounds, and the turnout for each round. Only France has two rounds, we record the second round whenever a choice need to be made. In the case of countries that use two different votes with different electoral systems, such as Germany and Mexico, we code the PR one. We record the vote share and seat share obtained by every party elected to parliament, recording which parties were “traditional” and which “non-traditional”,<sup>10</sup> and which parties were right-leaning and which left. Finally, we record the vote share for parties not elected to parliament if categorized as non-traditional (e.g. far right, far left or green).

In general, we follow standard coding rules such as Carey-Hix (2011)’s. We use several sources, including previous publications containing such information (e.g. Carey-Hix (2011) and DPI (2015)), official records (in print and online), and unofficial online sites (e.g. Google, Wikipedia).<sup>11</sup> Economic indicators such as the share of employment accounted for the industrial sector, GDP, unemployment and inflation were obtained from the OECD, the ILO and the World Banks public databases. In addition to this, we collected the quantity of imports from China to each OECD country from the UN Comtrade Database. Specifically, we added the total dollar amount of imports from 60 categories of goods broadly defined as industrial in origin, those classified 30 to 90 in the Harmonized Commodity Description and Coding System, for each year available. Most countries had data available only from 1989. All variables containing monetary amounts are measured in real terms, and with purchasing power parity when available; when used in an estimation, these variables are logged.

Data availability varies with variable. The estimations shown in the text use the maximum

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<sup>9</sup>Countries that were admitted as members by 2010.

<sup>10</sup>Traditional parties are understood as those formed around the end of the second World War and/or that have alternated in power during most of the 20th century. Non-traditional parties are, in general, those that are not traditional which have anti-establishment platforms. For example, in Germany the SPD and CDU/CSU are traditional left and right respectively, the Left (Linke) and Green are non-traditional left, the AfD is non-traditional right, and the FDP is traditional yet neither left nor right.

<sup>11</sup>In order to cross-check our data, a random sample is checked against official records, where available.

Table 1: Descriptive Statistics

	1975		1995		2015	
	N	Mean	N	Mean	N	Mean
<b>Electoral System</b>						
Single-Member Districts	35	0.17	35	0.14	35	0.14
Min % to secure one seat	24	0.20	35	0.18	35	0.18
Open List System	35	0.57	35	0.43	35	0.46
Presidential System	35	0.40	35	0.17	35	0.20
<b>Electoral Results</b>						
Left Government	35	0.37	35	0.46	35	0.37
Traditional Left	26	0.26	34	0.23	35	0.18
Non-Traditional Left	26	0.05	34	0.05	35	0.07
Traditional Right	26	0.31	34	0.24	35	0.22
Non-Traditional Right	26	0.04	34	0.04	35	0.09
<b>Effective Number of Parties</b>						
All Parliament	26	3.29	34	3.90	35	4.03
Right Parties	25	1.74	34	2.02	35	2.12
Left Parties	25	1.56	33	1.76	34	1.88
<b>Economic Variables</b>						
GDP per capita (in thousands US\$)	26	5.79	35	18.35	35	41.66
GDP growth	26	0.10	35	0.06	35	0.04
Inflation rate	26	0.28	34	0.10	35	0.01
Unemployment rate	7	0.04	13	0.07	35	0.08
Industrial jobs, as % of employment	7	0.16	13	0.13	34	0.10
Import industrial goods from China (million US\$)			33	49.68	35	571.06

number of years and countries for which there is data available for our main variables, namely party fragmentation and the share of employment accounted for the industrial sector, for OLS estimates this is from 1966 until 2015, for 2SLS from 1989. Since some potentially relevant controls are available only for a subset of years and/or countries, in the text we present estimates using only those controls available for the maximum sample, and in the appendix we re-do our estimates using additional controls.

Table 1 presents descriptive statistics of a subset of the variables, for three years: 1975, 1995 and 2015. Notably, the intuition of Figure 1 can be observed here as well: industrial jobs, as percentage of employment, starts at an OECD average of 0.16 in 1975, going to 0.13 in 1995 and ending in 0.10 in 2015; on the other hand, the *effective number of parties* in the left starts at 1.56, going to 1.76 ending at 1.88.<sup>12</sup> Notice, however, that a similar trend is observed for fragmentation in the entire

<sup>12</sup>Effective number of parties =  $\frac{1}{\sum_i (s_i)^2}$ , where  $s_i$  is the votes or seats obtained by party  $i$ , as a share of the total number of votes or seats obtained in parliament or a faction of parliament depending on the case. See Laakso and Taagepera (1979) and Taagepera and Shugart (1989).

parliament as well as within right parties. This first finding is precisely the reason that justifies checking whether the relationship between industrial jobs and fragmentation is (i) specific to the left and (ii) systematic, rather than spurious, which is the task we undertake in the next sections.

## 3.2 Research Design

We will employ three research designs: an ordinary least squares model with country and year fixed effects and a two-stage least squares model using as instrument trade flows from China, in order to estimate the effect of industrial jobs on left fragmentation, and a fixed effects model using the timing of scheduled elections to study the effect of left fragmentation on policy. A description of each design and a discussion of its potential threats is presented below.

### 3.2.1 OLS with fixed effects

In the case of an ordinary least squares model, we will estimate the following equation

$$y_{it} = \alpha_i + \lambda_t + \beta IndJobs_{it-1} + X_{it}\Pi + \epsilon_{it} \quad (1)$$

where  $i$  indexes countries and  $t$  indexes years when an election was held. Given the data limitations and the year of elections, we are able to consider all 35 OECD but two, South Korea and Latvia, and all years from 1966 until 2015. In every year where an election was held, the sample includes a median of 4.5 countries, with as few as 1 (e.g. 1995) and as many as 13 (in 2011).

