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Cast a Ballot or Protest in the Street - Did our Grandparents Do More of Both? An Age-Period-Cohort Analysis in Political Participation

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ABSTRACT

Political participation is at the core of democracy. Well-functioning democracies need citizens who participate not only in formal politics but in all levels and aspects of collective life. Recent research suggests that younger generations are less likely to be engaged in formal forms of political participation than older ones. However, there is little evidence on the trends for non-formal participation. This paper tries to fill a gap in this field by looking at the evolution of extra-parliamentary participation in politics through various measures of civic and political engagement, based on data from six waves of the European Social Survey. It analyses the trends in formal and extra-parliamentary political participation in European countries by the means of a methodology that allows studying the determinants of various forms of participation and, in particular, to disentangle the effects of age, period and cohort on political participation. The paper confirms that, relative to older generations, younger generations in European countries participate less in politics through formal activities. A similar trend is also observed for extra-parliamentary political participation, although this trend is less clear-cut. The results also show that the financial crisis of 2007-2009 witnessed a halt in the downward trend of period effects in the various forms of political participation, followed by the increase of period effects on both formal and extra-parliamentary political participation in the subsequent years (2011-2012).

RÉSUMÉ

La participation politique est au cœur de la démocratie. Pour bien fonctionner, les démocraties ont besoin que leurs citoyens participent à la vie des institutions, mais aussi qu'ils s'impliquent à tous les niveaux et dans tous les domaines de la vie de la collectivité. Selon des études récentes, les jeunes générations sont moins susceptibles que leurs aînés d'être engagées dans une forme conventionnelle de participation politique. Les tendances de la participation non-conventionnelle sont en revanche moins connues. Le présent document tente de combler cette lacune en étudiant l'évolution de la participation non-conventionnelle à la vie politique à travers diverses mesures de l'implication civique et politique, sur la base des données de six éditions de l'Enquête Sociale Européenne. Sont étudiées les tendances de la participation politique tant conventionnelle que non-conventionnelle dans les pays européens par le biais d'une méthodologie qui permet de cerner les déterminants des différentes formes de participation et, en particulier, d'isoler les effets des facteurs âge, période et cohorte. Le document confirme que les jeunes générations d'Européens participent moins à la vie politique à travers des activités conventionnelles que les générations précédentes. La participation politique non-conventionnelle suit une tendance similaire, bien que de façon moins marquée. Les résultats montrent également que la crise financière de 2007-2009 a vu stopper le déclin des effets de période. En revanche, les effets de période ont augmenté dans toutes les formes de participation politique durant les dernières années observées (2011-2012).

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1. Introduction

1. Political participation is at the core of a democratic society (Kaase, 1979). Well-functioning democracies need citizens that participate not only in *formal politics* but in all levels and aspects that concern collective life (Alesina and Giuliano, 2009). Through participation individuals express their preferences and ideals to the large public; they influence the groups in power and determine the political choices that impact everyone's lives and well-being. Public participation is a condition for effective governance (OECD, 2009).

2. In his seminal work, *Bowling Alone*, Putnam (2000) argues that in the United States younger cohorts (those born between 1960 and 2000) are less inclined to engage in community life and in politics than older cohorts (those born between 1910 and 1940). Putnam claims that a process of "generational replacement" was responsible for a steady decline of social capital, civic engagement and political participation in US society (Stolle, 2005). In other words, as old birth-cohorts were replaced by new ones, the stock of social capital, which includes civic engagement and political participation, slowly declined. In a similar way, Lane (2000) argues that the decline of social capital (and political participation) was not limited to the United States but reflected a more general process of disenchantment in all Western societies.

3. On the other hand, Hooghe (2003) holds that there is yet no conclusive evidence that participation and civic engagement levels in general are declining in Western European societies. According to several authors, declining political participation has been observed only for some conventional forms of participation, such as party membership (Mair, 1999) and voter turnout (Gray, 2000).

4. Political participation can be conceived in a variety of ways that go further than *formal politics*. Moreover, different forms of participation seem to be related (positively or negatively), i.e. some forms of political participation can be seen by some people as complementary activities and by some others as substitutes. For instance, individuals who engage in illegal public demonstrations tend to also be involved in legal public demonstrations, but rarely in political parties or in other kind of hierarchical institutions (Teorell et al., 2007). Hence, the fact that voter turnout and party membership are declining in Europe is not enough to conclude that political participation *in general* is declining. According to Gabriel (2002), there is no evidence of a downward trend in non-political membership and civic participation across European societies.

5. The purpose of this paper is to investigate whether or not political participation in Western Europe is being negatively impacted by the process of generational replacement. In particular, the focus is on the "legal manifest" forms of political participation in European countries. The methodology used in this paper builds on three main studies: i) Ryder (1965), who considers cohorts as the relevant unit of measurement for studying social change; ii) Ekman and Amna (2009), who provide a typology of political participation and civic engagement; and iii) Yang, Schulhofer-Wohl, Fu and Land (2008), who developed the technique of the "intrinsic estimator" to disentangle age, period and cohort effects. In this paper, we combine these ideas to investigate the change in political participation in Europe through an age, period and cohort analysis. Unlike most of the previous research on political participation, we also study a form of political participation that goes beyond formal politics, namely *extra-parliamentary political participation* or *protest behaviour*.

6. The structure of this paper is as follows. Section 2 presents the conceptual framework used in this paper, describing a typology of different forms of political participation and reviewing the literature on the determinants of political participation. Section 3 explains the empirical methodology used in the paper, describing data, the construction of the measures of political participation and their explanatory variables,

and presenting the econometric model (which is further detailed in the Annex). Section 4 discusses the results and Section 5 concludes.

2. Conceptual framework

2.1. Defining political participation

7. Most research on political participation has focused on the study of electoral politics (especially, voting turnout). Nevertheless, political participation involves a wide range of activities that vary according to the context in which it occurs (Salisbury, 1975). For the practical purposes here pursued, this paper relies on the definition coined by Kaase and Marsh (1979) and understands political participation as *"all voluntary activities by individual citizens intended to influence either directly or indirectly political choices at various levels of the political system".*

8. This definition implies that political participation goes beyond elections. Even if elections are the most popular and institutionalized means through which individuals "control" the appointment of government officials, there are certainly other, and perhaps more effective ways that allow individuals to influence or "control" government officials, their political choices and the political system. These include activities such as public demonstrations, boycotts, strikes, signing petitions and other forms of protest behaviour (Barnes and Kaase, 1979).

9. Brady (1999) defines political participation in a very similar manner, namely as "*actions by ordinary citizens directed toward influencing some political outcomes*". According to Brady, political participation has three distinctive features. First, it should refer to the *manifest* and *observable* activities that individuals voluntary engage in; second, these activities should be performed by *ordinary citizens*, which exclude members of political elites and civil servants; and third, the action should *deliberately aim to influence the people in power* and hence the political choices that affect societal issues. People in power are not only government officials, but also any powerful actors (politically and/or economically) in society such as the media and business.

10. Building on these three features, various typologies of political participation have been constructed. One of the most relevant was developed by Teorell et al. (2007). This typology consists of five categories: i) electoral participation, e.g. voting; ii) consumer participation, e.g. donating money to charity, boycotting, signing petitions and other ways of political consumption; iii) party activity, which includes membership of, voluntary work for, or donations to a political party; iv) protest activity, which consists of acts like public demonstrations and strikes; and v) contact activity, e.g. contacting organisation, politicians or government officials.

11. Even though this is one of the most accepted typologies, it is of limited relevance as it excludes "latent forms" of political participation. These, in the words of Ekman and Amna (2009), correspond to a "pre-political kind of civic and political engagement". The notion of latency refers to the fact that there are several activities that do not qualify as deliberated and explicit forms of political participation, but are nonetheless of great significance because they can ultimately lead to manifest and observable forms of political participation. For that reason, these authors propose a typology that differentiates between *latent* and *manifest* forms of political participation. These forms can also be sub-categorised in individual or collective forms of engagement and political participation.

12. To account for a most comprehensive typology, we follow the work of Ekman et al. (2009). Nevertheless, in the empirical analysis, due to the limited availability of data on latent forms of political participation, this paper will only focus on a subset of the legal manifest forms of political participation (those highlighted in bolded letters in Table 1 below).

Table 1. A Typology of political participation

Latent political participation		**Manifest political participation**		
Involvement (interest, attention)	**Engagement (action)**	**Formal**	**Extra-parliamentary (protest behaviour)**	
			Legal	Illegal
Individual Forms				
Personal interest in politics and societal issues Attentiveness to political issues (e.g. perceiving politics as important)	Activities based on personal interest in and attention to politics and societal issues (e.g. recycling, discussing politics)	Electoral participation and contact activities (e.g. **voting and contacting a government official**)	Make one's voice heard or to make a difference by individual means (e.g. **signing petitions, boycotting and other forms of political consumption**)	Politically motivated unlawful acts on an individual basis (e.g. politically motivated attacks on property)
Collective Forms				
A sense of belonging to a group or a collective with a distinct political profile or agenda Life-style related politics (e.g. identity, clothes, music, food, values)	Voluntary work to improve conditions in the local community, for charity, or to help others (outside the own family and circle of friends) (e.g. volunteering in social work, participate in community based organisation)	Organised political participation (e.g. **membership in political parties, trade unions and organisation**)	Loosely organised forms or network-based participation (e.g. new social movements, **demonstrations, strikes, and protests**)	Illegal and violent activities and protests (e.g. demonstrations, riots, squatting buildings, damaging property, confrontations with the police or political opponents)

Note: The forms of political participation that are studied in this paper are in bold.

Source: Adapted from Ekman, Joakim, and Erik Amna (2009), *Political Participation and Civic Engagement: Towards A New Typology*, Orebro University, Youth & Society.

13. Manifest political participation refers to those individual or collective activities that are directed towards influencing political decisions and political outcomes (usually by targeting the powerful elites of society). Since the objective of these activities is often clearly defined and observable, manifest political activities are easier to measure than latent political activities.

14. Manifest political participation can be further sub-divided into two main categories:

- ***Formal political participation*** includes electoral and contacting activities at the individual level, and organised political participation at the collective level. Electoral activities include, for instance, voting and participating in referenda through which individuals can express some of their political preferences and/or support some political group relative to the others; individuals can also participate in elections running for office or other official posts. Contacting activities account for situations where the individuals contact politicians or government officials with the intention of influencing their decisions. At the collective level, organised political participation takes the form of membership or support to political parties, trade unions[1] or other organisation with a specific political agenda (e.g. environmental groups, human rights advocacy groups).

[1] Trade unions are considered as manifest forms of political participation in line with the literature on the subject (see Ekman et al., 2009). While some jurisdictions make it compulsory for the worker to become member of

- ***Extra-parliamentary participation*** refers to activities that go beyond the formal political institutional framework of a country, i.e. beyond "the parliamentary sphere" (Ekman et al., 2009). While extra-parliamentary activities can be legal or illegal, this paper only focuses on the former due to the non-availability of data on the latter. Extra-parliamentary activities were once known as *unconventional* forms of political participation in relation to the formal participation that was considered as conventional. However, according to recent literature, these forms of participation are not considered unconventional anymore, neither in practice nor in the political science theory.

15. As in the case of formal participation, extra-parliamentary or protest behaviours can be identified at the individual and at the collective level. Protest activities at the individual level include political actions such as signing petitions or boycotting a product or firm. By signing petitions people express their support to a specific cause; this activity is considered as a form of "political consumption" because the individual can easily decide which cause to support or not, without a long-term engagement or commitment. Boycotting is also a form of individual political consumption, since people choose to consume or not to consume certain brands or products for political, ethical, ideological or environmental reasons. It is a type of protest that aims to influence not only politicians and government officials but also different economic and political actors, such as multinational enterprises and mass media corporations, for instance.

16. At the collective level, protest behaviour takes the form of public demonstrations, strikes and, other kinds of social movements. A characteristic of these collective forms of participation, which distinguishes them from classic political organisation, is that their structure is less hierarchical than the one prevailing in political parties or trade unions. The internal organisation of these groups tends to be horizontal and their practical activities often provide their members with a clearer sense of "doing something". According to Stolle and Hooghe (2004), these forms of participation are more emotion-driven forms of protest and mobilization and they are characterized by spontaneity, irregularity, easy exit and the possibility of shifting in and out.

