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An Empirical Test of the Relative Education Model in Sweden

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Abstract Numerous studies show that education has a positive effect on political participation at the individual level. However, the increase in aggregate levels of education in most Western countries over the last decades has not resulted in a corresponding increase in aggregate levels of political participation. Nie et al. (Education and democratic citizenship in America, 1996) propose the relative education model as a possible solution to this paradox. According to this model, it is not the skills promoted by education that have positive effects on political participation. Rather, education influences individuals' social status, which in turn influences political participation. The relative education model expects that the individual-level effect of an additional year of education will decrease as the mean level of education in the environment increases. This article evaluates this theory using Swedish election surveys (1985–2006) and it thus provides the first in depth evaluation of the relative education model outside the US. On voting and political participation related to political parties, support is found for the relative education model.

Keywords Political participation · Voting · Education · Political socialization · The sorting model · Relative education

The Problem

The "paradox of participation" has puzzled political scientists over the last few decades (Abramson and Aldrich 1982; Brody 1978; Leighley and Nagler 1992; McDonald and Popkin 2001; Miller 1992). The paradox is that, on the one hand,

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numerous studies show that education has a positive effect on political participation at the individual level, but that, on the other hand, increased levels of education at the macro level do not increase aggregate levels of political participation. The most promising solution to the paradox so far is provided by Nie, Junn and Stehlik-Barry (1996) (henceforth NJS),[1] who put forward the so-called relative education model.[2] According to this model, it is not the skills gained through education that have positive effects on political participation, but rather the fact that education influences individuals' social network centrality, which in turn influences political participation. Thus, NJS hypothesize that the effects of education are *relative*; what matters is an individual's position in the educational hierarchy, not one's level of education per se. Education works only as a sorting mechanism placing individuals with higher levels of education into environments that encourage political participation.

This article contributes to an emerging literature that questions the absolute effects of education on political participation (Berinsky and Lenz forthcoming; Burden 2009; Highton 2009; Kam and Palmer 2008; Luskin 1990; Persson and Oscarsson 2010; Tenn 2007). Recently, the relative education model has been a central matter of debate in this discussion (Campbell 2006, 2009; Desjardins 2008; Emler and Frazer 1999; Helliwell and Putnam 2007; Hillygus 2005; Nie and Hillygus 2001; Tenn 2005). The discussion has primarily revolved around three main questions. The first concerns the accuracy of the predictions derived from the model; are the effects of education on political participation relative or absolute? In other words, does education affect political participation through sorting processes, and if so, where and when do sorting processes operate? The second question concerns the scope of the model; can the relative education model be generalized to all forms of political participation? The third question concerns the unit of aggregation that should be used when measuring the educational environment; i.e., how the relative position in the educational hierarchy should be operationalized.

This article contributes to the discussion on the relative education model on each of these three questions. First, the model will be applied in a new context in which it is less likely to be supported. Despite the fact that the "paradox of participation" is valid in most Western countries, the relative education model has been almost exclusively tested on data from the US.[3] This article examines whether education affects political participation through sorting mechanisms in the European context as well, and if so, where and when sorting processes operate. An examination of the relative education model in the European context is provided by an analysis of data from the Swedish National Election Studies (SNES) from 1985 to 2006. Hence, this study further investigates the generalizabilty of the relative education model by providing the first in-depth country-specific analysis of the relative education model in a country other than the US. Since the level of equality and social mobility is

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[1] Although it is not referred to as 'the relative education model' the same idea is put forward already by Huckfeldt (1979) and Verba and Orren (1985, Chap. 10).

[2] The model is synonymously referred to as 'the sorting model' in the literature.

[3] Chapter 10 of NJS (1996) provides a brief investigation of effects of raised educational levels on tolerance in Europe. Campbell (2006) presents results in partial support of the sorting model on non country-specific European data.

higher in Sweden than in the US, and because the working class movement constitutes an influential alternative pathway for recruitment to political participation, it is argued that Sweden constitutes a harder test for the model; it is less likely that the relative education model is supported in Sweden than in the US. Despite this fact, the results show support for the relative education model on three of the four political participation indicators under study. The analysis demonstrates that the individual level of education does not have the same impact on political participation in all contexts; instead the individual-level effect of education is conditional on levels of education in the environment.

Second, by discussing the scope of the model the article also contributes to the discussion on how contextual factors—such as social networks—influence political participation (Dyck et al. 2009; Leighley 1990; McClurg 2003). NJS claim that the relative education model is valid for all forms of political participation. However, Campbell (2009) has recently argued that there is reason to believe that not all forms of participation are affected by relative education via social network centrality. Since not all forms of political participation are socially based and affected by recruitment via social networks, we only have reason to expect that the relative education model is valid on the competitive forms of political participation. Likewise, in an early contribution to the debate Huckfeldt (1979) argued that socially based forms of political participation are strongly affected by contextual factors such as social network composition, whereas individually based forms of participation are not affected by contextual factors whatsoever.

In this article, the predictions derived from the relative education model are tested on four indicators of political participation: writing letters to political representatives, voting, political party activities and party membership. Support is found for the relative education model on voting and activities related to political parties, whereas the model is not supported when it comes to writing letters to political representatives. Hence, the relative education model is, at least partially, supported in the European context as well. The evidence for relative education effects on the socially based forms of participation under study—activities and membership in political parties—and the absence of relative education effects on an individually based form of participation—writing letters to political representatives—confirms the hypotheses proposed by previous research: socially based forms of participation are influenced by contextual factors, whereas individually based forms are not.