Our dependent variable  $y_{it}$  will measure either vote share or party fragmentation. Following the literature, our preferred measure for fragmentation is *effective number of parties*. Our main coefficient of interest is  $\beta$ , which accompanies  $IndJobs_{it-1}$  the share of employment that corresponds to the industrial and manufacturing sector. Since some elections are held in the middle of the year and in order to minimize reverse causality issues, we measure  $IndJobs_{it-1}$  the year previous to the election. All standard errors are clustered at the year level to correct for non-independence of observations across countries within a year, for example due to global political or economic trends.<sup>13</sup>

The main threat to the identification of  $\beta$  as a causal estimate in this design is that the share of industrial jobs may be correlated with other factors that drive electoral support that we do not control for, both across countries and years. Common political and economic shocks are chief concerns, for example when the support for non-traditional left parties is increasing across the board due to cultural changes. Even if this wasn't a concern, country-specific time-varying phenomena

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<sup>13</sup>We choose to cluster by year in our baseline specification because we work with about 50 years in the sample, as opposed to 25 to 33 countries, depending on the year, and the small number of clusters by country may bias the estimated standard errors. In the appendix we show our main results clustering by country, showing that the standard errors change only slightly, in both directions, without affecting our conclusions.

may pose issues. For example, it is possible that technological advances reduce industrial jobs at the same time that they increase per capita income, the latter which may change the relative attractiveness of traditional vis-a-vis non-traditional parties. It is also possible that globalization increased pressure on making electoral systems more proportional at the same time it ships manufacturing jobs to developing countries, the former which may account for the bulk of the increase in fragmentation of parties elected to parliament.

To account for some of these forces, the specification includes country fixed effects  $\alpha_i$  and year fixed effects  $\lambda_t$ . The country fixed effects capture any time-invariant differences across countries, such as persistent differences in ideological stigma or in corruption. Year fixed effects control for global trends that affect all countries similarly. In addition to this, the specification includes a vector of covariates  $X_{it}$ , which include GDP per capita of the year previous to the election, to avoid reverse causality issues, and a collection of controls for the political system valid the year of the election. Political controls include indicator variables for presidential, vis--vis parliamentary, system, for open list systems, and for electoral systems with single-member districts (SMDs). In one specification, we also include and interact industrial jobs with a variable we call Min % that calculates for each election the minimum percentage of votes within a district that a party requires to secure at least one seat. This variable intends to measure, in top of the SMD dummy, the degree of proportionality of an electoral system, and it is constructed using three pieces of information: the median district magnitude, the formula used to allocate seats to parties in a proportional system (e.g. D'Hont) and the PR legal threshold, if one exists. Due to lack of data for certain years and countries, we relegate to the appendix a specification that additionally controls for inflation, participation in the labor market, unemployment rate and long-term unemployment rate, natural controls but which highly reduce estimation the sample. Finally, in the text we include both scheduled and called elections, and in the appendix we estimate equation 1 excluding elections that were called ahead of the next scheduled election just to check for robustness.

### 3.2.2 2SLS

Correcting for the factors above, OLS allows us produce very reliable estimates of the correlation between the fall in industrial jobs and party fragmentation, but only a tentative causal claim. This is because identification still relies on selection on observables, that is, that the share of industrial jobs in each country in year  $t - 1$  is “as good as randomly assigned”, conditional on  $\alpha_i$ ,  $\lambda_t$  and  $X_{it}$ . This condition seems rather implausible because it is not difficult to conjecture many country and election specific phenomena –cultural factors, for example– that are very hard to measure and whose shocks affect both the electoral and economic fortunes of a country.

A research design aimed at leveraging exogenous variation to identify a causal relation in the

context of a panel of the most powerful economies seems almost unrealistic. Any such design would have to argue that it possesses a source of variation that is, conditional on the set of controls, completely independent from shocks in party fragmentation in OECD parliaments. Despite the minimum chance of achieving this, we present our best shot of identifying causal variation through an instrumental variables approach.

We propose to instrument *IndJobs* by using imports of industrial goods from China to each individual country in our sample, here called *IndImports*. This instrument has to satisfy the three known conditions for a good instrument. First, *IndImports* needs to be correlated with *IndJobs*. We argue that a lagged *IndImports* may provide information to industrial producers which allows them to adjust their production and hiring plans, thus affecting current *IndJobs*. Second, the influence of *IndImports* on left fragmentation must run only through its influence in *IndJobs*, and not directly through its own or indirectly through other channels. This assumption is not entirely implausible, specially to the extent that controversies regarding the shipment of industrial jobs to third-world countries and China’s trade record usually pops up in the public discussion as it relates to its effect on jobs. However, this assumption could certainly be violated through other economic channels, for example if increased disposable income coming from cheaper imported goods changed the voter’s political preferences away from traditional parties, for reasons other than the labor market. Third, conditional on  $\alpha_i$ ,  $\lambda_t$  and  $X_{it-1}$ , *IndImports* must be “as good as randomly assigned” to each country. This is the hardest assumption to justify because, for example, it is hard to imagine that shocks in party structure in parliament do not affect the government’s trade decisions. Therefore, we proceed with this instrument, yet with caution. First, we measure *IndImports* two period before we measure party fragmentation, which nevertheless does not entirely solve the exogeneity issue because politicians may change trade policy in anticipation of changes in the political arena, among others fragmentation. Second, we produce IV estimates using the full sample as well as excluding the two biggest world economies, U.S. and Japan, obtaining similar results. A final concern of using this measure is that trade flow information is only available since 1989, which highly reduces our sample, potentially increasing the noise of the estimation.

In order to estimate the effect of *IndJobs* on party fragmentation we calculate a two stage least squares. First, we estimate the first stage, equation (2) below, the effect of industrial imports on industrial jobs. Using the estimated coefficients in equation (2), we predict *IndJobs* and use this prediction,  $\widehat{IndJobs}$ , to then estimate equation (3), the second stage.

$$IndJobs_{it-1} = \alpha_i + \lambda_t + \delta IndImports_{it-2} + X_{it-1}\Pi + \epsilon_{it} \quad (2)$$

$$y_{it} = \alpha_i + \lambda_t + \beta^{IV} \widehat{IndJobs}_{it-1} + X_{it-1}\Pi + \epsilon_{it} \quad (3)$$

where the coefficient  $\beta^{IV}$  is the instrumental variable estimate of the causal effect of industrial jobs on party fragmentation.<sup>14</sup>

### 3.2.3 Fixed Effects using timing of scheduled elections

In this paper we study the effect of the fall on industrial jobs on equilibrium left fragmentation, which itself has an effect on equilibrium policy outcomes. However, party fragmentation in parliament can affect policy in many different ways, depending on the source of the fragmentation. So, even if the fall in industrial jobs is the main cause for left fragmentation, testing the effect of fragmentation on policy will confound the effect of other potential sources of fragmentation, which may bias upwards or downwards depending on the sign of these sources. On the other hand, testing the effect of industrial jobs on policy is a naive exercise, because the fall in industrial jobs affects policy through many channels, only one of which is fragmentation.<sup>15</sup>