17. Finally, Ekman and Amna (2009) define latent forms of political participation as those activities that, even though they are not clearly identified as "political", could lead to "clearly defined" political activities. The authors call these kinds of activities "pre-political" or "stand-by" participation, and classify them in two categories: involvement and civic engagement. While involvement is limited to those activities that express the awareness and interest of individuals in politics and societal issues, civic engagement also implies actions. Ekman and Amna (2009) define civic engagement as those activities intended to influence circumstances in society that are of relevance to others (beyond their own family and close friends). Contrary to manifest political participation, civic engagement does not target relevant political actors to determine political outcomes, but rather directly address specific societal issues.

2.2 Determinants of political participation

2.2.1. Traditional determinants of political participation

18. According to Vrablikova (2010) traditional determinants of political participation include predispositions (also known as individual-level determinants of political participation) and social networks.

19. Predispositions are both socio-economic characteristics ("first type" of predispositions) and political attitudes ("second type" of predispositions). Predispositions cover the *personal* aspects of participation; these are individual-level determinants of political participation that enclose what Verba et

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the trade union, union affiliation is a free choice in the majority of cases. In addition, by political participation it is not meant that trade unions members are necessarily linked to a political party but that they support some type of political agenda (e.g. defend workers' rights, etc.).

al. (1995) define as the "cannot do" and the "do not want to" reasons for non-participation. The "cannot do" reasons include socio-economic characteristics such as education, social class and income but also other kind of resources such as free time. For instance, Rosenstone and Hansen (2003) claim that, since political participation implies costs, people with higher levels of free time, income and skills can devote more resources to engage in politics. The "do not want to" reasons refer to political attitudes and motivations such as ideologies, values, political trust, interest in politics and beliefs on the efficacy of participation. For instance, when a person believes that she is able to influence the collective choices and political outcomes of her society, she will become more interested in politics and, consequently, more participative.

20. The other traditional determinants of political participation refer to social networks. The correlation between social networks and political participation was first highlighted by Putnam (2000). Putnam argues that networks create trust and reciprocity among individuals, and that higher levels of trust and reciprocity will lead the individual to higher levels of civic engagement and political participation. Norris (2002) explains the relationship between social networks and political participation through mobilising channels or mobilising agencies such as political parties, civic groups, associations, religious groups and media that incentivise people to participate. According to Verba et al. (1995), non-participation may be due to the lack of social networks, a sort of "nobody asked me to participate" reason. Rosenstone and Hansen (2003) have distinguished between direct and indirect forms of mobilisation channels: the former include activities like canvassing, TV campaigning, phone calls, and mails; while indirect forms take place through the social networks to which the individual belongs to. Being a member of a group implies that the individual is more agreeable to the request of participation, and exposed to peer-pressure when it comes to taking part in some activity that concerns the group. An individual can also be mobilised by their family or by playmates from the chess club, for instance.

2.2.2. Contextual determinants of political participation

21. Although traditional factors have been found to play an important role in the explanation of political participation, they do not provide all the pieces to the whole. According to Vrablikova (2010), it is also necessary to introduce the contextual perspective, since circumstances also have a significant impact on the individual when it comes to decide whether or not to participate.

22. Building on the social movement literature, Vrablikova (2010) considers that the main contextual determinant of political participation is the Political Opportunity Structure (POS). Tarrow (1998) defines POS as a "*consistent – but not necessarily formal or permanent – dimension of the political environment that provides incentives for people to undertake collective action by affecting their expectations for success or failure*." When studying the political opportunity structure of a society, we typically want to identify the degree of "openness" of the system in order for individuals to take part in the public decisions, as well as the degree of "effectiveness" of the available channels of participation. According to Vrablikova (2010), openness and effectiveness of the system depend on the national polity characteristics, which vary with the national institutional setting and national political culture. Therefore, two main approaches have been constructed to explain the idea of political opportunity structure: the formal political institutions and the "prevailing strategies" (Kriesi et al., 1995).

23. The POS determinants might look very close to the political attitudes determinants (second type of predispositions). However, while POS refers to an actual structure of the political system that could impact upon political participation, the second type of predisposition refers to attitudes, motivations and beliefs that might be (or not) justified by the actual political structure. It seems likely that there is a correlation between these two kinds of determinants since the "actual political structure" (POS) might generate or reinforce some individuals beliefs on the efficiency of the political system; or, conversely, the political attitudes and beliefs of the citizens might have shaped these institutions. For practical purposes,

we define the effects of POS on political participation as those that come from the incentives generated by the actual and objective political structure; while the effects associated to political attitudes would be those that come from beliefs and motivations that do not correspond to, nor are the consequence of, the POS.

24. The political institutions perspective explains the openness of the political system through the "state's strength". A weak state does not centralize too much power, has a more limited capacity to act and is characterised by a greater degree of formal participation channels. Thus, a weak state provides more possibilities to participate and influence political choices. This context will lead to a higher level of manifest political participation, and particularly to higher levels of moderate types of political action. Conversely, a strong state is characterized by centralized power, with a lower degree of institutionalized channels of participation, and a higher state capacity to act. All these factors make participation more costly and reduce the levels of manifest political participation, as public demonstrations and protest action become more costly.

25. The prevailing strategies approach focuses on the cultural circumstances such as culture (collective) beliefs and practices. Prevailing strategies refer to the "*procedures that members of the political system employ when they are dealing with challengers*" (Kristi et al., 1995). These strategies can be related to the historical and cultural characteristics of the society. This framework distinguishes between exclusive and inclusive strategies. Exclusive strategies are confrontational and polarizing; they do not facilitate the engagement in politics because they do not support people who want to take part, and they do not provide the proper channels to participate, therefore leading to a lower level of manifest political participation. In addition, when people do not anticipate a positive reaction from the political system to participating in formal channels, they tend to engage in more costly and informal activities, which lead to higher levels of protesting activities. Inclusive strategies are cooperative and facilitative, i.e. they rely on non-state actors and/or non-governmental sector, they are friendlier to public engagement, and are more responsive to individual demands. All these characteristics lead to a higher level of formal political participation and a lower level of protest behaviour.

26. Other work looks at public engagement from the perspective of governments (OECD, 2009). These studies identify the conditions under which policy making can be made more inclusive (e.g. commitment, clarity, accountability, etc.) and ultimately more effective. This strand of the literature is not followed in this paper as the data sets at hand do not include measures of governance and therefore do not allow studying policy determinants of people's civic and political engagement.

2.2.3. Age, period and cohort effects as determinants of political participation

27. Finally, and as one of the main contributions of this paper, the birth-cohort is considered as an important driver of political participation; it is often through new cohorts that change occurs in societal values, attitudes, behaviours and ideas. Since the study of political participation is a time-specific phenomenon, one must identify and distinguish between the following three main time-related variations: a) Age effects; b) Period effects, and c) Cohort effects.

a) Age effects

28. Several authors have shown that there is an important causal relationship between age and political participation. In the literature, this relationship has also been called the life-cycle theory, as it explains the life cycle (age specific) effects of political behaviour.

29. Verba and Nie (1972) and Nie et al. (1974) have suggested that the political behaviour of an individual is a dynamic process in which the change in values, perceptions and resources are associated to the stage in life of each person. Since, in general, each stage of life is correlated to a certain amount of

experiences and material resources, the authors suggest that political attitudes and behaviours for a representative individual can be predicted. In particular they found, similarly to Milbrath and Goel (1977) that political participation is low at early ages, increases during adulthood until it reaches a maximum in the middle age, and finally declines in the latter stages of life.

30. This perspective is also partly shared by Norris (2003), who explains that the life cycle effects are the consequence of the experience of changing individual circumstances. Since each successive stage of life (e.g. going to school, getting a job, having kids, retiring) generates exposure to different circumstances, individual political behaviour is expected to change along the life cycle process.

31. Finally, in a further effort to clarify the role of age effects, Rosenstone and Hansen (1993) have formulated two hypotheses that explain the relationship between age and political participation: i) the life-experience hypothesis; and ii) the life-cycle hypothesis. The life-experience hypothesis claims that, as people get older, they acquire resources and experiences that will enhance their engagement and participation in the community. On the other hand, the life-cycle hypothesis suggests that political participation and social involvement will decrease in the elderly stage due to the natural physical limitations expected at this point in life. In general, the first hypothesis explains political participation with the experiences and resources acquired during the life process; whereas the second hypothesis explains participation through the physical effects of ageing.

b) Period effects

32. According to Norris (2003), period effects are the result of particular historical events that have a generalized impact on all people in a society at a specific point in time. These impacts could modify the general political behaviour in very different ways. The First World War (WWI), the Great Depression, the end of Second World War (WWII), the transition to democracy in post-Communist Europe, and the Eurozone crisis are examples of major historical events that could be expected to have a general impact on the political participation on the majority of the individuals in a specific society. Even if period effects may not be the key determinants of political participation, to the extent that they can be considered as exogenous and unpredicted by individuals, it is important to control for them whenever investigating the impact of age and/or cohort membership in political participation.

c) Cohort effects

33. Miller and Shanks (1996) and Putman (2000) have stressed the importance of generational/cohort differences to understand the evolution of civic engagement and political participation in Western societies. Similarly, Ryder (1965) explains how social change, and consequently change in political participation, could take place due to a process of generational replacement (new birth-cohorts replacing older ones). Nevertheless, it is not clear how and why new birth-cohorts are or could be significantly different from the older ones in their attitudes, beliefs and behaviour.

34. To address this issue, several authors have made use of traditional theories of socialization. These theories argue that persistent habits of political behaviour are acquired during the individual's formative years, e.g. in family and school (Norris, 2003). Inglehart (1971, 1977), Barnes and Kasse (1979) and Dalton (1988) also appeal to this process of political socialisation to explain differences in political behaviour across cohorts, arguing that this process takes place predominately through shared historical experiences in people's formative years. One of the assumptions shared by these approaches is that the values, beliefs and behaviours held by distinct generations (due to this process) do not disappear with the passage of time; on the contrary, they are persistent over people's lifetime.

35. Since socialisation experiences impact each generation differently, this creates different patterns of political participation across generations. One very well-known example is the political socialisation experienced by older cohorts before and after the WWII, which generated what Putnam (2000) defined as "the long civic generation".

36. In sum, the cohort effects reflect the impact of the different socio-political and economic context in which the process of socialisation takes place for each cohort in people's formative years. Since these contextual environments are continuously changing, each generation reflects a characteristic political behaviour that could be captured through the cohort effects.

3. Empirical strategy

37. The main goal of the empirical analysis is to study the age, period and cohort effects of political participation. To do this, we first construct our dependent variables, which consist of three different measures of political participation relating to: i) Manifest political participation; ii) Formal political participation; and iii) Extra-parliamentary political participation. Accordingly to the literature reviewed in the previous section, we then build various explanatory variables to account for the different determinants of political participation, which include our variables of interest, i.e. the Age-Period-Cohort (APC) variables. Finally, using the same set of explanatory variables in each specification, we estimate three regressions models, one for each of the aforementioned types of political participation.

38. To disentangle age, period and cohort effects, we make use of the technique of the intrinsic estimator developed by Yang et al. (2008) (see Annex for a detailed explanation). We apply this technique while controlling for different drivers of political participation and while weighting our data to correct for sampling errors.

3.1. Data, variables, and measures of political participation

39. The data sets used for the analysis are based on the six rounds of the European Social Survey (ESS). Each round corresponds to one of the six waves, i.e. 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, and 2012-2013. The ESS is a biennial cross-sectional survey that covers many social and subjective well-being dimensions, including values, attitudes, beliefs and some behavioural patterns of the European population. The original data set gathers information from 36 European countries during the first 12 years of the 21st century, with each of the 36 countries appearing at least once in the aforementioned time span. Given the availability of the variables of interests and the technical constraints required by our analysis, the final sample consists of 127 380 individual observations distributed across 16 countries and 6 time periods (see Table 2).