Third, in studies of the relative education model following NJS (1996), there has been considerable debate on how to operationalize relative education. Which is the relevant unit of aggregation for the educational environment? In relation to whom should each individual's education be compared? In this article, three different units of aggregation for the educational environment are evaluated: (a) narrow as regards both age and place, (b) wide as regards age and narrow as regards place, and (c) narrow as regards age and wide as regards place. By using these three definitions, we can trace where sorting processes operate. Census data are used to apply very precise information on mean levels of education in the social environment according to each of the three definitions, at the time of each original survey. Results show that different forms of political participation are affected by different forms of sorting

processes since the relative education hypothesis is only proven valid under specific operationalizations of the educational environment. The relative education model is supported for political party activities and party membership when defining the unit of aggregation for educational environment as wide as regards age and narrow as regards place. When it comes to voting, however, support for the sorting model is found when applying any of the three different units of aggregation for the educational environment.

In what follows, the theoretical explanation of the relative education model is first outlined. Thereafter, critique and improvements of the model are discussed. We then turn to the Swedish case and demonstrate why it constitutes a less likely case for the model. The data, statistical techniques and results are subsequently presented. A concluding section discusses implications of the findings.

The Relative Education Model

Research on political participation has most often failed to provide a proper explanation for the paradox of participation. For example, in their influential study on political participation Verba, Schlozman and Brady argue that "education is the prime factor in most analyses of political activity" (Verba et al. 1995, p. 433). Yet they emphasize that they "are not arguing that aggregate changes in the level of education of the population will be associated with commensurate changes in the aggregate level of participation" (Verba et al. 1995, p. 436). According to NJS there is no paradox to explain. Since they consider the effects of education to be relative rather than absolute they do not expect that an aggregate increase in mean levels of education should lead to a corresponding increase in political participation.

The idea behind the relative education model comes from an argument most famously put forward by Hirsch (1978), who argues that, as educational levels rise "the effect will be to push competition by hitherto qualified applicants down the hierarchy of jobs" (Hirsch 1978, p. 50). This means that, for example, jobs that previously required high school education would after educational expansion require college education. According to Hirsch, educational expansion will lead to an inflation of educational credentials as the positional competition increases. In other words, education works as a sorting mechanism.

NJS apply this argument to effects of education on political participation and develop it in sharp contrast to the mainstream view on effects of education, the so-called *absolute education model*. The widely held idea behind the absolute education model is that education improves civic skills and civic knowledge, which in turn leads to political participation. NJS rejects that civic skills and knowledge are the causal mechanisms linking education with political participation. Instead, NJS claim that the link between education and political participation is, what they refer to as, a positional pathway. Education matters to the extent that it determines individual's social network positions, which in turn influences political participation. This means that the impact of education is relative: the "value" of an individual's education depends on the level of education in the environment. In technical terms this means that the individual level effect of education is interacted

with the contextual level of education. As the level of education in the environment increases, the effect of each individual's education decreases. The core assumption of the relative education model is that education is simply a proxy for social network centrality. Persons with high social status are exposed to networks that encourage participation and are thus more likely to be recruited.[4] Hence, the relative education model implies that since education influences participation via social network centrality, the individual-level effect of education decreases when the level of education in the environment increases.

The Critique of the Relative Education Model

In addition to whether the relative education model spells out the correct relationship between education and political participation, the critique of the model has mainly concerned two points. The first question concerns the scope of the model: is the relative education model applicable to all forms of political engagement? The second question concerns the relevant unit of aggregation for the educational environment: in relation to whose level of education should each individual's education be compared?

Is the Relative Education Model Applicable to All Forms of Political Participation?

NJS assume that all forms of political engagement are equally affected by relative education since they consider political participation to be a competitive zero-sum game in which those with high social status have an advantage. However, Campbell (2009) argue that all forms of political participation are not equally competitive, and it is thus wrong to assume that support for the relative education model should be equivalent on all forms of political participation. Therefore, following Campbell, the relative education model should be valid only in relation to the truly competitive forms of political participation. NJS are, of course, correct that some forms of political participation are essentially competitive. For example, not everyone can be a political representative in parliament because there are only a finite number of seats. But not all forms of political participation are of this character. Take, for example, the act of writing letters to political representatives, which is a form of political participation that is not restricted or bounded in any zero-sum way. One individual's decision to write a letter does not decrease the ability of others to do the same thing, which would be the case if it were a zero-sum game. Likewise, writing letters does not seem to be as dependent on recruitment through social networks as the more competitive forms of political participation. Campbell (2009) argues that several forms of political participation are not at all competitive, and that it is not clear as to why the relative education model should apply to these forms. If social

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[4] As Verba, Schlozman and Brady point out, one of the reasons why individuals participate in democratic activities is simply because they were asked. Consequently, the reason why individuals with low levels of education participate to a lesser extent in political activities may simply be that they are "outside of the recruitment networks that bring people into politics" (Verba et al. 1995, p. 269).

network centrality is the causal mechanism linking relative education and political participation, the model should only be valid on those forms of political participation that are dependent on recruitment from social networks.