No strategy is ideal. However, in order to provide a tentative test of the effect of the fall in vote cohesiveness and thus left fragmentation on policy, we undertake the first strategy described above: test the effect of quasi-exogenous changes in party fragmentation on policy choice and policy outcome. Besides the research design's assumptions described above, the main assumption of this exercise is that any alternative source of fragmentation will at most attenuate the effect of fragmentation due to the fall of industrial jobs that we expect from the model.<sup>16</sup>

Our main estimating equation is

$$y_{it+1} = \alpha_i + \lambda_t + \beta_1 \text{LeftFrag}_{it} + \beta_2 \text{LeftFrag}_{it} \times \text{LeftGov}_{it} + \delta \text{LeftGov}_{it} + X_{it}\Pi + \epsilon_{it} \quad (4)$$

where  $i$  indexes countries and  $t$  years. Similar to above, we are able to consider all 35 OECD countries but South Korea, and all years from 1966 until 2015. We include the maximum number of observations for the main estimation in order to maximize the power of the empirical strategy (we need as many years with at least one, hopefully more, election been held). However, since we only know the effect of fragmentation due to industrial jobs fall and we only find this relationship in multi-member districts (MMD), in the appendix we estimate the effects on the sub-sample of MMD systems obtaining very similar results, in part because most observations in the sample involve this system (80%).

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<sup>14</sup>In practice, we use the Stata code `ivregress` which automatically calculates the first and second stage, using the correct standard errors.

<sup>15</sup>This is the same reason an instrumental variables approach will not work, because the *exclusion restriction* will not be satisfied.

<sup>16</sup>That is, either the other sources of fragmentation will add noise to the estimate we are looking for, thereby increasing our estimated standard errors, or at most will produce an attenuation bias, if the effect of this other sources goes in the opposite direction. However, if the other sources have an effect on policy that goes in the same direction as the fall in industrial jobs, then our coefficient will capture these other sources and inflate our estimate.

Fragmentation changes only at elections, and elections are held in different years for different countries. This staggered nature of elections allows us to employ a differences-in-differences-like design to test how left fragmentation  $LeftFrag_{it}$ , as measured by the seat share in parliament, has affected policy choice and outcome.<sup>17</sup> Since we expect left fragmentation to have a different effect on policy depending on whether the left is party of government and when it's not, we include a term interacting  $LeftFrag_{it}$  with an indicator variable equal to 1 if the left was part of the government that was formed,  $LeftGov_{it}$ .

We test two sets of dependent variables,  $y_{it+1}$ , in order to measure the degree to which policy choice and outcomes have departed from those benefiting *median voters* the most. The first set intends to capture policy choices. First, we measure total government spending dedicated to community amenities (water supply, street lighting, parks building, community development), our best measure of public good without an ideological component (such as Defense spending, for example), which to the extent that it benefits most voters we assume it benefits the median voter. Then we consider the opposite, government spending targeted to a very specific audience, of which the best measure we have is agricultural producers' support. Finally, we wanted to use spending variables that clearly revealed an ideological component. Defense spending and environmental spending were good options for right and left, but both can also be considered public goods. We use government spending on redistribution (old age spending, housing subsidies, disability insurance), to the extent that it's a bastion from the left and it is usually considered to benefit a sector of the population at the expense of median income tax payers (high income as well if they do not take advantage of loop holes and tax incentives to re-invest). Important spending categories, such as education, health or economic affairs, are not considered since we cannot clearly classify them.<sup>18</sup> Second, we measure the three main short/medium-term macroeconomic policy outcomes, unemployment, inflation and GDP growth. We expect the first two to benefit the median voter the most, unemployment because it usually hits stronger the least educated and non-unionized, and inflation because it is known to hurt the most those less wealthy –having a highest fraction of their wealth in cash. On the other hand, it is unclear to us what to expect from GDP growth because an effect on productivity usually takes longer than one electoral cycle. We expect to see a higher effect on unemployment than on inflation, because the former is more under the control of the seating government, as opposed to the latter which depending on the country may be in the hands of an autonomous agency.

We make a deliberate choice to focus on short-run outcomes. Depending on the country, elections are held every 2, 3, 4 or 5 years. Thus, to focus on the effect of the recent fragmentation

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<sup>17</sup>Formally, we call a differences-in-differences design one estimating on group data, that is, where every unit that suffers change over time contains several observations, but this is simply equivalent to an OLS with fixed effects on group data, so here we treat these terms interchangeably. See Angrist and Pischke (2009) for details.

<sup>18</sup>We use the Classification of Functions of Government (COFOG) from the OECD.



change without contaminating the results with future elections, we measure all outcomes in the year posterior to the election, which inevitably limits the scope of our analysis.

As part of the fixed-effects model, equation (4) includes country fixed effects  $\alpha_i$  and year fixed effects  $\lambda_t$ . The main identifying assumption in this design is that fragmentation changes are as good as randomly assigned conditional on  $\alpha_i$  and  $X_{it}$ ,<sup>19</sup> which essentially requires that the trajectory of our dependent variable in a country where an election was held would, if it hadn't been held, have been similar to that of a country where no election occurred. When the election timing is set before hand, say every 4 years by a constitution, this assumption is highly plausible. If political actors are allowed to call anticipated elections, we run the risk that the change in the parliaments composition is brought about in response to anticipated changes in the dependent variable. For this reason, we exclude from the sample elections that were called ahead of the next scheduled election, about 13% of all elections in our sample. To account for omitted country-specific time-varying factors, the specification also includes a vector of covariates  $X_{it}$ , containing the same covariates as the OLS research design, together with an indicator variable of whether the governing party or coalition is from the left and a variable that measures the fragmentation of the right parties which, if there are factors fragmenting parties overall, allows us to isolate the effect of *left* fragmentation alone on the policy outcome. As robustness check, in the appendix we repeat our estimates using the full sample (i.e. scheduled and called elections) and, for the restricted and full sample, including linear time trends for each country, a parametric way of relaxing the parallel trends assumption allowing each country to have a unique trend over time. Finally, we also include as estimation using the sub-sample of multi-member district systems (MMD) only, because the first results below will show that most, if not all, of the fragmentation caused by the decline in industrial jobs comes from MMD, and our model only allow us to predict policy changes due to fragmentation caused by the loss of cohesiveness of the base or not because of other sources. To have in mind, however, most of the observations used in the baseline sample are from MMD, so we should not expect results to change wildly.