Table 2. Number of observations per country and period

Country	2002	2004	2006	2008	2010	2012	Total
Belgium	1,214	1,363	1,287	1,311	1,301	1,358	7,834
Switzerland	1,275	1,402	1,122	1,132	930	968	6,829
Germany	2,144	2,074	2,124	2,044	2,182	2,073	12,641
Denmark	1,196	1,102	1,123	1,219	1,170	1,087	6,897
Spain	1,042	1,158	1,239	1,719	1,308	1,415	7,881
Finland	1,330	1,336	1,255	1,375	1,222	1,659	8,177
France	963	1,226	1,383	1,463	1,216	1,393	7,644
United Kingdom	1,382	1,389	1,704	1,735	1,747	1,569	9,526
Hungary	1,167	1,012	1,035	1,035	1,161	1,422	6,832
Ireland	1,325	832	1,007	1,370	1,781	1,960	8,275
Netherlands	1,875	1,455	1,435	1,344	1,399	1,405	8,913
Norway	1,357	1,260	1,229	1,063	1,164	1,200	7,273
Poland	1,518	1,223	1,264	1,158	1,200	1,366	7,729
Portugal	1,063	1,393	1,449	1,438	1,375	1,411	8,129
Sweden	1,309	1,245	1,234	1,121	1,087	1,361	7,357
Slovenia	865	850	956	919	954	899	5,443
Total	21,025	20,320	20,846	21,446	21,197	22,546	127,380

Source: Authors' computations based on different waves of the European Social Survey.

3.1.1. Measures of political participation

40. In this paper, we are interested in the trends of different forms of political participation. Following the typology on political participation and civic engagement developed by Ekman and Amna (2009), we create three different indicators of political participation. We generate a variable for legal manifest political participation that includes various legal and active forms of participation; we will also refer to this variable as ***total political participation***.

41. We also define the two main sub-dimensions of manifest political participation: ***formal*** and ***extra-parliamentary political participation*** or protest behaviour (both including only legal activities).

42. The following variables (which are all dummy variables where $0 = No$ and $1 = Yes$) are used to build the different measures of political participation:

- Voted last national election ($vote$)
- Contacted politician or government official ($contplt$)
- Worked in political party or action group in the last 12 months ($wrkprty$)
- Worked in another organisation or association in the last 12 months ($wrkorg$)
- Worn or displayed campaign badge/sticker in the last 12 months ($badge$)
- Signed petition in the last 12 months ($sgnptit$)
- Taken part in lawful public demonstration in the last 12 months ($pbldmn$)

- Boycotted certain products in the last 12 months ($bctprd$)
- Member of political party ($mmbprty$)
- Member of trade union or similar organisation ($mbtru$)
- ($No\ or\ Yes, previously = 0;\ Yes\ currently = 1$)

43. Since there is no theoretical justification to value more or less any political participation activity relative to the others, the dependent variables are built as the simple mean of the pertinent above variables (see Table A. 4 in the Annex). Hence, we construct the three dependent variables of political participation as follows:

1. Legal Manifest Political Participation (or Total Political Participation) ($toparti$):

$$toparti_h = ((vote_h + contplt_h + wrkprty_h + wrkorg_h + badge_h + sgnptit_h + pbldmn_h + bctprd_h + mmbprty_h + mbtru_h)/10)$$

2. Formal Political Participation ($cpoliti$):

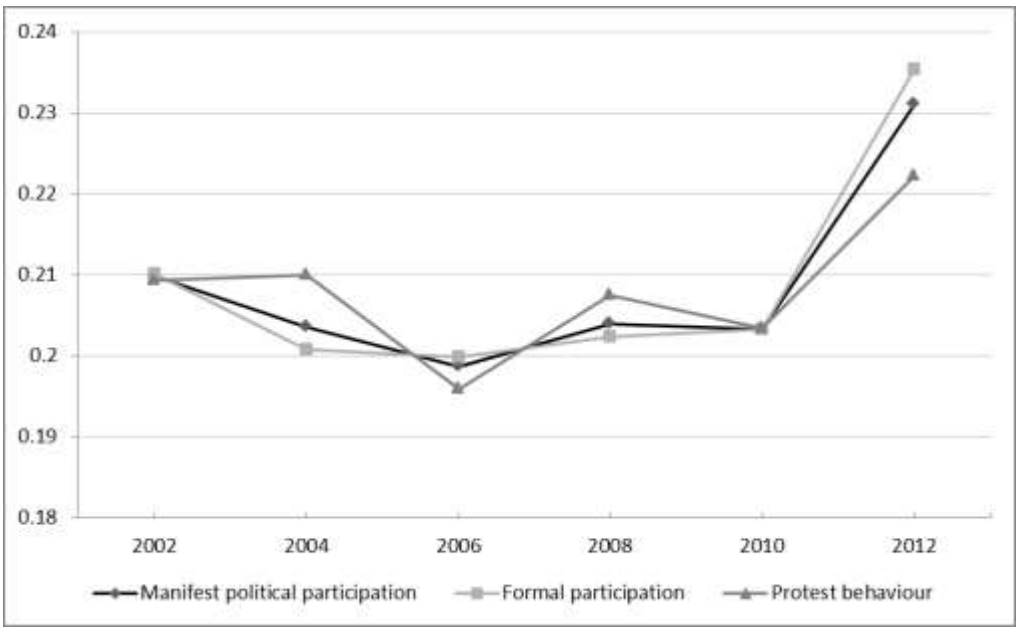
$$cpoliti_h = ((vote_h + contplt_h + wrkprty_h + wrkorg_h + badge_h + mmbprty_h + mbtru_h)/7)$$

3. Legal Extra-parliamentary Political Participation (or Legal Protest Behaviour) ($upoliti$):

$$upoliti_h = ((sgnptit_h + pbldmn_h + bctprd_h)/3)$$

$$\forall\ h \in [1, \dots, N]$$

Figure 1. Measures of political participation in Europe from 2002 to 2012



Source: Authors' calculations based on data from various waves of the European Social Survey.

44. Figure 3.1 shows the evolution of the main forms of political participation in Europe from 2002 to 2012. According to these indexes, all forms of political participation declined from 2002 to 2006, followed by a significant increase in 2012, to a level exceeding the one recorded in 2002. As discussed before, several factors may explain these changes in political participation. The specific hypothesis investigated in this paper is whether new cohorts tend to participate less than the older ones.

3.1.2. Control variables

45. The choice of control variables is based on the literature on the determinants of political participation discussed in Section 2.

46. First, individual-level determinants of political participation include education, socio-economic status and income. We control for education through the variable *Years of full-time education completed* and for social status through the variable *Responsible for supervising other employees*. We are not able to include the income variable as such, as this variable was collected for very few countries and periods of interest in the European Social Survey; however, this variable is highly and positively correlated to education and social status, which are already controlled for in the regressions.

47. Among personal characteristics, we also use the variable *Main activity (in the last 7 days)*, creating the following dummy variables: *Unemployed*, which includes unemployed people actively and non-actively looking for job; *Employed*, which consists of the response category Paid work; *Education*, which refers to the response category Students; *Housework, looking after children, etc*.; *Retired*; *Permanently sick or Disabled*; and *Other than previous* (which includes the response categories Others and Community or military service).

48. Labour market participation has in principle an ambiguous effect on political participation at the individual level. On one hand, we may expect a positive correlation between being unemployed and personal dissatisfaction with the functioning of the labour market institutions, which could make the

individual more aware of the political and economic situation of the society and could give him/her more incentives to participate. On the other hand, unemployment may also have psychological repercussions on the individual, who may feel discouraged about his/her personal situation and find it useless to participate in political processes. If the latter effect prevails, being unemployed should be associated to lower levels of political participation.

49. In addition, employed people are expected to participate more than the unemployed or the inactive due to their social connections and the group-interest that workers share in the workplace. We also expect students to participate more than the unemployed, not only because of the social connections they are likely to generate in the academic environment, but also because of the nature of education (at least in Western societies) as a mean of social change. We do not expect people whose main activity is housework to participate more or less than the unemployed, since both groups lack the social connections created in the work-place or in the educational institution.

50. We expect disabled people to be less participative in protest behaviour activities due to the physical demand of some of these activities. With respect to formal politics, disabled people who have benefitted from the health and social protection systems could have special interest in participation, not only for self-interest but also because of a reciprocal feeling toward society.

51. We use the variable *Citizen of country* to control for the restrictions that some forms of participation could have on non-citizens. We expect a positive correlation between this variable and all forms of participation. The intuition for the formal politics is straightforward, i.e. non-citizens are typically not allowed to vote in the country where they live. Regarding protest behaviour, we expect a higher participation of *citizens* due to their likely stronger ties and feelings towards the community they live in.

52. The variable *Immigrant* is constructed as a dummy variable that denotes that both parents, as well as the respondent, were born in another country. We expect less participation from immigrants in all forms of participation. For some formal forms of participation, immigrants might face legal restrictions that prevent their participation. For extra-parliamentary forms, participation is likely to be low if immigrants feel that they lack the legitimacy to protest or if their sense of belonging to the receiving country is low due to real or perceived discrimination.

53. For the variable *Gender*, we expect a positive correlation between being a man and formal political participation due to the historical lack of opportunities that women have faced to participate in formal politics. Nevertheless, the relationship between gender and extra-parliamentary forms of political participation is not straightforward; some studies on gender, civic engagement and participation (Inglehart, 2003; Micheletti, 2004) have argued that women tend to participate through more direct and less hierarchical forms. Hence, when controlling for activities that decrease participation in general, like housework or low education, that might be correlated to being a woman, women could be found to undertake more protest activities than men.

54. We also take into account households characteristics since family composition may shape individual's social connections and therefore political participation. For this, we use the variable, *Lives with husband/wife/partner at household grid*.

55. We also control for the fact of having children. Based on the literature that explains participation as a function of resources (e.g. time), we would expect that having children decreases political participation. However, from the social capital theory, we would expect that having children increases the awareness and engagement of the individual in societal and political issues. Overall, we expect that the social capital effect of having children would be higher that the resources constraints that a child could

impose. To control this, we created the variable, *Number of children (son/daughter/step/adopted) younger than 18 year's old living in household grid*.

56. The traditional determinants of political participation also include social networks and social capital. More precisely, social capital theory predicts a positive relation between trust, social connections, human contacts and political participation. To control for levels of trust, we distinguish between two kinds of trust: trust in people and trust/confidence in institutions. From the ESS, we construct an indicator of "trust in people", applying a Principal Component Analysis (PCA) to the three variables: *Most people can be trusted or you can't be too careful*; *Most people try to take advantage of you, or try to be fair*; *Most of the time people are helpful or mostly looking out for themselves*. To control for "trust/confidence in institutions", a PCA is applied to the three variables *Trust in the legal system*; *Trust in the police*; and *Trust in politicians* into one figure. Social connections are proxied with the variable: *How often do you socially meet with friends, relatives or colleagues*. Finally as a proxy of personal contacts/resources, we used the variable: *Having anyone to discuss intimate and personal matters with*.

57. Both the traditional and contextual drivers of political participation include social attitudes. These attitudes could be related to cohort effects but not necessarily so. In this paper, we control for three types of social attitudes. The first is captured by the variable: "*It is important to help people and care for others' well-being"*, where we expect to observe a positive relationship with political participation, since caring more about others is likely to imply giving more importance to the collective decisions and public policy. A positive answer to this question may denote a certain degree of altruism and therefore indicate a higher willingness to participate to improve society's well-being.

58. We also control for the variable "*It is important to make own decisions and be free",* which captures the value that people give to empowerment and to freedom of choice. We expect a positive correlation between this variable and all the forms of participation studied.

59. We use the variable "*It is important to do what one is told and follow rules"* to control for people who give a lot of weight to rules and just follow the established order; we expect the impact of this variable to be negative for extra-parliamentary forms of participation. Even if these forms of participation are not illegal, they do imply a form of protest against the established political system.

60. Finally, we use the variable *Country* to control for contextual determinants of political participation, which may capture the effect of some characteristics of political institution such as the electoral system, e.g. whether voting is compulsory, frequency of elections, whether is a two round election, etc., as well as the political culture of the country.