If the relative education model is correct the individual level effect of education should be conditioned on the level of education in the social environment. But how can we distinguish between the forms of political participation that are likely to be affected by contextual factors in the social environment from those that are not? Huckfeldt (1979) introduces a distinction between individualistic versus collectivistic forms of political participation. The individualistic forms of political participation are not supposed to be affected by contextual factors. Collective forms of political participation, on the other hand, require individuals to be involved with other individuals or organizations in order to perform the acts. For that reason, collective forms of political participation are more likely to be affected by contextual factors such as social network centrality. Huckfeldt points out writing letters to political representatives as an example of an individualistic form of political participation while, for example, joining and being active in a political party are collectivistic forms of participation since they are hard to perform without interacting with other people.

However, Kenny (1992) has criticized this distinction by arguing that it is inappropriate to lump together acts such as voting and writing letters to political representatives. Kenny argues that while voting is an individualistic act, the "processes leading up to this act may well include interactions with members of various social contexts" (Kenny 1992, p. 260). Thus, even though it is difficult to make a distinction between purely individualistic acts and collectivistic socially based acts, we have reason to believe that forms of political participation that include high levels of interaction with other people are more influenced by contextual factors. Hence, the relative education model should receive stronger support for forms of political participation that are socially based than for those that are individually based.

Which is the Relevant Unit of Aggregation for the Educational Environment?

The second crucial question in the debate about the relative education model is the relevant unit of aggregation for measuring the educational environment. The crucial difficulty is: What kind of territorial boundaries should be drawn and to what age group should each respondent's education be compared? Previous research has employed very different units of aggregation for the educational environment and has shown contradictory results. Table 1 presents a summary of previous research on the relative education model.

Although NJS are theoretically sophisticated, in their empirical analyses they employ a quite peculiar definition of educational environment. NJS argue that it is not relevant to compare each individual's level of education to the mean levels of education among the entire population. Instead, they compare each respondent's level of education to the mean national level among individuals at age 25–50 when the respondent was 25. Helliwell and Putnam (2007) point out that NJS's measure of educational environment implies that everyone always competes with those older

Table 1 Summary of previous studies on the relative education model on participation

Study	Unit of aggregation for educational environment regarding *age*	Definition of educational environment regarding *place*	Support for the relative education model	Dependent variables in the analyses
Nie et al. (1996)	Mean national levels among individuals who were 25–50 years old, when the respondent were 25 years old	Wide (national mean levels)	Yes, on all indicators	Voting in national elections Political attentiveness Campaign activity
Tenn (2005)	Narrow (those born in the same year)	Wide (national mean levels)	Yes	Voter turnout
Helliwell and Putnam (2007)	Wide (all other living adults)	Narrow (census region)	No	Social engagement (number of memberships, club meetings, community projects, dinner parties)
Campbell (2006)	Narrow (four cohorts: 25–39, 40–54, 55–69, 70+)	Wide (national levels)	Strong support for the relative education model is found on *competitive political activity* (There is no support for the relative education model on the other indicators)	Competitive political activity (a: contacts with politicians/government/ local government official; b: working in a political party or action group) Expressive political activity (a: signed petition; b: taking part in lawful demonstration; c: boycotted certain products) Voting Working in voluntary associations

Table 1 continued

Study	Unit of aggregation for educational environment regarding *age*	Definition of educational environment regarding *place*	Support for the relative education model	Dependent variables in the analyses
Campbell ([2009](#))	Narrow (four cohorts: 25–34, 35–44, 45–64, 65+)	Wide and narrow: State MSA/County Zipcode	The relative education model is only supported on *electoral activity* and only when the educational environment is measured narrowly regarding geography (i.e., as MSA/county or zipcode) No support for the relative education model is found on *the expressive index, the civic index, voting*	Electoral activity (a: persuading others; b: displaying button/signs/stickers; c: campaign contributions; d: volunteering for candidate or political organizations) Expressive index (a: contacting officials; b: contacting the print media; c: contacting the broadcast media, protesting) Civic index (a: community problem-solving; b: regular volunteering for non-electoral organization; c: active membership in association; d: raising money for charity) Voting

Comment: Dependent variables other than forms of political participation are excluded from the table

than oneself, but never with those younger than oneself. NJS's definition of the educational environment is indeed rather counter-intuitive; for that reason, Helliwell and Putnam use geographically narrower measures and compare respondents' education to "all other living adults, both older and younger" (Helliwell and Putnam 2007, p. 3). In relation to NJS, Helliwell and Putnam's definition is wide when it comes to age but narrow geographically. Their results show that "the contextual effects of education on social participation are generally positive, and never significantly negative" (Helliwell and Putnam 2007, p. 3). Thus, their results provide no support for the relative education model.[5]

Tenn (2005) presents an even finer measure of relative education. To overcome the definitional problems in previous studies, Tenn employs an intra-birth-cohort measure of relative education; each individual's education is compared to those born in the same year. Tenn's results support the relative education model: "relative education has far more explanatory power than does absolute education" (Tenn 2005, p. 279). However, Tenn uses data from the US Current Population Survey, and he is therefore only able to test the influence of relative education on one dependent variable—voter turnout.

Furthermore, Campbell (2009) criticizes the wide geographic scope of NJS's and Tenn's measures of the educational environment by arguing that since social networks are local rather than national, the educational environment should be measured using narrow geographic units. Consequently, it is not appropriate to assume, for example, that the relative impact of education among people living in New York is dependent on the levels of education in Alaska. To date, the only study that uses a narrow measure of both age and place is Campbell's (2009). Using relatively small age groups (divided into four cohorts) and zip codes, Campbell finds support for the relative education model on competitive forms of political participation, more precisely "electoral activities" such as persuading others, displaying buttons, making campaign contributions, and volunteering for candidates or for political organizations.