### 3.3 Results

#### 3.3.1 Industrial Jobs and Left Fragmentation, OLS

First, we examine how changes in the labor market affect vote support for each of the four factions, traditional left, non-traditional left, traditional right and non-traditional right. Estimating equation (1) using as outcome the vote share of each faction, Table 2 shows that a decrease in industrial jobs has a statistical significant effect on growing the non-traditional left support, as predicted

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<sup>19</sup>The “parallel trends assumption” in a differences-in-differences design with group data.

Table 2: Industrial Jobs and Electoral Support

	Left		Right	
	Traditional	Non-Traditional	Traditional	Non-Traditional
	(1)	(2)	(3)	(4)
Ind Jobs	0.41 (0.57)	-0.89** (0.43)	0.54 (0.32)	-0.24 (0.18)
SMD	0.12 (0.10)	-0.02 (0.07)	-0.11* (0.05)	0.05 (0.05)
Open List	-0.03 (0.05)	0.05 (0.03)	0.06** (0.02)	0.01 (0.03)
Presidential	-0.02 (0.03)	0.03 (0.02)	0.02 (0.02)	-0.09*** (0.02)
GDP per cap	0.05 (0.08)	0.03 (0.06)	-0.01 (0.04)	0.04 (0.05)
R2	0.907	0.646	0.927	0.822
N	222	222	222	222
Mean of Dep Var	0.272	0.060	0.298	0.047

Robust standard errors, clustered by year, in parenthesis. Statistical significance: \*0.10 \*\*0.05 \*\*\*0.01.

in the theory. In particular, a 10% decrease in the share of manufacturing jobs increases in 9% the vote share of non-traditional parties. Even though the correlation between industrial jobs and traditional party vote support is positive as expected, this correlation is not statistically significant, as it isn't with right vote share, traditional or non-traditional, either.

Notice that a statistically insignificant effect in table 2 does not necessarily mean that voters did not change their support; it just means that, in net, total support did not change, because voters could have joined and others left a faction. Replicating these estimates using the vote as share of registered voters (as opposed to turnout) closely mimics these results, and no effect is observed on turnout, as shown in the appendix.

Then, we turn to party fragmentation. Table 3 presents the results of estimating equation (1) using as outcome variable the effective number of parties elected to parliament, as well as the same measure but in the subset of right and left parties respectively. The theory above indicated that a decrease in the cohesiveness of the left vote, which we measure as the fall in industrial jobs, should fragment the left, but should have no effect on right parties fragmentation. Results in table 3 confirm this intuition. In particular, this table shows that a 10% shrink in the share of industrial jobs is associated with an increase in about 0.5-0.6 effective parties in the left, measured both by vote intention (vote share) and the resulting seat share in parliament. The fall in industrial jobs, however, is not shown to be associated with changes in right fragmentation. Consequently,

Table 3: Industrial Jobs and Party Fragmentation, OLS

	Total		Right		Left	
	By Vote (1)	By Seats (2)	By Vote (3)	By Seats (4)	By Vote (5)	By Seats (6)
Ind Jobs	-5.25 (5.26)	-2.36 (4.17)	2.05 (2.29)	3.34 (2.28)	-4.73* (2.59)	-5.73** (2.50)
SMD	-1.67 (1.30)	-0.92 (1.06)	-0.75 (0.65)	-0.38 (0.65)	0.47 (0.72)	0.30 (0.64)
Open List	0.03 (0.65)	0.62 (0.46)	0.14 (0.27)	0.46** (0.23)	0.68** (0.27)	0.55** (0.25)
Presidential	-0.83 (0.58)	-0.25 (0.47)	-0.39* (0.22)	-0.40* (0.23)	0.25 (0.36)	0.25 (0.40)
GDP per cap	-1.53 (1.35)	-0.91 (1.06)	-0.33 (0.80)	-0.62 (0.77)	0.60 (0.75)	0.52 (0.60)
R2	0.848	0.888	0.785	0.808	0.792	0.795
N	222	222	222	222	221	222
Mean of Dep Var	4.281	3.520	1.864	1.776	1.821	1.697

Robust standard errors, clustered by year, in parenthesis. Statistical significance: \*0.10 \*\*0.05 \*\*\*0.01.

a shrink in industrial jobs is negatively, but not statistically significantly, correlated with party fragmentation in parliament as a whole.

A natural follow-up question is whether this effect is exclusive to a specific type of democracy. The theory has a simple implication when it comes to the magnitude of districts, because the traditional left always holds an edge over the non-traditional one, thus in a winner-take-all system, such as single-member districts, only the traditional left or traditional right will succeed in achieving seats. Therefore, we expect only in multi-member districts, proportional systems to observe an effect of the fall in industrial jobs. Table 4 tests this conjecture in two ways. First, in top of the baseline specification of equation (1) we interact the share of industrial jobs with an indicator variable equal to 1 if the electoral system contains only single-member districts (SMD), and 0 if some form of proportional representation is in place. Column (1) shows that the effect completely comes from non-SMD systems, because the coefficient for *IndJobs* is estimated to be a statistically significant 0.52 parties per 10% of *IndJobs* change, very close to our baseline estimation, and adding this estimate to the coefficient accompanying the interaction sums to 3.7 which is statistically indistinguishable from zero (“+ p-value” in bottom of the table: 0.445).