61. It should be noted that some of the control variables used in our regression models might be endogenous, especially the ones related to social capital and social attitudes (for example, do social connections increase political participation or does political participation increase social connections?) Despite this possibility, it is also very likely that excluding one of these variables might generate omitted variable bias. Since the variables of interest "Age", "Period" and "Cohort" are very unlikely to be endogenous, and since we prefer to have more precision in their coefficients, we include controls even if they might bring problems of reverse causality. Therefore, the relationships estimated for some of these controls in the model have to be interpreted as mere associations rather than as causal pathways.

3.1.3. Age, period and cohort variables

62. To study the age, period and cohort effects of political participation, we create dummy variables for groups of individuals based on their age, the period in which they responded the survey, and their year of birth (birth-cohorts).

63. Contrary to other studies (Grasso, 2014; Smets and Neundorf, 2014), this paper does not build cohort variables based on any theoretical categorization of "generations". As Spitzer (1973) has emphasized, there is always a problem in the delimitation of generations and on where to apply the "cuts" to define a cohort, which might result in inaccuracies and misspecifications. In this paper, we define age, period and cohort groups in the most possible detailed way allowed by the biennial structure of the ESS.

64. More precisely, since our data consists of the 2002, 2004, 2006, 2008, 2010 and 2012 waves of the ESS, we construct 31 birth-cohort groups, each one defined by two subsequent years of birth (1933-1934 is the first birth-cohort, and 1993-1994 is the last birth-cohort). We also define 26 age groups, the first age group being the one from 18 to 19 years old and the last one from 68 to 69 years old. Finally, we construct 6 period groups that will account for the year where the survey was held (see Annex for more details).

65. This structure allows us to study the effect of generational replacement on political participation in a smooth way, as well as minimising the errors produced by an inaccurate aggregation of individuals with different years of birth. In sum, we will study the effect that belonging to a younger cohort has on different forms of political participation compared to older cohorts, all this without following any a priori assumption or definition of "generations".

3.2. Empirical specification

66. We want to solve the following general model, where Y is the vector of any of our dependent variables of political participation (dimension $N \times 1$); $\bar{X}$ (dimension $N \times [2a + 2p - 4]$) is the structure of dummy variables describing age (a), period (p) and cohort (k) membership as in the APC accounting model presented in the Annex; Z is the matrix of dimension $N \times [z + 1]$ to account for z control variables and the intercept; B (dimension $1 \times 2a + 2p + z - 3$) is the vector of coefficients to be estimated, and ε is the vector of residuals (dimension $N \times 1$). T is the matrix containing $\bar{X}$ and Z (dimension $N \times [2a + 2p + z - 3]$).

$$Y = [\bar{X} \quad Z]B + \varepsilon$$

$$Y = TB + \varepsilon$$

67. As explained in the annex, the model cannot be estimated through OLS. However, using the technique of the intrinsic estimator we are able to obtain the vector of coefficients B_{IE}.

68. Using the technique of the intrinsic estimator and the method of maximum likelihood to solve the following generalised linear models, we are able to explain three types of individual political participation as a function of different controls and of the age, period and cohort variables.

$$Manifest\ Political\ Participation_h = \alpha_{i_h} + \beta_{j_h} + \gamma_{k_h} + Z\theta + \varepsilon_h$$

$$Formal\ Participation_h = \dot{\alpha}_{i_h} + \dot{\beta}_{j_h} + \dot{\gamma}_{k_h} + Z\dot{\theta} + \sigma_h$$

$$Protest\ Behavior_h = \ddot{\alpha}_{i_h} + \ddot{\beta}_{j_h} + \ddot{\gamma}_{k_h} + Z\ddot{\theta} + \tau_h$$

69. Since we have $a = 26$ age groups and $p = 6$ periods, we obtain $[a + p - 1] = k = 31$ cohorts, with $i = 1, \dots, a = 26$; $j = 1, \dots, p = 6$; $k = 1, \dots, a + p - 1 = 31$; and $h = 1, \dots, N = 127380$. Finally, θ is the vector of coefficients of dimension $[z + 1] \times 1$; ε_h, σ_h and τ_h represent the error term in the

respective model; while α_{i_h}, β_{j_h} and γ_{k_h} account for the age i, period j and cohort k effects, respectively, of the individual h.

4. Results

70. The results from the three empirical specifications are presented in Table 3. Most of the variables included in the models are statistically significant at 1% level. The first model, where the dependent variable is the most comprehensive one, i.e. "total political participation", is the one best fitted by our selected explanatory variables (with an adjusted R-squared of 0.19).

71. The first model (Table 3, column 1) suggests that both higher trust in people and in institutions are positively correlated to our index of total political participation. The coefficient of the former is twice as large as the one of the latter.

72. A positive association is also found between social connections (the frequency at which people meet their friends and relatives) and manifest political participation, as well as between personal contacts (the ability to have someone to discuss about intimate matters) and total political participation. These results are in line with the theories that suggest that social networks and social capital are important drivers of political participation.

73. Manifest political participation also varies substantially with the personal characteristics of the individual. For instance, higher education and higher job responsibility (the latter being our proxy of higher socio-economic status) are associated with higher total participation in politics, confirming the view that "better-off" people have more material and non-material resources to devote to political and civic activities. According to our estimates, men tend to participate more than women in manifest political activities, as well as do people living with their partner and people with children. We also find that employed students and retired people all participate more than the unemployed, while there is no difference between house workers and unemployed. Native people also tend to participate more than immigrants. In general, all these findings seem to confirm the view that labour market participation, as well as social and cultural integration, are important contributors to active political participation. Finally, other-regarding people also participate more in political activities, as well as people who believe in self-empowerment and in political freedom. Conversely, those who believe that one should follow rules and do what one gets told tend to participate less.

74. The models that distinguish between formal and non-formal types of political participation point to broadly consistent patterns. Higher social capital and networks are associated to higher levels of formal and extra-parliamentary participation. One of the most remarkable exceptions is represented by the variable 'confidence in institution', a variable that is associated positively to formal political participation and negatively to protest behaviour. Another difference relates to gender. Men show a stronger tendency to formal political participation, while women tend to be more engaged in protest behaviour. There are no differences concerning the impact of the three attitudes examined here (altruism, freedom of choice, follow rules) on the different forms of political participation. Similarly, both labour market situation (except for disabled people) and immigrant status affect formal and non-formal participation in a similar direction, although the effects have different magnitudes. Finally, the impact of country-fixed effects depends on the type of participation considered, with French people being, in general, much more likely to participate in protest behaviour than people living in other European countries.

Table 3. Estimates of the effect of different variables on various types of political participation

Type of Variable	Variable	General Political Participation (1)	Formal Political Participation (2)	Protest Behaviour (3)
Social Capital	Trust in People	0.0067135***	0.0046818***	0.0113305***
	Confidence in Institutions	0.0030423***	0.0084023***	-0.0089001***
	Social Connections	0.0066258***	0.0061717***	0.0076794***
	Personal Relationships	0.0142353***	0.0122925***	0.0187199***
Human Capital	Level of Education	0.0102984***	0.0085061***	0.0143206***
	High responsibility Job	0.0008253**	0.0015139***	-0.0007269
Personal/Household Characteristics	Gender	0.0113641***	0.0205952***	-0.0093593***
	Lives with a Partner in household	0.0101394***	0.0137864***	0.0017014
	Number of children in household	0.0038518***	0.0040832***	0.0034147***
Ideology	Important to help people and care for others well-being	0.0060843***	0.0054845***	0.0074504***
	Important to make own decisions and be free	0.0016057***	0.0004885**	0.0040711***
	Important to do what is told and follow rules	-0.0044267***	-0.0018828***	-0.010129***
Main activity Status (Reference: Unemployed)	Employed	0.026048***	0.034351***	0.0075135**
	Student	0.049674***	0.0375636***	0.0771104***
	Housework	-0.00311	-0.0005866	-0.0085322**
	Retired	0.0160311***	0.0192337***	0.0087393**
	Disable	0.0013658	0.0059086*	-0.0088782*
	Other than previous activities	0.0370989***	0.0378056***	0.0358545***
Civic Status	Citizen	0.0628995***	0.0815716***	0.023085***
	Immigrant	-0.036894***	-0.0334899***	-0.0441921***
Country Effects (Reference: France)	Belgium	0.0209802***	0.0792307***	-0.1108136***
	Switzerland	0.0034106	0.0013728	0.0081375
	Germany	0.00000484	0.0151476***	-0.0346868***
	Denmark	0.0533956***	0.1079735***	-0.0703778***
	Spain	0.0099172***	0.0297409***	-0.0359097***
	Finland	0.066319***	0.1201251***	-0.055444***
	United Kingdom	-0.0270034***	-0.0155854***	-0.0525594***
	Hungary	-0.0720764***	-0.0135931***	-0.2049746***
	Ireland	-0.0184705***	0.0261578***	-0.1199331***
	Netherlands	-0.0316138***	0.0199167***	-0.1488471***
	Norway	0.0727162***	0.1218677***	-0.0382643***
	Poland	-0.0660348***	-0.0182714***	-0.1747602***
	Portugal	-0.0465913***	-0.0000409	-0.1532611***
	Sweden	0.0897528***	0.1179619***	0.0252671***
	Slovenia	-0.0582285***	0.0005821	-0.1918523***

Table 3. Estimates of the effect of different variables on various types of political participation (cont.)

Type of Variable	Variable	Manifest Political Participation	Formal Political Participation	Protest Behaviour
Age Effects	18-19	-0.0627714***	-0.0684867***	-0.0463062***
	20-21	-0.0368358***	-0.0389666***	-0.0292165***
	22-23	-0.0325093***	-0.0379691***	-0.0179726***
	24-25	-0.0305248***	-0.0329894***	-0.0238684***
	26-27	-0.0225739***	-0.0258326***	-0.0145768***
	28-29	-0.0240036***	-0.0257088***	-0.0200733***
	29-31	-0.0164406***	-0.0198493***	-0.0092174**
	32-33	-0.0046144*	-0.0080959***	0.0024262
	34-35	-0.0007855	-0.0013092	-0.0005935
	36-37	-0.0046506*	-0.0048287*	-0.0061986
	38-39	-0.0005198	0.0005076	-0.0046115
	40-41	0.0084975***	0.0080387***	0.0079111*
	42-43	0.0159245***	0.0166449***	0.0126342***
	44-45	0.0142288***	0.0133685***	0.0141869***
	46-47	0.021619***	0.0214211***	0.0202701***
	48-49	0.0158267***	0.0185831***	0.0080694**
	50-51	0.0263962***	0.0287344***	0.0196595***
	52-53	0.022273***	0.0259102***	0.0125241***
	54-55	0.0194387***	0.0230879***	0.010086**
	56-57	0.0218728***	0.0255657***	0.0130895***
	58-59	0.0160021***	0.0181892***	0.0107068***
	60-61	0.0191173***	0.0203937***	0.0166141***
	62-63	0.0129439***	0.0169211***	0.0054064
	64-65	0.0067603**	0.0078178***	0.0060918
	66-67	0.0113634***	0.012626***	0.0108843**
	68-69	0.0039656	0.0062267*	0.0020744
Period Effects	2002	0.0077617***	0.0054405***	0.0128628***
	2004	0.0019561**	-0.002327**	0.0116569***
	2006	-0.010582***	-0.0096152***	-0.0130918***
	2008	-0.0086628***	-0.009617***	-0.0066607***
	2010	-0.0085275***	-0.0078269***	-0.0103481***
	2012	0.0180545***	0.0239456***	0.0055809***

Table 3. Estimates of the effect of different variables on various types of political participation (cont.)