How to best measure the educational environment remains an open question since previous research employs very different units of aggregation for the educational environment and has shown contradictory results. Hence, in the empirical analyses I will separately test three alternative measures of the educational environment in order to obtain a better understanding of where and when sorting processes operate.

The Relative Education Model in the Swedish Context

Although this is a single-country study of Swedish data, the aim is to make a comparison with previous US studies on the relative education model. For that reason, it is essential to emphasize both the similarities and differences between the two national contexts. Initially it should be emphasized that Sweden and the US are

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[5] However, as Campbell points out Helliwell and Putnam "have not accounted for the considerable differences in educational attainment across age cohorts" (Campbell 2009, p. 775). In addition, Helliwell and Putnam do not include electoral activities. In sum, this may explain the weak support of the sorting model in their analyses.

similar in that they are both post-industrial Western democracies. However, within this group of countries they are poles apart (cf. Granberg and Holmberg 1988, p. 3).

The most important difference between the Swedish and the US context is the greater amount of equality in Sweden. The level of equality is of interest in relation to the relative education model because it is reasonable to expect that the model receives less support in societies that have high levels of equality. NJS claim that what matters is the position in the educational hierarchy, and they do not provide any discussion as to how the distance between the positions in the hierarchy affects the applicability of the relative education model. I hypothesize that the relative education model should gain more support the more unequal a society is. In a society where there is a large amount of inequality, there are also larger distances between social networks—it is harder for those with low levels of education to access the social networks that are the most important for gaining political influence. Low levels of social stratification may make it easier for the disadvantaged to participate in politics. Thus, the support for the relative education model should be stronger in societies with higher levels of inequality. For that reason, I hypothesize that Sweden constitutes a harder test—a less likely case—for the relative education model, since the levels of equality are, in most respects, higher in Sweden than in the US.[6]

Yet there is no previous research on how the level of inequality affects the validity of the relative education model. However, we can draw some predictions from the literature on how inequality affects social networks. Bottero points out that one of the key features of inequality is that "it leads to 'social distance' in our personal relations" (Bottero 2007, p. 828). Furthermore, in unequal societies "[p]eople with different social attributes are less likely to interact and form social relationships because there is *already* 'social distance' between them" (Bottero 2007, p. 828). Hence, since the distance between social networks is larger in the US than in Sweden it is plausible to assume that social network centrality has a stronger effect on political participation in the US than in Sweden.

Here it should also be emphasized that a prominent difference between the contexts is the fact that the Swedish educational system has been explicitly designed to achieve egalitarian values, such as promoting social equality (Erikson and Jonsson 1996; Hout and Dohan 1996; Rothstein 1996; Meghir and Palme 2005). Furthermore, Eriksson and Jonsson claim that Sweden is exceptional since regarding trends in educational inequality Sweden is the only country where they find equalization over time (Erikson and Jonsson 1996, p. 8). Consequently, since the Swedish educational system has increased social mobility one could expect that social networks are less stratified in Sweden. Furthermore, since the Swedish educational system is more egalitarian, education may have a weaker impact on

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[6] Regarding income there is a larger gap between the rich and the poor in the US than in Sweden (De Nardi et al. 2000). The Gini Coefficient is 0.368 for USA and 0.252 for Sweden (*source*: Luxembourg Income Study 2007). Additionally, Sweden has been shown to occupy a special place in studies of social mobility. Breen and Jonsson claim that "class origins […] appear to have a smaller influence on class destinations […] than in most other countries" (Breen and Jonsson 2007, pp. 1175–1776). Likewise, preferences in favor of egalitarian values are also less common in the US than in Sweden (Verba and Orren 1985).

social networks, which in turn would imply that the hypothesized pathway between relative education and political participation via network centrality is less evident in Sweden than in the US.

Moreover, the pathways of recruitment to political assignments in Sweden are very different compared to those in the US. As in most countries, the members of the Swedish parliament (Riksdag) constitute an elite that is more highly educated and more often has upper-middle class occupations compared with the entire electorate (Esaiasson and Holmberg 1996; Holmberg 1989; Narud and Valen 2000). However, in Sweden there has been a close link between the dominant party—the Social Democratic Party—and the working class movement, particularly the Swedish Trade Union (LO). For that reason, engagement in the trade union has been an important pathway for recruitment to political assignments in Sweden (Holmberg 1974, Chap. 10). The working class movement constitutes an alternative pathway to political participation that has no counterpart in the US context. Cross-national studies show that strong labor organizations have a significant mobilizing effect that increases levels of participation (Radcliff and Davis 2000). Most importantly, education is not crucial to achieve central positions in these networks. To conclude, in Sweden there are other non-educational routes to central social network positions that positively affect political participation. Hence, the impact of the working class movement on the Swedish political scene may decrease or balance the sorting effects of education. Thus, these factors suggest that the relative education model should receive less support in the Swedish context.