A SMD dummy is, however, a very coarse measure of proportionality, and thus we turn to our variable *Min %*, the minimum share of votes within a district theoretically necessary for a party to secure one seat. Column (2) shows the estimates when including an interaction of *IndJobs* with this measure, results similar to those of column (1). At very low levels of *Min %*, that is,

Table 4: Industrial Jobs and Fragmentation of Left Parties, Heterogeneous effects

	Effective Number of Left Parties			
	(1)	(2)	(3)	(4)
Ind Jobs	-5.21** (-2.18)	-7.19*** (-2.80)	-5.87** (-2.31)	-5.46** (-2.19)
Ind Jobs × SMD	8.91** (2.22)			
Ind Jobs × Min %		25.51** (2.22)		
Ind Jobs × Open List			1.76 (0.50)	
Ind Jobs × Presidential				11.40*** (2.91)
R2	0.799	0.803	0.795	0.800
N	222	212	222	222
Mean of Dep Var	1.697	1.685	1.697	1.697
+ p-value	0.445	0.505	0.032	0.232

*Note.* At bottom of the table, "+ p-value" indicates the p-value of the test that  $IndJobs + (IndJobs \times A) = 0$ , where  $A$  is either SMD, min %, Open list or Presidential system. Robust standard errors, clustered by year, in parenthesis. Statistical significance: \*0.10 \*\*0.05 \*\*\*0.01.

at very high levels of proportionality, the effect is of a statistically significant 0.71 parties per 10% of *IndJobs* change, slightly higher than our baseline estimate. With every 10% increase in *Min %*, approaching the 50% of SMDs, there is a statistically significant decrease of 0.26 parties. The addition of the baseline effect of *IndJobs* and its interaction, evaluated at the mean of *Min %*, 20%, is statistically indistinguishable from zero, consistent with the result in column (1).

Finally, in columns (3) and (4) of table 4, we interact industrial jobs with an indicator variable equal to one if the electoral systems consists of parties running *Open Lists*, and with an indicator variable equal to one if the system of government is *Presidential*. The model does not inform us regarding the interaction between the fall in industrial jobs and there political variables, thus we hold no priors. Column (3) shows that list systems do not interact with changes in industrial jobs, showing that among closed list systems (the coefficient accompanying *IndJobs* in column (3)) as well as among open list systems (the coefficient of *IndJobs* plus the interaction coefficient) industrial jobs are significantly associated with left party fragmentation. Column (4), on the other hand, presents the perhaps surprising finding that changes in industrial jobs is associated with fragmentation only in parliamentary democracies: while the coefficient for *IndJobs* is a significant 0.55 parties per 10% industrial jobs, as in the baseline specification, the addition of this coefficient and the interaction term is indistinguishable from zero as indicated by the p-value of 0.232.

Table 5: Effect of Industrial Jobs on Party Fragmentation, 2SLS

	N	Party Fragmentation			First Stage	
		Total (1)	Right (2)	Left (3)	partial $R^2$ (4)	p-value (5)
Full Sample (1989-2015)	165	-32.16 (33.29)	-11.76 (31.37)	-23.46 <sup>+</sup> (14.92)	0.072	0.035
Balanced Sample (1996-2015)	156	-28.62 (28.42)	21.41 <sup>+</sup> (14.03)	-23.41* (13.62)	0.120	0.011
Full Sample, excl. US and Japan	141	-30.24 (30.65)	-7.05 (24.89)	-24.34* (14.03)	0.098	0.018

Robust standard errors, clustered by year, in parenthesis. Statistical significance: <sup>+</sup>0.15 \*0.10 \*\*0.05 \*\*\*0.01.

### 3.3.2 Industrial Jobs and Left Fragmentation, 2SLS

As discussed above, the estimates so far presented are accurate measures of the correlation between industrial jobs and left fragmentation, but not necessarily good measures of a causal effect. In order to attempt to get at a causal story, we estimate equations (2) and (3) in a two-stage procedure to produce instrumental variables estimates. One of the main issues we face is that the available data to run this exercise forces our sample to contain only half of the years than in the OLS exercise, greatly reducing the statistical power. Furthermore, the number of countries with available data per year varies considerably. Finally, as explained above, the exogeneity assumption needed for the instrument to be valid is threatened by the fact that many of the countries under study are influential economies whose politics may shape their relationship with China and their trade policy.

In order to consider these issues, we estimate the instrumental variable coefficient for the whole available sample, years 1989 to 2015, for the sample of back-to-back years with at least one election (in fact, two), 1996 to 2015, and for the full sample but excluding the two biggest world economies, the U.S. and Japan. The estimated coefficients are presented in table 5. In general terms, the estimates confirm our previous findings: the fall in industrial jobs fragments the left, without affecting the right or parliament as whole. The magnitude of the coefficient is higher, as expected, since the 2SLS is interpreted as a treated-on-the-treated estimate; however significant, a slightly weak first stage also contributes to the magnitude of the coefficients: a partial  $R^2$  ranging from 0.07 to 0.12. The level of significance is around the 8-11%, which is expected in this smaller sample and much noisier estimation method. For this reason, in table 5 we include a <sup>+</sup> symbol to point out coefficients statistically significant to the 85% confidence level. These estimates are also less robust than the OLS ones, for in the appendix we show that slight specification and sample adjustments while almost not varying the estimated coefficient change the standard errors enough to make the statistical significance of this estimates volatile.

Table 6: Fragmentation of Left Parties and Policy Choice and Outcome

	Policy Choice			Policy Outcome		
	Gov Spend Community	Agric Producer Support	Gov Spend Redistribution	Unemployment Rate	Inflation	GDP growth
	(1)	(2)	(3)	(4)	(5)	(6)
Left Frag	-0.03 (0.04)	0.25*** (0.06)	-0.42** (0.19)	0.01 (0.20)	0.75 (0.59)	0.00 (0.00)
Left Frag × Left Gov	-0.15** (0.07)	0.06 (0.08)	1.01** (0.39)	1.02*** (0.37)	0.31 (0.72)	-0.00 (0.00)
Left Gov	0.18*** (0.05)	-0.32** (0.13)	-0.06 (0.22)	0.30 (0.27)	-0.86 (0.54)	-0.00 (0.00)
R <sup>2</sup>	0.544	0.913	0.948	0.746	0.646	0.532
N	478	302	478	639	1103	1090
Mean of Dep Var	0.759	1.430	15.370	7.165	6.795	0.064
+ p-value	0.008	0.000	0.107	0.030	0.088	0.213

All outcome variables are measured in  $t + 1$ . Regressions include controls for the contemporary electoral and political system, fragmentation on the right, as well as GDP per capita. At bottom of the table, “+ p-value” indicates the p-value of the test that  $LeftFrag + (LeftFrag \times LeftGov) = 0$ . Robust standard errors, clustered by year, in parenthesis. Statistical significance: \*0.10 \*\*0.05 \*\*\*0.01.

### 3.3.3 Left Fragmentation and Policy

Proposition 2 indicates that a decrease in the left vote cohesiveness shifts the equilibrium policy enacted in parliament away from the median voter. In particular, when the left is in government (alone or in a grand coalition), the policy shifts to the left; when the left is outside, the policy shifts to the right.