Type of Variable	Variable	Manifest Political Participation	Formal Political Participation	Protest Behaviour
Cohort Effects	1933-1934	0.015934**	0.0273294***	-0.0136373
	1935-1936	0.0014997	0.0139898***	-0.0302192***
	1937-1938	0.0195723***	0.0269744***	0.0003763
	1939-1940	0.0217272***	0.0239447***	0.0148314***
	1941-1942	0.0163023***	0.0189419***	0.0087915*
	1943-1944	0.0205646***	0.0231706***	0.0144776***
	1945-1946	0.0182397***	0.0202302***	0.013727***
	1947-1948	0.0192987***	0.0189558***	0.0206557***
	1949-1950	0.0118059***	0.0130197***	0.0105688***
	1951-1952	0.0136835***	0.0126486***	0.0175054***
	1953-1954	0.0138547***	0.0119569***	0.01983***
	1955-1956	0.013452***	0.0113709***	0.0206412***
	1957-1958	0.009966***	0.0059587**	0.0216395***
	1959-1960	0.0031327	-0.0016948	0.0167639***
	1961-1962	0.0009484	-0.0034571	0.0138278***
	1963-1964	0.0017921	-0.0027471	0.0151467***
	1965-1966	-0.0017689	-0.0051605**	0.0086684*
	1967-1968	-0.008724***	-0.014492***	0.0068801
	1969-1970	-0.0135827***	-0.0146588***	-0.0086425*
	1971-1972	-0.0131194***	-0.014901***	-0.0066629
	1973-1974	-0.0106022***	-0.013542***	-0.0019485
	1975-1976	-0.0103991***	-0.0165596***	0.0048867
	1977-1978	-0.0144746***	-0.0158053***	-0.0101223**
	1979-1980	-0.0130492***	-0.0158644***	-0.0059653
	1981-1982	-0.014349***	-0.0180206***	-0.0059678
	1983-1984	-0.0136167***	-0.0157185***	-0.0093324**
	1985-1986	-0.0180381***	-0.0145428***	-0.0272456***
	1997-1988	-0.0142591***	-0.0157953***	-0.0125136**
	1989-1990	-0.0264371***	-0.0209783***	-0.0412468***
	1991-1992	-0.0207538***	-0.0095537*	-0.0496853***
	1993-1994	-0.0085999	-0.0149997*	-0.0060286
Intercept	Constant	-0.1083726***	-0.1331319***	-0.0550014***
Statistics	Adj. R-squared	0.198	0.182	0.153
	Observations	127,380	127,380	127,380

Note: ***Significant at 1%, **Significant at 5%, *Significant at 10%

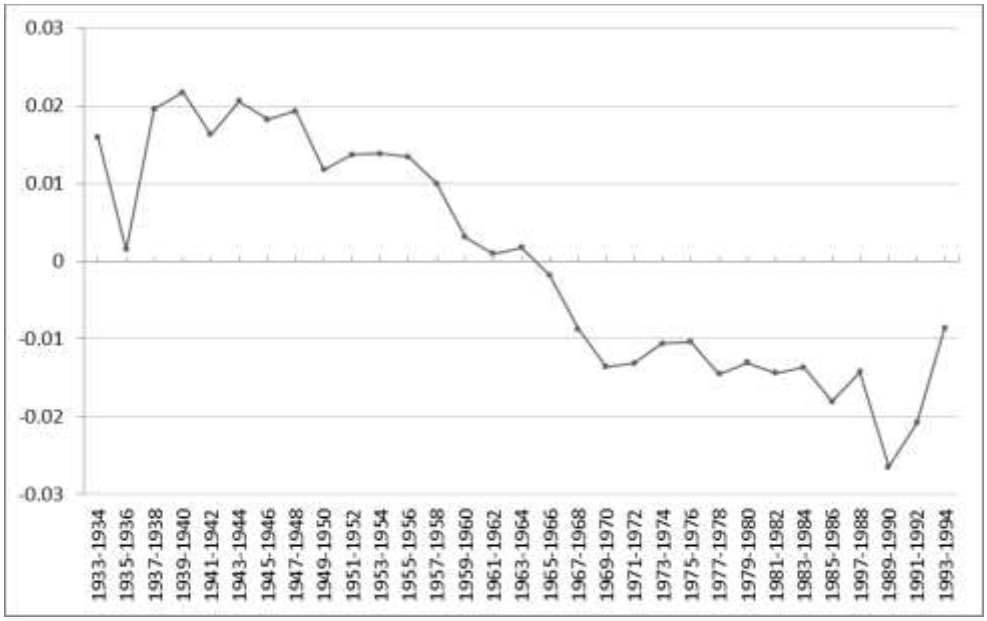
Source: Authors' calculations based on data from various waves of the European Social Survey.

Age, period and cohort effects

75. One of the goals of this paper was to contribute to the debate on whether political participation has changed across cohorts, in particular whether this is true when one looks at forms of political participation other than formal ones.

76. Our analysis finds that, in the European countries analysed, manifest political participation sharply declined among people born just after the Second World War (Figure 2). From 1948s onwards, all cohorts experience a steady decline in their participation rates, with this effect flattening out from the late '70s. Figure 2 suggests that our "grandfathers and grandmothers" were in general more politically engaged and participative than us in manifest political activities.

Figure 2. Cohort effects for manifest political participation



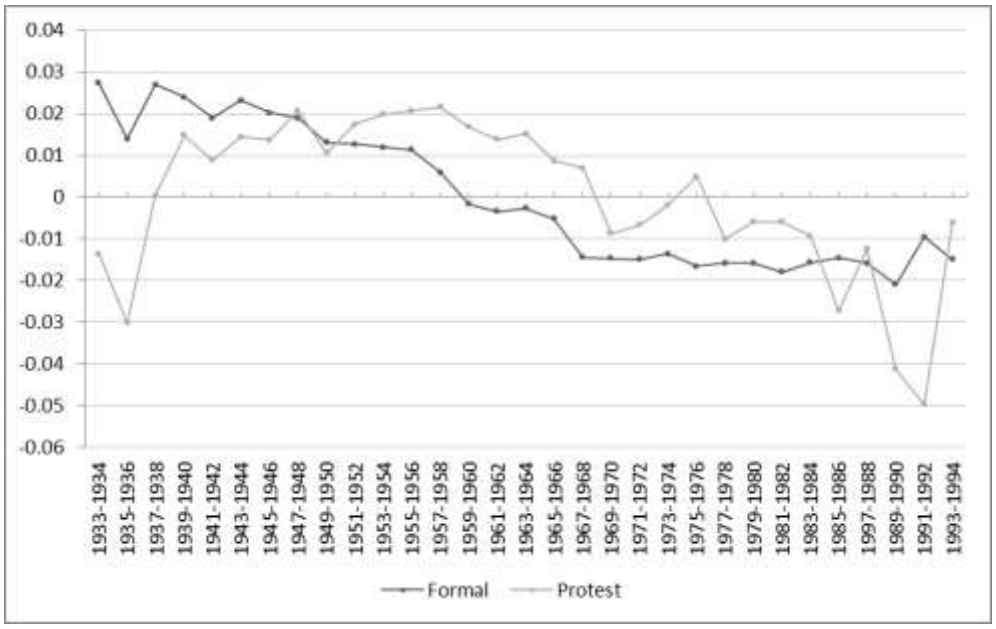
Source: Authors' calculations based on data from various waves of the European Social Survey.

77. On the other hand, when breaking down manifest political participation into formal and extra-parliamentary participation, the previous observed trend does not equally hold for both types of participation (Figure 3). In particular, cohort effects of protest behaviour are less clear cut, as the underlying pattern is more erratic than the one emerging from formal political participation. As shown in Figure 3, in contrast with the cohort effects of formal political participation, most of the cohort effects of protest behaviour (from 1967-1968 to 1981-1982) are not (statistically) significantly different from zero.

78. These results shed some light on the emerging substitutes' hypothesis, which states that traditional forms of political participation are being replaced by new ones (Stolle, 2005). Recent studies have explained the declining social capital and formal political participation through the process of post-modernisation and post-materialistic values. This process has produced cohorts of *critical citizens* who embrace "democratic values" (Inglehart, 1997, 1999) but replace formal participation with non-traditional, non-hierarchical and more spontaneous forms of political participation (as protest behaviour activities, Hustinx and Lammertyn, 2003). We found a very small replacement of formal participation with protest behaviour activities for the birth-cohorts from 1951-1952 to 1965-1966. This is however too limited (in

size and time) to corroborate the hypothesis of the emerging substitutes, i.e. that new forms of political participation emerge over time to compensate for declining formal engagement of younger cohorts.

Figure 3. Cohort effects for formal political participation and protest behaviour

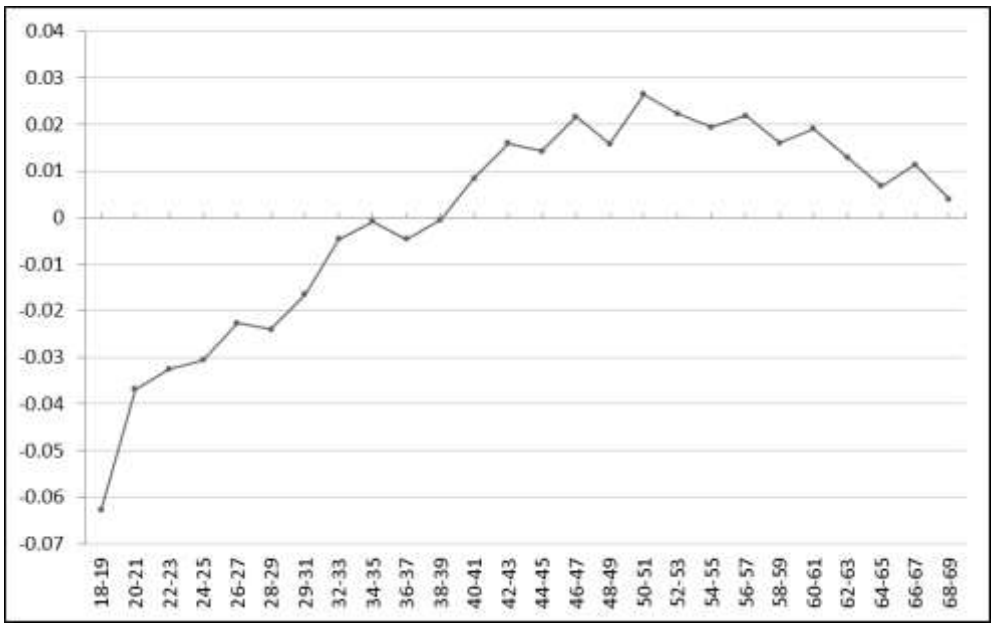


Source: Authors' calculations based on data from various waves of the European Social Survey.

79. In general, both formal participation and protest behaviour seem to have declined among younger birth-cohorts. Another possible explanation for this pattern, based on the political socialisation theory, is that these cohorts experienced a political socialisation process in a new and more hostile society, especially for the young. In this hypothesis, economic risk and uncertainty have put these generations in a situation where their main concern is to secure their immediate future, leaving no much room for politics. Since these socialisation processes are assumed to be persistent when experienced during early ages, it is likely that these cohorts will not find political participation as a priority compared to their own career and security even at older ages.