The general trends in Sweden concerning mean levels of education and the amount of political participation during the period 1985–2006 correspond to the general trends in most Western countries, i.e. the paradoxical relationship between education and political participation is valid in Sweden as well. During this period, the mean level of education has increased significantly, from less than 10 years to more than 11 years. The change in mean levels of education is even more prominent among 26–36 year olds, where the mean levels has increased from approximately 11.5 to 13 years. At the same time, all forms of political participation under study in this article declined during this period.[7]

Data

The analysis employs data from the Swedish National Election Studies (SNES) to test the relative education model.[8] The 1985 to 2006 SNES surveys were pooled,

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[7] During 1985 to 2006 voter turnout in Sweden has declined from 90% in 1985 to 82.0% in 2006. Moreover, contact with political representatives has decreased from 16% to about 9%. Party membership and active participation in political parties have however remained quite stable around 8 and 3% respectively since the early 1990s.

[8] The pooled dataset consists of SNES 1985, 1988, 1991, 1994, 1998, 2002, and 2006. The SNES-studies are based on face-to-face interviews; Statistics Sweden (SCB) carries out the fieldwork. The response rates vary between 69.3% (2002) and 81.4% (1998). The SNES surveys are conducted at every Swedish election and are based on national representative samples. Principal investigators were Sören Holmberg and Mikael Gilljam (1985, 1988, 1991 and 1994), Sören Holmberg (1998) and Sören Holmberg and Henrik Oscarsson (2002 and 2006).

and all the analyses in this article were made based on the merged dataset. Indicators on both each individual's level of education as well as the mean level of education in the social environment are needed in order to test the relative education model. To meet the task of providing a full test of the relative education model and the alleged causal mechanisms, we would ultimately need individual level longitudinal data with reliable measures of social network centrality, in addition to the independent and the dependent variables. In the absence of such data, the aim of the study is to examine the central prediction derived from the relative education model, i.e. whether the effect of individual education is conditional on educational levels in the educational environment. And most importantly, whether higher mean levels of education in the environment are associated with a smaller effect of education at the individual level.

All SNES surveys include information about each respondent's highest achieved level of education.[9] The educational environment variables were calculated based on data from Statistics Sweden and merged on the pooled SNES dataset. Fortunately, Statistics Sweden annually supplies information about the number of individuals with different lengths of education in every municipality, organized along the different years in which people were born. This data is publicly available on the Statistics Sweden website.[10] Spreadsheets can be generated to include information about the number of people at different ages with different lengths of education in each municipality. Mean levels of education were calculated in accordance with the three definitions of educational environment explained below, respectively, for every respondent in the dataset using the spreadsheets generated from the website of Statistics Sweden. Thereafter, the educational environment variables were merged on the pooled dataset containing SNES data from 1985 to 2006. In total, the dataset consists of 20,063 individuals and contains information about the educational environment in accordance with the three definitions, respectively, for each individual.[11]

Since previous studies put forward contradictory suggestions for how to best define the educational environment, three different units of aggregation for the

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[9] In SNES 2006 and 2002 we got exact information from Statistics Sweden about each respondent's educational attainment. In the older surveys, there is a single question on highest achieved education. Data from 2002 and 2006 are harmonized to follow the same scale as the measures in the earlier surveys in order to not produce distortion in the comparison between the surveys before and after 2002. Data on individuals' highest achieved education was transformed to a variable describing the length of education in years.

[10] All data on contextual levels of education can be obtained from http://www.ssd.scb.se/databaser/makro/start.asp.

[11] Following prior research in the field, respondents younger than 26 were excluded since a considerable amount of them have not yet finished their educations. Thus, the effects of education on social network centrality are yet to come. Likewise, respondents older than 74 years old are excluded since no information on mean levels of education among individuals over that age are available from Statistics Sweden.

educational environment were produced.[12] First, the measure *A*: *age and place* employs a unit of aggregation that is narrow as regards both age and place; it defines the educational environment as the mean level of education among individuals born in the same year as the respondent in the specific municipality where the respondents were living at the time of survey. This measure is the most narrowly defined measure of the educational environment considering *both* age and place tested so far in any study of the relative education model. Second, the measure *B*: *place only* is narrow as regards place but wide as regards age; it defines educational environment as the mean level of education in the municipality among individuals 26–74 years old. Third, the measure henceforth referred to as *C*: *age only* is narrow as regards age but wide as regards geography. Each individual's educational environment is defined as the mean level of education at the time of the survey among individuals born in the same year in the entire country.

   The following indicators of political participation are used to test the relative education model: (a) voting in general elections for the parliament (Riksdag); (b) writing a letter to a political representative; (c) membership in a political party; and (d) active participation in a political party. All dependent variables in the analyses are dichotomous. A set of controls including dummies for gender, civil status, homeownership, church attendance, and residence in rural area as well as taxable income (five categories) are included in the analyses to balance for the influence of these factors. Furthermore age is included as a control, which is important since numerous studies show that political participation is related to position in the life cycle.[13] However, not only age but also generation has been shown to affect participation. Older people generally participate more at each point of time, but seen over time there is also a generation effect, for example, individuals born in the beginning of the 20-century generally participate more in traditional forms of political participation than individuals born later (e.g. Zukin et al. 2006). Since the dataset used in this article contains election studies from a period ranging over 20 years (1985–2006), age and generation is not perfectly correlated and it is possible to include both age and two dummy coded variables for generation in the model without risking multicolliniearity to distort the results. More precisely the generation variable contains three categories: born pre 1945, born 1946–1964, and born post 1965. In addition, a variable measuring time[14] (year of survey) is included in the analyses to account for the generally decreasing trend in participation over the time period that the surveys cover.[15]

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[12] It is worth to mention that it is not possible to replicate the measure of educational environment employed by NJS—i.e. using the mean level of education among people 25–50 when the respondent was 25. To replicate this measure we would need detailed information about mean levels of education as far back as in the 1930s. Furthermore, to use a narrow area specific measure we would need to know where respondents lived at the time they were 25; unfortunately we only know where they lived at the time of the survey. For that reason, mean levels of education in the environment are calculated at the time of every specific survey.