In table 6 we show estimates of equation (4) for our preferred specification, and in table 9 using the full sample (risking endogeneity) and using country-specific trends. The focus of table 6 is on the coefficient of *Left Frag*, which indicates the effect of left fragmentation when the left is not in government, and on the sum of *Left Frag* and *Left Frag* × *Left Gov*, which indicates the effect of left fragmentation when the left is in government and whose statistical significance is measured by the p-value “+ p-value” at the bottom of the table. In sum, results generally confirm the direction of our hypothesis, but some of the findings are not fully robust.

Spending on our preferred measure of public good decreases with fragmentation when the left is in government, but there is no evidence that it does with left fragmentation when the right is. Agricultural producers’ support, our example of an easily targetable spending, increases with fragmentation regardless of the identity of the government. Finally, spending on redistribution, bastions of the left, increases with fragmentation when the left is government and decreases when the right is. Table 9 shows that these estimates are largely robust to changes in the specification and are practically replicated when restricting the sample to MMD systems.

On the policy outcome side, left fragmentation has a strong and robust effect on unemployment: when the left is in government, one additional left party causes an increase of 1% in the share of workers that are unemployed. Table 10 in the appendix shows that this effect is observed across unemployment of the women and youth, as well as long-term unemployment. One hypothesis for this result is that the fall in industrial jobs forces the left to continue serving organized workers –who mobilize well– with employment benefits and protection at the expense of the workers who lost their jobs and who find it hard to get a job given the high costs of employment. Finally, left fragmentation has a marginally statistically significant, and non-robust, effect on increasing inflation when the left is in government, and no effect on GDP growth, both of which fall close to our predictions. Here again results are robust to changes in the specification and in the sample to MMD systems, as shown in appendix table 9.

## 4 Discussion and Conclusion

This paper has shown that the decline in industrial jobs in rich democracies has, as predicted, increased the number of parties on the left. In concrete terms, a ten percent drop in industrial employment adds 0.6 parties on the left, on average. The parties are on average correspondingly smaller than the parties they replace, raising the question of declining electoral and legislative effectiveness. What happens to the power of the left when it breaks into pieces?

It is striking that left-party fragmentation occurs only in proportional representation systems, suggesting that plurality electoral rules continue to contain the dispersion of preferences on the left within traditional parties.

The growing electoral heft of alt right parties in Germany and Sweden, the inordinate time it takes to form governments in Belgium and the Netherlands, and the market jitters surrounding Italys new populist coalition, not to mention anti-market populism in the US and UK, all raise pressing questions about the future of democracy in a post-industrial world. Are current democratic institutions up to the task of representing public interests in a way that is consistent with long term political stability and economic prosperity? Are some institutions better than others?

Our current study does not pretend to answer all of these questions, but it does offer grounds for concern. We have found evidence that suggests that party fragmentation on the left has shifted policy focus away from the median voter, as measured by policy choices on public goods and by policy outcomes such as the unemployment rate. It bears watching to see if the same labor market shifts that have broken parties asunder also threaten the ability of party leaders to resist bottom-up accountability. Such a palliative, our findings suggests, would invite greater misery in the longer run.

That distributive outcomes move away from the median voter does not mean that they go to the most disadvantaged. Simultaneous increases in unemployment raise the possibility that they might instead be accruing to a shrinking labor aristocracy. Alternatively, they might be going to supporters of other parties in coalition governments—such as farmers. Nor have we settled the question whether fragmentation drives policy away from programmatic outcomes and toward clientelist ones. We have theoretical reasons for thinking that it does, because post-election bargaining creates incentives for parties to satisfy their supporters while externalizing the costs of their deals onto third parties. But these are questions for future empirical research.

Finally, two important pieces of the puzzle have intentionally been left out. First, the effect of party discipline how it interacts with fragmentation to generate platform and policy choices. Second, some conjecture that left fragmentation begets right fragmentation, but our analysis isolates the latter by assuming complete right-vote cohesiveness. The rise of far-right parties in western Europe was probably the most notable political phenomenon of the last electoral cycle, and it deserves proper attention. As explained in the text, formally this would require us to depart from the assumption that the right vote is unified in order to study (a) whether in equilibrium the traditional right would prefer to moderate and (b) under which circumstance they loose the far-right vote. These are important aspects of that we are currently developing in separate work.

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# A Proofs

## A.1 Proof of proposition 1

*Proof.* The main dynamics of the equilibrium are already in the intuition in the text. Basically, when  $m \in [\frac{1}{4}, \frac{1}{2}]$ , the best the traditional party can do is take the unified group. Since we suppose a small bias, in particular one that prevents the TL from taking center vote while securing the unified vote when  $m > \frac{1}{4}$ , the TL is indifferent in her position as long as it secures the unified vote:  $[\frac{m}{2} - b, \frac{m}{2} + b]$ . The non-traditional party proposes a platform in order to secure the center vote, which requires to be at least at a “bias” distance from the traditional party,  $TL + b$ , and not too far from the center-most unified voter  $m$ ,  $m + (m - TL - b) = 2m - b - TL$ , while not failing to be below  $\frac{1}{2}$ .

When  $m$  falls below  $\frac{1}{4}$ , the traditional left prefers to take the center because it anticipates it can secure more votes. In particular, TL proposes  $m + b$ , even if this means loosing voters close to  $\frac{1}{2}$ , because as  $m$  decreases TL gains more votes to the right of  $m$  than it loses in the center to the right-party.

The above is true, however, only to the extent that the non-traditional left prefers to capture the unified group, which it does as long as  $m > \frac{1}{4} - b$ , because NTL can always propose the median and, at  $m = \frac{1}{4} - b$ , TL proposes  $\frac{1}{4}$  and NTL can take  $\frac{1}{4} - b$ . In other words, at  $m = \frac{1}{4} - b$  the fact that far-left voters are unified ceases to be relevant, and competition for left voters (i.e. within  $[0, \frac{1}{2}]$ ) takes the classic 2-party competition form (because the right vote is unified and no left party can propose a platform above  $\frac{1}{2}$  and thus closer to the right-voter’s ideal point than any of the two right parties can), with the exception that the traditional right may take some votes if no left platform is at least at  $\frac{1}{4} + b$ . In practice, if TL proposes  $\frac{1}{4}$ , NTL is indifferent between proposing  $\frac{1}{4} + b$  and  $\frac{1}{4} - b$ , because it gets a fraction  $\frac{1}{4} - b$  of the votes either way; but TL is not indifferent: in the first case it gets  $\frac{1}{4} + b$  but in the second only  $\frac{1}{4} + \frac{b}{2}$ , because the traditional right party get part of the center. It is easy to check that TL can do no better than getting a fraction  $\frac{1}{4} + b$  of the votes, thus it secures this by proposing  $\frac{1}{4} - \epsilon$ , with a very small  $\epsilon > 0$ , inducing NTL to propose  $\frac{1}{4} + b$ .