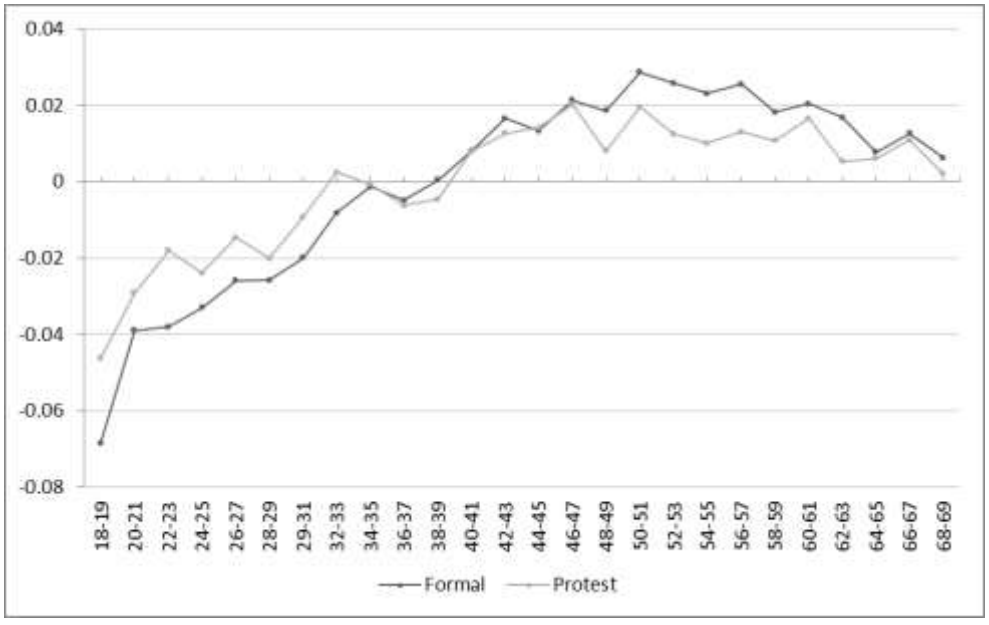
80. The cohort pattern contrasts sharply with the life-cycle one, where political participation increases with age, although not indefinitely (Figure 4). This life-cycle pattern is close to an inverted U-shape relationship, supporting the intuition of Rosenstone and Hansen (1993) about the co-existence of a life experience effect (driving up political participation through additional resources and experiences accumulated) and a life cycle one (driving it down due to physical limitations). There are no significant differences between the age pattern of formal political participation and that of protest behaviour, although the profile for protest behaviour is higher at younger ages than in the case of formal political participation, while the converse is true at older ages (Figure 5).

Figure 4. Age effects for manifest political participation



Source: Authors' calculations based on data from various waves of the European Social Survey.

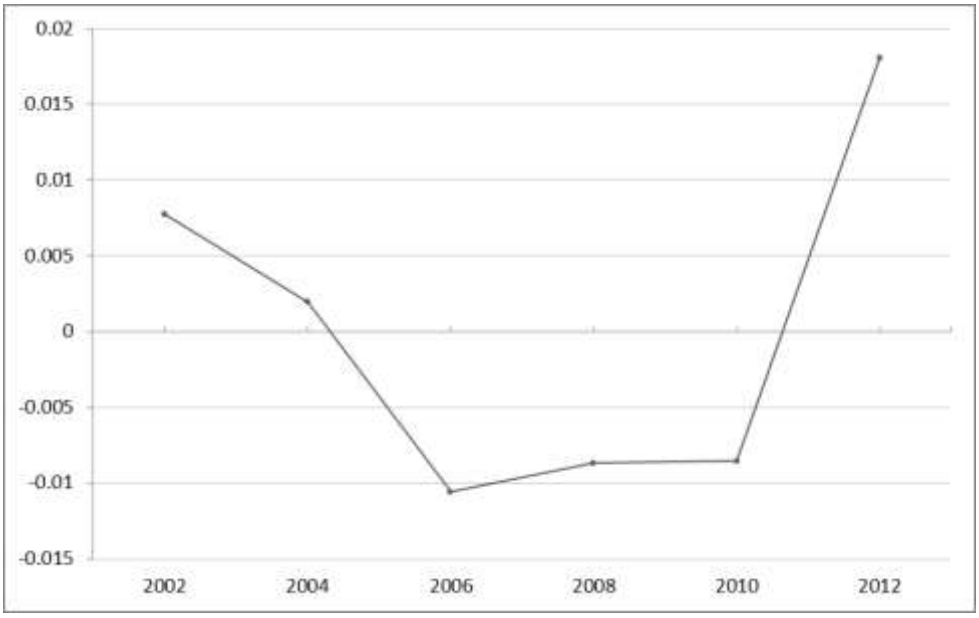
Figure 5. Age effects for formal political participation and protest behaviour



Source: Authors' calculations based on data from various waves of the European Social Survey.

81. Finally, it is interesting to look at the period effects of political participation as the time span under observation includes the Great Recession and the Eurozone crisis. Recent studies have documented that trust in institutions and confidence in democracy has declined in the wake of the crisis and in response to governments' handling of the socio-economic situation that followed (OECD 2013). Figure 6 shows that the period effects of manifest political participation moved in different directions since the start of the time span, declining between 2002 and 2006, then slightly increasing between 2006 and 2010, and increasing substantially between 2010 and 2012. Manifest political participation seems to have increased significantly due to period effects in the years that followed the financial crisis. According to our results, compared to the period effects of 2010, the index of manifest political participation increased by 2.6 perceptual points due to the period effects of 2012. The period effects of 2012 are around 50% higher than those of 2002, when period effects were also positive.

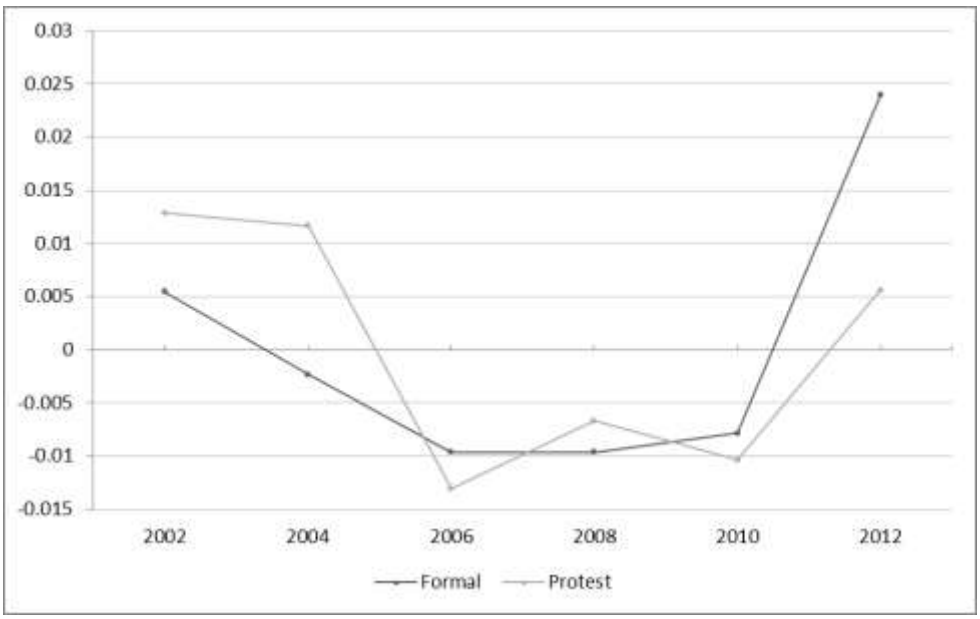
Figure 6. Period effects for manifest political participation



Source: Authors' calculations based on data from various waves of the European Social Survey.

82. In Figure 7 we break manifest political participation into formal and extra-parliamentary forms to better analyse the period effects. We observe mostly the same patterns between these forms of political engagement. However the 2012 period effects for formal participation are roughly twice as large as the ones observed for protest behaviour.

Figure 7. Period effects for formal political participation and protest behaviour



Source: Authors' calculations based on data from various waves of the European Social Survey.

5. Conclusions

83. This paper has looked at the determinants of various types of political participation. We find that the process of generational replacement is having a negative impact on political participation in European societies, as new birth-cohorts participate less than the older ones not only in terms of formal political participation but also in terms of extra-parliamentary participation (i.e. protest behaviour).

84. Overall, while the evidence in this paper shows that manifest, formal and extra-parliamentary political participation are declining among younger birth-cohorts compared to the older ones, it might still be possible that this analysis is missing other important forms of political participation. For example, along the lines of the emerging substitutes' argument, it might be possible that both formal participation and protest behaviour activities are currently being replaced by newer forms of political participation that fit better the characteristics and needs of the newer birth-cohorts. A broader research agenda is hence needed to identify new forms of political participation, notably those belonging to the "latent" or non-manifest forms of participation.

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ANNEX 1. PSEUDO PANEL DATA AND THE APC ACCOUNTING MODEL

85. From the European Social Survey we cannot construct a true panel data since the individuals interviewed in one period are not identified as the same individuals interviewed in the subsequent periods. However, we can use the cohort as a unit of analysis if we assume that the individuals sampled for one cohort at a given period are a representative sample of the cohort-population, and that, consequently, the observed cohort will keep the statistical characteristics (moments) of the true cohort-population at every period of time. This technique has been denominated, for some authors (Deaton, 1985), as a pseudo panel data. We will present our data in pseudo panel data because it is from this structure that we will deduce the Age-Period-Cohort accounting model and the Intrinsic Estimator.

86. To construct a pseudo panel data, we kept a sample of individuals from 18 to 69 years old, and with year of birth from 1933 to 1994. Since we have data from the 2002, 2004, 2006, 2008, 2010 and 2012 waves of the European Social Survey, we will able to construct 31 birth-cohort groups, each one defined by two subsequent years of birth. Being 1933-1934 (C1: Birth-cohort 1) the first birth-cohort and 1993-1994 (C31: Birth-cohort 31) the thirty-first birth-cohort. We will also have 26 age groups, each one defined by two subsequent ages. The first age group will be 18-19 years old and the twenty-sixth will be 68-69 years old. We will also construct 6 period groups that will account for the time where the survey was held, as we mentioned before the first survey took place in the 2002 and the last survey available was held in 2012.

87. We can order our data in a Cohort by Period table (groups of Age will be in the diagonal), which can be seen as an unbalanced pseudo panel data.

Table A.1. Number of observations by cohort and period in X form of political participation

Cohort		2002	2004	2006	2008	2010	2012	Total
C1	1933-1934	579	0	0	0	0	0	579
C2	1935-1936	608	635	0	0	0	0	1,243
C3	1937-1938	667	658	606	0	0	0	1,931
C4	1939-1940	720	713	721	685	0	0	2,839
C5	1941-1942	729	709	729	748	707	0	3,622
C6	1943-1944	773	753	817	807	786	758	4,694
C7	1945-1946	839	818	859	822	790	816	4,944
C8	1947-1948	905	874	922	909	884	923	5,417
C9	1949-1950	878	870	900	909	957	1,034	5,548
C10	1951-1952	926	835	853	916	881	954	5,365
C11	1953-1954	924	882	840	895	895	948	5,384
C12	1955-1956	856	877	898	932	913	997	5,473
C13	1957-1958	948	830	931	883	913	989	5,494
C14	1959-1960	984	879	894	922	932	1,066	5,677
C15	1961-1962	966	929	985	990	955	971	5,796
C16	1963-1964	1,011	950	956	957	873	970	5,717
C17	1965-1966	1,025	952	994	996	967	1,047	5,981
C18	1967-1968	964	908	918	970	921	961	5,642
C19	1969-1970	906	889	917	927	954	972	5,565
C20	1971-1972	904	839	906	924	858	967	5,398
C21	1973-1974	785	770	834	894	792	858	4,933
C22	1975-1976	701	769	829	845	879	912	4,935
C23	1977-1978	723	744	686	844	754	894	4,645
C24	1979-1980	700	706	749	800	805	802	4,562
C25	1981-1982	620	704	681	771	745	813	4,334
C26	1983-1984	384	555	606	672	645	761	3,623
C27	1985-1986	0	272	540	630	721	712	2,875
C28	1997-1988	0	0	275	560	665	737	2,237
C29	1989-1990	0	0	0	238	630	754	1,622
C30	1991-1992	0	0	0	0	375	633	1,008
C31	1993-1994	0	0	0	0	0	297	297
Total		21,025	20,320	20,846	21,446	21,197	22,546	127,380

88. As established by Yang (2008), we can also present our data in a table with groups of Age in the rows, Period in the columns and Cohorts in the diagonal. Each cell contains several individual observations that represent the age-per-period group or cohort-per period group population.