[13] To reduce multicollinearity in the model, age is divided in 10 cohorts (26–30, 31–35, 36–40, 41–45, 46–50, 51–55, 56–60, 61–65, 66–70, 71–74).

[14] Substituting the "time" variable with a set of dummy variables for each specific election year does not significantly alter the results. Results available upon request from the author.

[15] Even though the models include both age cohorts, generation, time, and in addition two of the specifications of the educational environment define mean education as the level of education among

The Modeling Strategy

In previous studies, relative education has been modeled in several different ways. In this section I will discuss the pros and cons of the different modeling strategies. The first strategy is to create a measure of relative education and compare its impact in relation to the conventional measure of absolute education (in years). This strategy is employed by NJS, who use a relative education measure calculated as the ratio between absolute education for the individual and the mean level of education in the environment (see Jenkins 1996, p. 230). Such a modeling strategy might work well when it comes to comparing the goodness of fit between models employing absolute versus relative education measures. However, this strategy does not explain whether a sorting process actually takes place. Most importantly, it does not explain whether the impact of individual levels of education varies with different levels of education in the environment.

The second strategy, applied by NJS (1996) and Helliwell and Putnam (2007), is to add a variable measuring the educational environment into a multiple regression model together with the individual level of education. A significant negative effect of the educational environment is interpreted as support for the relative education model. However, this modeling strategy does not constitute a true test of the predictions from the model since it only takes into account the contextual effect of the educational environment under control for the individual level of education. This modeling strategy does not test whether the individual effect is conditional on the contextual effect; in other words, whether the individual-level effect of education decreases as the level of education in the environment increases. This strategy only estimates whether there is a contextual level main effect of the mean level of education in the environment. The relative education model actually posits an interactive hypothesis—the higher the level of education in the environment, the smaller is the effect of individual education. Likewise, the second strategy does not answer the crucial question; whether each year of additional education matters less in environments with high mean levels of education.

For these reasons, Campbell (2009) applies a third modeling strategy; to test the interaction between each individual's years of education and the educational environment (Individual Education × Educational Environment). Explicitly specifying the interaction effect in a regression model is, by all standards, the most

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Footnote 15 continued

people at the same age, results are not distorted by multicollinearity. Models with educational environment defined as "A: Age and place" and as "B: Place only" includes no independent variables correlated higher than 0.706. None of the variables have a VIF above the critical value 10 or tolerance below 0.1. However, models with educational environment defined as "C: Age only" suffer from some multicollinearity since the educational environment measure and "age" has a correlation of -0.7949. As a consequence, the VIF for "Educational environment: Place only" is 10.56 and "Age" is 11.26. However, by dropping the "Generation" dummies the VIF decreases below the critical value 10 (VIF for "Educational environment" is 9.30 and "Age" is 7.03). Models without the generation dummies do not significantly alter the sizes, signs or significance of the main independent variables presented in the article. Most, importantly the interaction term in model 3 remain significant and the marginal effect of education decrease from a significant value of 0.0096 when the "Educational environment" is held constant two standard deviations below the mean to 0.0077 when the "Educational environment" is held constant two standard deviations above the mean.

accurate way to test of the relative education model, since it is the only one of these three modeling strategies that is up to the task of testing whether each year of education at the individual level matters less in environments with high mean levels of education. There is one obvious major argument in favor of including the interaction term to test the relative education model: the theory is about an interactive relationship. One cannot test whether the impact of individual education is conditioned on the education level in the environment without taking the interaction between individual level education and contextual education into account. For this reason I follow the strategy employed by Campbell (2009) and include an interaction term between individual education and contextual education in the models.

The downside of this strategy is that models with interaction effects are less intuitive and harder to interpret, especially when employing logistic regression. To actually test whether each year of education matters less in environments with high mean levels of education, one could not merely examine the signs, values and significance level of the coefficient of the interaction term in the regression output (Norton et al. 2004; Ai and Norton 2003). Rather, one needs to examine the marginal effect or predicted probabilities of individual-level education while holding the educational environment constant at a range of relevant values (cf. Kam and Franzese 2007). For that reason, marginal effects of individual level education is calculated while holding contextual education constant at a range of relevant values.

Results

Tables 2, 3, 4, and 5 present results from logistic regression models on the impact of education and the educational environment on each of the four dependent variables using the three different operationalizations of the educational environment, respectively.[16] All models include the interaction term between individual education and the educational environment, as well as both constitutive terms and the relevant controls.

A closer look at the effects on voting in Table 2 reveals that the interaction term is significant when applying all three of the operationalizations of the educational environment. The effect of education at the individual level is interacted with the level of education in the environment. When it comes to communication with political representatives, we find no significant interaction effects whatsoever. Furthermore, with regard to membership in political parties and actively working in political parties, the coefficient of the interaction term is significant only when using B: *place only* as the unit of aggregation for the educational environment. Hence, results indicate that sorting processes take place in relation to both voting and activities in political parties. However, for voting the individual-level education

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[16] Since the individuals are clustered within different educational environments the vce(cluster) option in STATA11 is used in order to cluster individuals within their educational environment and produce standard errors which allow for intragroup correlation.