The bias threshold,  $\frac{1}{16}$ , is the minimum bias that allows the traditional party to take some center votes as it secures the unified group, that is, solves  $\frac{m}{2} + 2b = m$  which, at the lowest possible  $m$  where TL is interested in the unified group,  $\frac{1}{4}$ , solves to  $b = \frac{m}{4} = \frac{1}{4}$ .

Results remain practically unchanged when we allow the bias to be bigger than  $\frac{1}{16}$ , but it may be illustrating to solve it. Suppose a general  $b_L = b$  and, to simplify calculations,  $b_R > 0$  very small. Then, the equilibrium strategies are

$$\begin{aligned}
 TL &= \begin{cases} [\frac{m}{2} - b, \frac{m}{2} + b] & \text{if } b < \frac{1}{16} \text{ or } \min\{\frac{m}{2} + b, \frac{1}{2}\} \text{ if } b > \frac{1}{16} & \text{if } m \in [\bar{m}, \frac{1}{2}] \\ [\frac{1}{4}, m + b] & & \text{if } m \in [\frac{1}{4} - b, \bar{m}] \\ \frac{1}{4} & & \text{if } m \in [0, \frac{1}{4} - b] \end{cases} \\
 NTL &= \begin{cases} [\min\{TL + b, \frac{1}{2}\}, \max\{\min\{TL + b, \frac{1}{2}\}, \min\{2m - b - TL, \frac{1}{2}\}\}] & \text{if } m \in [\bar{m}, \frac{1}{2}] \\ [m + b - TL, TL - b] & \text{if } m \in [\frac{1}{4} - b, \bar{m}] \\ \frac{1}{4} - b \text{ or } \frac{1}{4} + b & \text{if } m \in [0, \frac{1}{4} - b] \end{cases} \\
 TR &= \frac{3}{4} - b_R
 \end{aligned}$$

$$NTR = \frac{3}{4}$$

where  $\bar{m} = \frac{1-4b}{3}$  if  $b > \frac{1}{16}$  and  $\bar{m} = \frac{1}{4}$  otherwise.

Let's obtain  $\bar{m}$  and the bias threshold  $b = \frac{1}{16}$ . If the bias is large enough,  $b > \frac{1}{16}$ , the traditional party prefers to take the unified group as opposed to the center as long as  $\frac{m}{2} + 2b > \frac{1}{2} - m$ , which is equivalent to  $m > \frac{1-4b}{3}$ . If the bias is low enough,  $b < \frac{1}{16}$ , until the unified group makes up half of the left voters, i.e.  $m = \frac{1}{4}$ , the small bias does not allow the traditional party to both take the unified group and some dispersed voters, thus  $\bar{m}$  simply solves  $m > \frac{1}{2} - m$ , that is,  $\bar{m} = \frac{1}{4}$ . This is also the reason behind the two different (for each subset of bias values) equilibrium strategies of the traditional party when  $m \in [\bar{m}, \frac{1}{2}]$ . Notice that the bias threshold,  $\frac{1}{16}$ , can be solved here as well using the lowest possible  $m$  (i.e.  $\bar{m}$ ), solving to  $b = \frac{\bar{m}}{4} = \frac{1-4b}{4}$  or  $b = \frac{\bar{m}}{4} = \frac{1}{4}$ , which results in the same.  $\square$

## A.2 Proof of proposition 2

*Proof.* Direct computation from proposition 1.  $\square$

## A.3 Proof of proposition 3

The complete statement of this proposition is that as  $m$  decreases, party fragmentation (a) (weakly) increases for  $m > \bar{m}$  (using the notation of the proof of proposition 1, for a general bias), (b) decreases for  $m \in [\frac{1}{4} - b, \bar{m}]$ , and (c) is constant when  $m < \frac{1}{4} - b$ , where  $\bar{m} = \frac{1-4b}{3}$  if  $b > \frac{1}{16}$  and  $\bar{m} = \frac{1}{4}$  otherwise.

*Proof.* Measuring left fragmentation as  $\frac{1}{(vs_T/0.5)^2 + (vs_{NT}/0.5)^2}$  (effective number of parties measure; left parties always add to 0.5 in equilibrium), fragmentation increases if  $vs_T^2 + vs_{NT}^2$  decreases. Analyzing each case we have:

- When  $m > \frac{1}{4}$  and  $b < \frac{1}{16}$ ,  $vs_T^2 + vs_{NT}^2 = m^2 + (\frac{1}{2} - m)^2$ . The derivative of this term with respect to  $m$  is  $4m - 1$  which is positive. At  $m = \frac{1}{2}$ , this term is  $\frac{1}{4}$ .
- When  $m > \frac{1-4b}{3}$  and  $b > \frac{1}{16}$ ,  $vs_T^2 + vs_{NT}^2 = (\frac{m}{2} + 2b)^2 + (\frac{1}{2} - \frac{m}{2} - 2b)^2$ . The derivative of this term with respect to  $m$  is  $m - \frac{1}{2} + 4b$ . This term is lowest when  $m = \frac{1-4b}{3}$ , thus equal to  $\frac{16b-1}{6}$ , which is always positive. At  $m = \frac{1}{2}$ , this term is  $\frac{1}{8} + 8b^2$ .
- When  $m \in [\frac{1}{4} - b, \bar{m}]$ ,  $vs_T^2 + vs_{NT}^2 = m^2 + (\frac{1}{2} - m)^2$ . The derivative of this term with respect to  $m$  is  $4m - 1$  which is negative in this interval of  $m$ .
- When  $m < \frac{1}{4} - b$ ,  $vs_T^2 + vs_{NT}^2 = (\frac{1}{4} + b)^2 + (\frac{1}{4} - b)^2 = \frac{1}{16} + 2b^2$ . Notice this term is smaller than both  $\frac{1}{4}$ , when  $b < \frac{1}{16}$ , and  $\frac{1}{8} + 8b^2$ , when  $b > \frac{1}{16}$ .