Table A.2. Data structure for the APC analysis

Age	2002	2004	2006	2008	2010	2012
18-19	1983-1984 (C26)	1985-1986 (C27)	1997-1988 (C28)	1989-1990 (C29)	1991-1992 (C30)	1993-1994 (C31)
20-21	1981-1982 (C25)	1983-1984 (C26)	1985-1986 (C27)	1997-1988 (C28)	1989-1990 (C29)	1991-1992 (C30)
22-23	1979-1980 (C24)	1981-1982 (C25)	1983-1984 (C26)	1985-1986 (C27)	1997-1988 (C28)	1989-1990 (C29)
24-25	1977-1978 (C23)	1979-1980 (C24)	1981-1982 (C25)	1983-1984 (C26)	1985-1986 (C27)	1997-1988 (C28)
26-27	1975-1976 (C22)	1977-1978 (C23)	1979-1980 (C24)	1981-1982 (C25)	1983-1984 (C26)	1985-1986 (C27)
28-29	1973-1974 (C21)	1975-1976 (C22)	1977-1978 (C23)	1979-1980 (C24)	1981-1982 (C25)	1983-1984 (C26)
30-31	1971-1972 (C20)	1973-1974 (C21)	1975-1976 (C22)	1977-1978 (C23)	1979-1980 (C24)	1981-1982 (C25)
32-33	1969-1970 (C19)	1971-1972 (C20)	1973-1974 (C21)	1975-1976 (C22)	1977-1978 (C23)	1979-1980 (C24)
34-35	1967-1968 (C18)	1969-1970 (C19)	1971-1972 (C20)	1973-1974 (C21)	1975-1976 (C22)	1977-1978 (C23)
36-37	1965-1966 (C17)	1967-1968 (C18)	1969-1970 (C19)	1971-1972 (C20)	1973-1974 (C21)	1975-1976 (C22)
38-39	1963-1964 (C16)	1965-1966 (C17)	1967-1968 (C18)	1969-1970 (C19)	1971-1972 (C20)	1973-1974 (C21)
40-41	1961-1962 (C15)	1963-1964 (C16)	1965-1966 (C17)	1967-1968 (C18)	1969-1970 (C19)	1971-1972 (C20)
42-43	1959-1960 (C14)	1961-1962 (C15)	1963-1964 (C16)	1965-1966 (C17)	1967-1968 (C18)	1969-1970 (C19)
44-45	1957-1958 (C13)	1959-1960 (C14)	1961-1962 (C15)	1963-1964 (C16)	1965-1966 (C17)	1967-1968 (C18)
46-47	1955-1956 (C12)	1957-1958 (C13)	1959-1960 (C14)	1961-1962 (C15)	1963-1964 (C16)	1965-1966 (C17)
48-49	1953-1954 (C11)	1955-1956 (C12)	1957-1958 (C13)	1959-1960 (C14)	1961-1962 (C15)	1963-1964 (C16)
50-51	1951-1952 (C10)	1953-1954 (C11)	1955-1956 (C12)	1957-1958 (C13)	1959-1960 (C14)	1961-1962 (C15)
52-53	1949-1950 (C9)	1951-1952 (C10)	1953-1954 (C11)	1955-1956 (C12)	1957-1958 (C13)	1959-1960 (C14)
54-55	1947-1948 (C8)	1949-1950 (C9)	1951-1952 (C10)	1953-1954 (C11)	1955-1956 (C12)	1957-1958 (C13)
56-57	1945-1946 (C7)	1947-1948 (C8)	1949-1950 (C9)	1951-1952 (C10)	1953-1954 (C11)	1955-1956 (C12)
58-59	1943-1944 (C6)	1945-1946 (C7)	1947-1948 (C8)	1949-1950 (C9)	1951-1952 (C10)	1953-1954 (C11)
60-61	1941-1942 (C5)	1943-1944 (C6)	1945-1946 (C7)	1947-1948 (C8)	1949-1950 (C9)	1951-1952 (C10)
62-63	1939-1940 (C4)	1941-1942 (C5)	1943-1944 (C6)	1945-1946 (C7)	1947-1948 (C8)	1949-1950 (C9)
64-65	1937-1938 (C3)	1939-1940 (C4)	1941-1942 (C5)	1943-1944 (C6)	1945-1946 (C7)	1947-1948 (C8)
66-67	1935-1936 (C2)	1937-1938 (C3)	1939-1940 (C4)	1941-1942 (C5)	1943-1944 (C6)	1945-1946 (C7)
68-69	1933-1934 (C1)	1935-1936 (C2)	1937-1938 (C3)	1939-1940 (C4)	1941-1942 (C5)	1943-1944 (C6)

89. If we obtain the average political participation of each cell, using the individual information on political participation we will be able to construct the APC accounting classification model.

90. From this structure we can describe the age group, period and cohort of each individual in our sample. To account the effects age, period and cohort membership we have to create dummy variables for each Age, Period and Cohort we include in our analysis. Since we have $a = 26$ age groups and $p = 6$ periods, we will obtain $[a + p - 1] = k = 31$ cohorts. We need a reference group for each age, period and cohort group of variables, then we will obtain a matrix of regressors X of dimension $ap \times [2a + 2p - 4] = 156 \times 60$ and rank $r = 59$. Then, using the structure of matrix X we can follow the algorithm described below to apply the IE.

The intrinsic estimator for age-period-cohort analysis

91. The Age-Period-Cohort (APC) Analysis has widely contributed to the study of time-specific phenomena in the Social Sciences (Yang et al., 2008.)

92. Through the APC analysis one can identify three types of time-related variation in the studied phenomenon: Age effects, linked to the nature and needs of different age groups; Period Effects, related to the time shocks that have an impact in all age groups simultaneously; and Cohort Effects, that account for the impact of being part of a group of individuals who have experienced a particular common event within the same time interval (Ryder, 1965), e.g. being part of the generation that was born in Western Europe between 1945-1947.

93. While age effects account for the development of the life cycle, period and cohort effects reflect the influences of social change. Period effects are the consequence of shifts in social, historical and cultural environments. Cohort variations can be seen as the core of social change and they might capture the effects of early life exposure to socioeconomic, behavioural and environmental factors that act persistently over time to produce differences in individual behaviour across cohorts (Ryder, 1965.)

94. The APC accounting classification model was introduced by Mason (1973) and is a general methodology for cohort analysis when age, period, and cohort effects are all relevant in our study. To measure the APC effects of a certain phenomenon, this methodology propose the use of tables of proportions (percentages, ratios, etc.) that describe the magnitude of occurrence of the studied issue (as in Tables 10, 11 and 12). This technique, even if relevant theoretically, has a major issue known as the "identification problem", which is due to the linear dependency between age, period and birth cohort ($age + birth\,cohort = period$). In other words, we have collinear regressors (age, period and cohort variables) that generate a singular design matrix of one less than full rank.

95. Let's consider the following model, which belongs to the group of Generalised Linear Model:

$$M_{ij} = \left(\sum_{l=1}^{n_{ij}} P_{ijl}\right)/n_{ij} = \mu + \alpha_i + \beta_j + \gamma_k + \varepsilon_{ij} \qquad (1)$$

where M_{ij} denotes the observed mean of my indicator of Political Participation for the ith age group ($i = 1, \dots, a$) at the jth period ($j = 1, \dots, p$). P_{ijl} is an indicator of Political Participation for the individual l in the age group i and at the period j ($l = 1, \dots, n_{ij}$). n_{ij} is the number of individuals in the ij cell. μ is the intercept; α_i denotes the effect of the ith age group (ith row effect); β_j captures the effect of the jth period (jth column effect); γ_k denotes the effect of the kth cohort (kth diagonal effect, $k = 1, \dots, [a + p - 1]$); finally, ε_{ij} represents the random error where $E[\varepsilon_{ij}] = 0$.

96. According to Yang (2008), after centring the parameters this model can be treated as a Fixed-Effects Generalized Linear Model:

$$\sum_{i=1}^{a} \alpha_i = \sum_{j=1}^{p} \beta_j = \sum_{k=1}^{a+p-1} \gamma_k = 0 \qquad (2)$$

97. After this re-parameterisation, we could create a design matrix X_I for an OLS regression, as follows:

$$Y = X_I b + \varepsilon \quad (3)$$

where Y is the vector of Means of Political Participation (of dimension, $ap \times 1$), X_I is the matrix of regressors containing dummy variables for the age, period and cohort effects we want to measure (of dimension, $ap \times [2a + 2p - 3]$). Because of the use of dummy variables and the parameterization, we need to take a reference group for the age, period, and cohort variables (three references groups in total); then, instead of having $1 + a + p + [a + p - 1]$ columns of X_I, we will have $1 + [a - 1] + [p - 1] + [a + p - 2] = 2a + 2p - 3$ columns. Finally, b will be a vector of dimension $1 \times [2a + 2p - 3]$, and ε of dimension $ap \times 1$.

$$\begin{bmatrix} M_{11} \\ \vdots \\ M_{1p} \\ \vdots \\ \vdots \\ M_{a1} \\ \vdots \\ M_{ap} \end{bmatrix} = \begin{bmatrix} 1 & 1 & \cdots & 0 & 1 & \cdots & 0 & 0 & \cdots & 1 & 0 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ 1 & 1 & \cdots & 0 & 0 & \cdots & 1 & 0 & \cdots & \cdots & 1 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ 1 & 0 & \cdots & 1 & 1 & \cdots & 0 & 1 & \cdots & \cdots & 0 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ 1 & 0 & \cdots & 1 & 0 & \cdots & 1 & 0 & 1 & \cdots & 0 \end{bmatrix} \begin{bmatrix} \mu \\ \alpha_1 \\ \vdots \\ \alpha_{a-1} \\ \beta_1 \\ \vdots \\ \beta_{p-1} \\ \gamma_1 \\ \vdots \\ \vdots \\ \gamma_{a+p-2} \end{bmatrix} + \begin{bmatrix} \varepsilon_{11} \\ \vdots \\ \varepsilon_{1p} \\ \vdots \\ \varepsilon_{a1} \\ \vdots \\ \varepsilon_{ap} \end{bmatrix}$$

98. The ordinary least squared estimator of this equation would be:

$$\hat{b} = (X_I{}' X_I)^{-1} X_I{}' Y \quad (4)$$

But, since the design matrix X_I is not of full rank, $(X_I{}' X_I)^{-1}$ cannot be obtained, hence $\hat{b}$ doesn't exist, i.e. there are an infinite possible solutions for $\hat{b}$, which lead us to the model identification problem we mentioned before.

99. Following this method it is not possible to estimate the age, period and cohort effects at the same time. Some authors have proposed to impose at least one more restriction on the coefficients (in addition to the parameterization), method known as Constrained Generalized Linear Models CGLIM. This new constraint would produce a $(X_I{}' X_I)^{-1}$ nonsingular and would allow solving the identification problem. Nevertheless, this method have three main drawbacks: 1) the selection of the constraint has to rely on side information or external assumptions, which most of the time is not available: 2) choosing different constraints produce very different estimates, which makes very difficult to arrive to general conclusions; and 3) all the just-identified models will produce the same levels of goodness of fit, then it is not possible to use these criteria to select the best constrained model.

100. In sum, the dimension of the design matrix in the APC accounting model has an impact on the estimates obtained by CGLIM. The idea of Intrinsic Estimator is to remove this influence. More precisely, the intrinsic estimator is a technique that employs a special principal components regression to remove the influence of the null space of the design matrix on the estimator. So, what is the IE doing?

101. Let's consider the following expression, where we just removed the intercept μ from Equation 1,

$$M_{ij} = \left(\sum_{l=1}^{n_{ij}} P_{ijl}\right) / n_{ij} = \alpha_i + \beta_j + \gamma_k + \varepsilon_{ij} \qquad (5)$$

$$\forall\, i, j \text{ where } i \in [1, \dots, a] \text{ and } j \in [1, \dots, p]$$

We will call X the new matrix of regressors and we will have the subsequent matrix structure:

$$\begin{bmatrix} M_{11} \\ \vdots \\ M_{1p} \\ \vdots \\ \vdots \\ M_{a1} \\ \vdots \\ M_{ap} \end{bmatrix} = \begin{bmatrix} 1 & \cdots & \cdots & 0 & 1 & \cdots & 0 & 0 & \cdots & 1 & 0 \\ \vdots & \cdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ 1 & \cdots & \cdots & 0 & 0 & \cdots & 1 & 0 & \cdots & \cdots & 1 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ 0 & \cdots & \cdots & 1 & 1 & \cdots & 0 & 1 & \cdots & \cdots & 0 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ 0 & \cdots & \cdots & 1 & 0 & \cdots & 1 & 0 & 1 & \cdots & 0 \end{bmatrix} \begin{bmatrix} \alpha_1 \\ \vdots \\ \alpha_{a-1} \\ \beta_1 \\ \vdots \\ \beta_{p-1} \\ \gamma_1 \\ \vdots \\ \gamma_{a+p-2} \end{bmatrix} + \begin{bmatrix} \varepsilon_{11} \\ \vdots \\ \varepsilon_{1p} \\ \vdots \\ \varepsilon_{a1} \\ \vdots \\ \varepsilon_{ap} \end{bmatrix}$$

$$Y = Xb + \varepsilon \qquad (6)$$

where X will be of dimension $ap \times [2a + 2p - 4]$ and b of dimension $[2a + 2p - 4] \times 1$.