Table 2 Effects of education and educational environment on *voting*. Logit Models

Generation 1 (Born pre-1945) = Base	(1) Unit of aggregation for educational environment: A: *Age and place* (mean level of education in municipality among people at the same age)	(2) Unit of aggregation for educational environment: B: *Place only* (mean level of education in municipality among 26–74 year olds)	(3) Unit of aggregation for educational environment: C: *Age only* (mean level of education among individuals at the same age in entire country)
Years of education	0.123*** (0.014)	0.129*** (0.015)	0.129*** (0.014)
Educational environment	0.060 (0.045)	0.039 (0.050)	0.068 (0.089)
Years of education × Educational environment	0.038*** (0.008)	0.024** (0.011)	0.047*** (0.009)
Gender (1 = male)	−0.278*** (0.071)	−0.274*** (0.075)	−0.276*** (0.069)
Civil status (1 = married)	0.732*** (0.072)	0.716*** (0.072)	0.734*** (0.075)
Taxable income	0.195*** (0.031)	0.182*** (0.029)	0.200*** (0.029)
Residence (1 = reside in rural area)	0.004 (0.075)	−0.002 (0.079)	−0.011 (0.072)
Homeownership (1 = homeowner)	0.425*** (0.074)	0.422*** (0.072)	0.428*** (0.074)
Church attendance (1 = attend church monthly)	0.081 (0.129)	0.085 (0.134)	0.079 (0.120)
Age	0.070** (0.031)	0.083*** (0.026)	0.065 (0.048)
Generation 2 (1 = born 1946–1964)	−0.300** (0.132)	−0.259** (0.131)	−0.325** (0.148)
Generation 3 (1 = born post 1965)	−0.409* (0.211)	−0.270 (0.204)	−0.470* (0.252)
Time (year of survey)	−0.029*** (0.008)	−0.032*** (0.008)	−0.028** (0.012)
Constant	58.772*** (15.437)	65.220*** (14.985)	57.933** (23.248)
Observations	13,440	13,440	13,440
Pseudo R^2	0.068	0.066	0.069

Comment: Unstandardized coefficients. Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

effect is interacted with all three measures of the educational environment. For party related political participation the mean level of education of all individuals at the local level (B: *place only*) is interacted with the individual-level effect.[17]

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[17] In logistic regression, merely examining the significance level of the coefficient for the interaction term reported in the regression output cannot test the true significance of the interaction. Since each of the coefficients is conditional on the other variables in the model in logistic regression, the true sign of the interaction term as well as its level of significance may be different for different observations (Norton et al. 2004; Ai and Norton 2003). Additional analyses have been made to compute the correct effect of the interaction term by making use of Norton, Wang and Ai's STATA command inteff. Results from inteff for the models with significant coefficients of the interaction terms are supplied upon request from the author.

Table 3 Testing the impact of education and the educational environment on *writing a letter to a political representative*. Logit Models

Generation 1 (Born pre-1945) = Base	(4) Unit of aggregation for educational environment: A: *Age and place* (mean level of education in municipality among people at the same age)	(5) Unit of aggregation for educational environment: B: *Place only* (mean level of education in municipality among 26–74 year olds)	(6) Unit of aggregation for educational environment: C: *Age only* (mean level of education among individuals at the same age in entire country)
Years of education	0.161*** (0.019)	0.160*** (0.019)	0.161*** (0.019)
Educational environment	0.053 (0.062)	0.033 (0.073)	0.073 (0.105)
Years of education × Educational environment	0.008 (0.011)	0.010 (0.018)	−0.002 (0.012)
Gender (1 = male)	0.262** (0.104)	0.256** (0.103)	0.257** (0.110)
Civil status (1 = married)	−0.188* (0.113)	−0.187* (0.110)	−0.190 (0.122)
Taxable income	0.127*** (0.047)	0.129*** (0.047)	0.127*** (0.044)
Residence (1 = reside in rural area)	0.110 (0.105)	0.104 (0.112)	0.076 (0.102)
Homeownership (1 = homeowner)	0.006 (0.116)	0.005 (0.116)	−0.001 (0.115)
Church attendance (1 = attend church monthly)	0.687*** (0.145)	0.683*** (0.144)	0.686*** (0.158)
Age	0.099** (0.042)	0.078** (0.035)	0.112* (0.059)
Generation 2 (1 = born 1946–1964)	−0.203 (0.175)	−0.180 (0.163)	−0.177 (0.175)
Generation 3 (1 = born post 1965)	−0.006 (0.287)	−0.009 (0.274)	0.056 (0.313)
Time (year of survey)	−0.033*** (0.013)	−0.032** (0.014)	−0.036** (0.015)
Constant	62.671** (24.812)	60.298** (28.706)	67.897** (30.178)
Observations	5970	5970	5970
Pseudo R^2	0.048	0.047	0.047