$\square$

## B Robustness of empirical results

Table 7: Industrial Jobs and Electoral Support: Alternative outcomes

	Turnout	Left		Right		Left Governments
		Traditional	Non-Traditional	Traditional	Non-Traditional	
	(1)	(2)	(3)	(4)	(5)	(6)
Ind Jobs	-0.06 (0.26)	0.73 (0.81)	-1.19* (0.59)	1.11* (0.60)	-0.34 (0.27)	2.73 (3.80)
R <sup>2</sup>	0.913	0.926	0.663	0.916	0.831	0.463
N	222	222	222	222	222	222
Mean of Dep Var	0.726	0.396	0.081	0.430	0.070	0.374

Column (1) is turnout: voters divided by registered voters. Columns (2)-(5) is vote as share of registered voters. Column (6) is an indicator variable equal to 1 if the government is Left. Robust standard errors, clustered by year, in parenthesis. Statistical significance: \*0.10 \*\*0.05 \*\*\*0.01.

Table 8: Effect of Industrial Jobs on fragmentation of parties in parliament, Robustness

		OLS			2SLS		
		Total	Right	Left	Total	Right	Left
		(1)	(2)	(3)	(4)	(5)	(6)
(a)	Clustering by Country	-2.36 (4.10)	3.34 (2.75)	-5.73** (2.31)	-32.16 (40.10)	-11.76 (38.14)	-23.46 (16.86)
(b)	Scheduled Elections Only	-1.68 (4.64)	5.08 (3.15)	-5.93* (3.17)	3.67 (29.36)	-24.09 (47.31)	-27.21 (28.54)
(c)	Additional Controls	5.88 (6.29)	9.17* (5.35)	-7.30* (3.86)	-27.56 (67.52)	116.61 (95.73)	-30.08 (31.18)

Robust standard errors, clustered by year (unless indicated), in parenthesis. Statistical significance: \*0.10 \*\*0.05 \*\*\*0.01. Row (a)  $N = 222$  and 34 clusters, and  $N = 159$  and 33 clusters, for OLS and 2SLS respectively; row (b)  $N = 181$  and  $N = 130$  for OLS and 2SLS respectively; row (c)  $N = 179$  and  $N = 147$  for OLS and 2SLS respectively.

Table 9: Effect of Left Fragmentation on Policy Choice and Outcome, Robustness

Especif	Coeff	Gov Spend Community (1)	Gov Spend Redistribution (2)	Agric Producer Support (3)	Unemploy-ment Rate (4)	Inflation (5)	GDP growth (6)
Baseline Sample	Left Frag	-0.03 (0.04)	-0.42** (0.19)	0.25*** (0.06)	0.01 (0.20)	0.75 (0.59)	0.00 (0.00)
	Left Frag × Left Gov	-0.15** (0.07)	1.01** (0.39)	0.06 (0.08)	1.02*** (0.37)	0.31 (0.72)	-0.00 (0.00)
	Inter	0.008	0.107	0.000	0.030	0.088	0.213
Full Sample	Left Frag	-0.04 (0.04)	-0.39** (0.17)	0.28*** (0.06)	0.33* (0.18)	0.76+ (0.49)	0.00 (0.00)
	Left Frag × Left Gov	-0.10** (0.04)	1.00*** (0.23)	-0.03 (0.06)	1.28*** (0.20)	0.05 (0.59)	-0.00 (0.00)
	Inter	0.002	0.007	0.001	0.000	0.091	0.314
Baseline Sample + Trends	Left Frag	0.09*** (0.02)	0.21+ (0.13)	0.16*** (0.06)	0.32+ (0.22)	-0.80 (0.57)	-0.00 (0.00)
	Left Frag × Left Gov	-0.23*** (0.07)	-0.39 (0.32)	-0.05 (0.05)	0.39+ (0.25)	0.95 (0.66)	-0.00 (0.00)
	Inter	0.053	0.552	0.077	0.033	0.775	0.320
Full Sample + Trends	Left Frag	0.04* (0.03)	0.10 (0.11)	0.15*** (0.05)	0.44* (0.23)	-0.78+ (0.49)	-0.00 (0.00)
	Left Frag × Left Gov	-0.10*** (0.04)	0.15 (0.18)	-0.10** (0.05)	0.71*** (0.15)	0.17 (0.51)	-0.00 (0.00)
	Inter	0.190	0.153	0.335	0.000	0.188	0.326
Baseline Sample MMD	Left Frag	0.04 (0.04)	-0.29 (0.20)	0.19** (0.08)	0.07 (0.20)	0.87 (0.71)	-0.00 (0.00)
	Left Frag × Left Gov	-0.20** (0.07)	0.79* (0.41)	-0.09 (0.08)	0.77* (0.43)	0.32 (0.91)	-0.00 (0.00)
	Inter	0.018	0.187	0.268	0.098	0.093	0.264

Baseline samples excludes called elections, full sample includes called and scheduled elections. Trends refer to country-specific trends. MMD refers to using only multi-member districts. Robust standard errors, clustered by year, in parenthesis. Statistical significance: +0.15 \*0.10 \*\*0.05 \*\*\*0.01.

Table 10: Effect of Left Fragmentation on Unemployment Rate

	Total (1)	Women (2)	Youth (3)	Long-term (4)
Left Frag	0.01 (0.20)	0.28 (0.26)	0.47 (0.65)	-1.26* (0.63)
Left Frag × Left Gov	1.02*** (0.37)	0.90** (0.35)	1.45* (0.84)	5.84*** (1.13)
Left Gov	0.30 (0.27)	0.06 (0.27)	0.71 (0.53)	-1.78** (0.85)
R <sup>2</sup>	0.746	0.804	0.808	0.865
N	639	612	522	814
Mean <i>y</i>	7.165	7.740	16.539	31.995
+ p-value	0.030	0.019	0.103	0.000

Robust standard errors, clustered by year, in parenthesis. Statistical significance: †0.15 \*0.10 \*\*0.05 \*\*\*0.01.