102. Since the matrix X is singular of rank $[2a + 2p - 5]$ (one less than full rank) it has been proposed to get rid of the null space of X through the use of Principal Component Analysis PCA.

103. A PCA is applied on the regressors of X where, once we have obtained the normalized eigenvectors of $X'X$, we exclude $V_{\lambda=0}$ (the eigenvector associated to the eigenvalue $\lambda = 0$) to calculate the principal components of X.

104. The result would be the matrix X_{ie} of dimension $ap \times [2a + 2p - 5]$. The columns of X_{ie} are the principal components of X that correspond to the non-zero eigenvalues of $X'X$. This can be seen as obtaining a family of vectors that describe the non-null space generated by X.

105. This previous structure would be enough if we only had 1 observation in each ij age-per-period group. Nevertheless, our data set has many individual observations in each ij age-per-period group ($N = \sum_{i=1}^{a}\sum_{j=1}^{p} n_{ij} = 127380$ individual observations), as shown in Table A.3.

Table A.3. Number of observations by age and period in X form of political participation

	Period	2002	2004	2006	2008	2010	2010	Total
Age	n_{ij}	j=1	j=2	j=3	j=4	j=5	j=6	
18-19	i=1	384	272	275	238	375	297	1,841
20-21	i=2	620	555	540	560	630	633	3,538
22-23	i=3	700	704	606	630	665	754	4,059
24-25	i=4	723	706	681	672	721	737	4,240
26-27	i=5	701	744	749	771	645	712	4,322
28-29	i=6	785	769	686	800	745	761	4,546
29-31	i=7	904	770	829	844	805	813	4,965
32-33	i=8	906	839	834	845	754	802	4,980
34-35	i=9	964	889	906	894	879	894	5,426
36-37	i=10	1,025	908	917	924	792	912	5,478
38-39	i=11	1,011	952	918	927	858	858	5,524
40-41	i=12	966	950	994	970	954	967	5,801
42-43	i=13	984	929	956	996	921	972	5,758
44-45	i=14	948	879	985	957	967	961	5,697
46-47	i=15	856	830	894	990	873	1,047	5,490
48-49	i=16	924	877	931	922	955	970	5,579
50-51	i=17	926	882	898	883	932	971	5,492
52-53	i=18	878	835	840	932	913	1,066	5,464
54-55	i=19	905	870	853	895	913	989	5,425
56-57	i=20	839	874	900	916	895	997	5,421
58-59	i=21	773	818	922	909	881	948	5,251
60-61	i=22	729	753	859	909	957	954	5,161
62-63	i=23	720	709	817	822	884	1,034	4,986
64-65	i=24	667	713	729	807	790	923	4,629
66-67	i=25	608	658	721	748	786	816	4,337
68-69	i=26	579	635	606	685	707	758	3,970
Total		21,025	20,320	20,846	21,446	21,197	22,546	N = 127,380

106. In order to use all the individual-level data, the IE will be work in the following way. Let's define i_h, j_h and k_h as the i age, j period and k cohort group of the individual in observation h ($h = 1, \dots, N$). Let's define $\bar{X}$ as the matrix of age, period and cohort dummies for our entire sample, $\bar{X}$ is of dimension $N \times [2a + 2p - 4]$. Since I will use control variables for the analysis, let's define Z as the matrix of controls, Z will be of dimension $N \times [z + 1]$ to account for z controls and the intercept.

107. Now let's construct $\bar{X}_{IE}$ as follows, the row h of $\bar{X}_{IE}$ will be the row of X_{ie} corresponding to the age i_h, period j_h and cohort k_h. We will obtain a matrix $\bar{X}_{IE}$ of dimension $N \times [2a + 2p - 5]$. We can then define a matrix $\underline{\overline{X}}$ of dimension $N \times [2a + 2p + z - 4]$ which contains the vectors of the matrix $\bar{X}_{IE}$ and Z.

$$\underline{\overline{X}} = [\bar{X}_{IE} \quad Z] \qquad (7)$$

108. Then we will use the contents of $\bar{X}_{IE}$ and Z as regressors.

$$\overline{\underline{Y}} = \overline{\underline{X}}\,\phi + \psi \qquad (8)$$

where $\overline{\underline{Y}}$ is the vector of dimension $N \times 1$ containing the measures of political participation for each of the N individuals. Then the regression is run on individual-level data replacing the age, period and cohort dummies by the principal components defined according to the IE in the APC accounting model.

109. We run the regression via ML (or OLS), and we obtain:

$$\hat{\phi} = \left(\overline{\underline{X}}'\overline{\underline{X}}\right)^{-1}\overline{\underline{X}}'\overline{\underline{Y}} \qquad (9)$$

where $\hat{\phi}$ is the vector of dimension $[2a + 2p + z - 4] \times 1$ that contains the coefficients for the controls, the intercept and the coefficients associated to the principal components obtained from X (and presented in X_{ie}).

110. Since the coefficients of the principal components are not easy to interpret in terms of the age, period and cohort effects, another transformation has to be applied. From $\hat{\phi}$ we can obtain $\hat{w}$ the vector containing the estimated coefficients associated to the principal components (dimension $[2a + 2p - 5] \times 1$). Then we define V as the matrix containing the normalized eigenvectors of $X'X$ associated to the non-zero eigenvalues. V is of dimension $[2a + 2p - 4] \times [2a + 2p - 5]$. We obtain:

$$\hat{\phi}_{IE} = V\,w \qquad (10)$$

where $\hat{\phi}_{IE} = V\,w$, of dimension $[2a + 2p - 4] \times 1$, is the vector of coefficients of the age, period and cohort effects. (This vector can be described by the structure of vector b from Equation 6).

111. Finally from the re-parameterisation defined in Equation 2 we can deduce the coefficients of the reference groups used for age, period and cohort variables.

Supporting tables

Table A.4. Measures of political participation (dependent variables)

Variable Name	Variable Label	Description
vote	Voted last national election	Dummy variable (No=0, Yes=1)
contplt	Contacted politician or government official	Dummy variable (No=0, Yes=1)
wrkprty	Worked in political party or action group last 12 months	Dummy variable (No=0, Yes=1)
wrkorg	Worked in another organisation or association last 12 months	Dummy variable (No=0, Yes=1)
badge	Worn or displayed campaign badge/sticker last 12 months	Dummy variable (No=0, Yes=1)
sgnptit	Signed petition last 12 months	Dummy variable (No=0, Yes=1)
pbldmn	Taken part in lawful public demonstration last 12 months	Dummy variable (No=0, Yes=1)
bctprd	Boycotted certain products last 12 months	Dummy variable (No=0, Yes=1)
mmbprty	Member of political party	Dummy variable (No=0, Yes=1)
mbtru	Member of trade union or similar organisation	Dummy variable (No or Yes, previously=0; Yes currently=1)
cpoliti	Indicator of Formal Political Participation[2]	cpoliti=((vote + contplt + wrkprty + wrkorg + badge + mmbprty + mbtru)/7)
upoliti	Indicator of Legal Extra-parliamentary Political Participation (Legal Protest Behaviour)	upoliti=((sgnptit + pbldmn + bctprd)/3)
toparti	Indicator of Legal Manifest Political Participation[3]	toparti=((vote + contplt + wrkprty + wrkorg + badge + sgnptit + pbldmn + bctprd + mmbprty + mbtru)/10)

[2]Only for 2012, cpoliti=((vote + contplt + wrkprty + wrkorg + badge + mbtru)/6)

Only for Spain in 2012, cpoliti=((vote + contplt + wrkprty + wrkorg + badge)/5)

[3]Only for 2012, toparti=((vote + contplt + wrkprty + wrkorg + badge + sgnptit + pbldmn + bctprd + mbtru)/9)

Only for Spain in 2012, toparti=((vote + contplt + wrkprty + wrkorg + badge + sgnptit + pbldmn + bctprd)/8)

Note. Various waves of the European Social Survey.

Table A.5. Independent variables

Variable Name	Variable Label	Description
age	Age of respondent	Discrete. Values from 18 to 69.
agesup	Groups of Age (each one of 2 consecutive Ages)	Groups of Age from 18-19 to 68-69 years old.
yrbrn	Year of birth	Discrete values from 1933 to 1994.
geninf	Groups of Generation (each one of 2 consecutive years of birth)	Groups of Generation from 1933-1934 to 1993-1994 years old.
period	Year of the Survey	Five surveys have been held, each one in one of the following years: 2002, 2004, 2006, 2008, 2010, 2012.
ppltrst	Most people can be trusted or you can't be too careful	Discrete. Values from 0 to 10.
pplfair	Most people try to take advantage of you, or try to be fair	Discrete. Values from 0 to 10.
pplhlp	Most of the time people helpful or mostly looking out for themselves	Discrete. Values from 0 to 10.
trstlgl	Trust in the legal system	Discrete. Values from 0 to 10.
trstplc	Trust in the police	Discrete. Values from 0 to 10.
trstplt	Trust in politicians	Discrete. Values from 0 to 10.
peopletrust	Indicator of General Trust in People	Principal Component Analysis of ppltrst pplhlp pplfair. Values from -4.1367 to 3.5328.
trustins	Indicator of General Confidence in Institutions	Principal Component Analysis of trstlgl trstplc trstplt. Values from -3.0492 to 7.2760.
sclmeet	How often socially meet with friends, relatives or colleagues	Discrete. Values from 0 to 10.
inmdisc	Anyone to discuss intimate and personal matters with	Dummy variable (No=0, Yes=1)
eduyrs	Years of full-time education completed	Discrete. Values from 0 to 50.
jbspv	Responsible for supervising other employees	Dummy variable (No=0, Yes=1)
gndr	Gender	Dummy variable (Woman=0, Men=1)
partner	Lives with husband/wife/partner at household grid	Dummy variable (No=0, Yes=1)
nblilchildren	Number of children (son/daughter/step/adopted) under 18 years old living in household grid	Discrete. Values from 0 to 6.
solid	Important to help people and care for others well-being	Discrete values from 0 to 10.
freedom	Important to make own decisions and be free	Discrete. Values from 0 to 10.
frule	Important to do what is told and follow rules	Discrete. Values from 0 to 10.
wideunemp	Unemployed, actively and non-actively looking for job (main activity, last 7 days)	Dummy variable (No=0, Yes=1)
employed	Paid work (main activity, last 7 days)	Dummy variable (No=0, Yes=1)
student	Education (main activity, last 7 days)	Dummy variable (No=0, Yes=1)
housework	Housework, looking after children, etc. (main activity, last 7 days)	Dummy variable (No=0, Yes=1)
retired	Retired (main activity, last 7 days)	Dummy variable (No=0, Yes=1)
disable	Permanently sick or Disabled (main activity, last 7 days)	Dummy variable (No=0, Yes=1)
noactive	Other than previous (main activity, last 7 days)	Dummy variable (No=0, Yes=1)
ctzcntr	Citizen of country	Dummy variable (No=0, Yes=1)
immig	Immigrant	Respondent and their parents were not born in the country the survey was held. Dummy variable (No=0, Yes=1)
cntry	Country where the survey was held	List of 13 countries, from which we create one dummy variable for each country (See Table of countries).
dweight	Design weight	Continous. Values from 0.0016 to 5.1345.
pweight	Population size weight (must be combined with dweight)	Continous. Values from 0.1095 to 3.2090.

[1]For the variables with the scale from 0 to 10, 10 is the highest value the person assigns to the belief, opinion, perception in question.

Note. Various waves of the European Social Survey.