Comment: Unstandardized coefficients. Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Now, let us see how the educational environment alters the effects of individuals' education by looking more closely at the marginal effects of individual level education while holding education in the environment constant at different levels. The crucial test of the relative education model is whether there is a decreasing marginal effect of an additional year of education on the probability of political participation when the educational environment is held constant at increasingly higher values. Table 6 reports the marginal effect of individual education and standard errors calculated by the delta method for models with a significant

Table 4 Testing the impact of education and the educational environment on *membership in political parties*. Logit Models

Generation 1 (Born pre-1945) = Base	(7) Unit of aggregation for educational environment: A: *Age and place* (mean level of education in municipality among people at the same age)	(8) Unit of aggregation for educational environment: B: *Place only* (mean level of education in municipality among 26–74 year olds)	(9) Unit of aggregation for educational environment: C: *Age only* (mean level of education among individuals at the same age in entire country)
Years of education	0.036*** (0.011)	0.048*** (0.011)	0.026** (0.012)
Educational environment	−0.130*** (0.038)	−0.273*** (0.047)	0.062 (0.049)
Years of education × Educational environment	0.000 (0.006)	0.016* (0.009)	−0.005 (0.008)
Gender (1 = male)	0.466*** (0.064)	0.465*** (0.064)	0.478*** (0.066)
Civil status (1 = married)	0.168** (0.074)	0.172** (0.075)	0.164** (0.068)
Taxable income	0.051* (0.027)	0.053* (0.029)	0.036 (0.028)
Residence (1 = reside in rural area)	0.484*** (0.062)	0.396*** (0.064)	0.547*** (0.057)
Homeownership (1 = homeowner)	0.250*** (0.073)	0.225*** (0.075)	0.252*** (0.077)
Church attendance (1 = attend church monthly)	0.822*** (0.082)	0.814*** (0.082)	0.838*** (0.086)
Age	0.019 (0.024)	0.071*** (0.019)	0.106*** (0.029)
Generation 2 (1 = born 1946–1964)	−0.154 (0.105)	−0.187* (0.102)	−0.161 (0.112)
Generation 3 (1 = born post 1965)	−0.557*** (0.184)	−0.525*** (0.181)	−0.409* (0.213)
Time (year of survey)	−0.031*** (0.007)	−0.018** (0.007)	−0.052*** (0.008)
Constant	59.654*** (13.012)	31.740** (14.880)	100.919*** (15.306)
Observations	13,465	13,465	13,465
Pseudo R^2	0.066	0.069	0.064

Comment: Unstandardized coefficients. Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

interaction term (Models 1, 2, 3, 8 and 11).[18] The marginal effects of education are calculated when holding the educational environment at its mean as well as plus and minus one and two standard deviations of the mean.[19] Thus we can trace how the marginal effect of education alters when moving from low to high levels of education in the environment. This is also shown graphically in Fig. 1.

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[18] Marginal effects were calculated with the margins command in STATA11.

[19] Marginal effects are calculated while all controls are simultaneously held at their means.

Table 5 Testing the impact of education and educational environment on *actively working in a political party*. Logit Models

Generation 1 (Born pre-1945) = Base	(10) Unit of aggregation for educational environment: A: *Age and place* (mean level of education in municipality among people at the same age)	(11) Unit of aggregation for educational environment: B: *Place only* (mean level of education in municipality among 26–74 year olds)	(12) Unit of aggregation for educational environment: C: *Age only* (mean level of education among individuals at the same age in entire country)
Years of education	0.095*** (0.017)	0.107*** (0.018)	0.085*** (0.017)
Educational environment	−0.059 (0.056)	−0.260*** (0.065)	0.163 (0.109)
Years of education × Educational environment	0.008 (0.009)	0.024* (0.013)	−0.001 (0.011)
Gender (1 = male)	0.322*** (0.096)	0.316*** (0.095)	0.331*** (0.098)
Civil status (1 = married)	0.244** (0.114)	0.245** (0.117)	0.238** (0.113)
Taxable income	0.033 (0.041)	0.038 (0.043)	0.019 (0.039)
Residence (1 = reside in rural area)	0.550*** (0.093)	0.437*** (0.093)	0.574*** (0.088)
Homeownership (1 = homeowner)	0.380*** (0.120)	0.354*** (0.121)	0.375*** (0.126)
Church attendance (1 = attend church monthly)	1.093*** (0.108)	1.078*** (0.110)	1.106*** (0.102)
Age	0.039 (0.037)	0.066** (0.028)	0.147*** (0.054)
Generation 2 (1 = born 1946–1964)	−0.443*** (0.154)	−0.440*** (0.151)	−0.420** (0.169)
Generation 3 (1 = born post 1965)	−0.579** (0.271)	−0.536** (0.263)	−0.359 (0.296)
Time (year of survey)	−0.023** (0.010)	−0.004 (0.011)	−0.047*** (0.014)
Constant	40.746** (19.974)	4.137 (21.417)	89.768*** (27.674)
Observations	13,466	13,466	13,466
Pseudo R^2	0.064	0.068	0.065

Comment: Unstandardized coefficients. Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

First, all marginal effects reported are significant at the $p < 0.01$ level. It is important to note that under control for the level of education in the environment the marginal effects of individual education are small albeit significant. If the relative education model is to be proven right, the marginal effect of education should be larger in low education environments and smaller in high education environments. In Table 6 we can clearly see that this is the case: the marginal effect of education decreases when the level of education in the environment increases. The higher the level of education in the environment, the smaller the marginal effect of each individual's education. For voting, the marginal effect is decreasing with about 25%
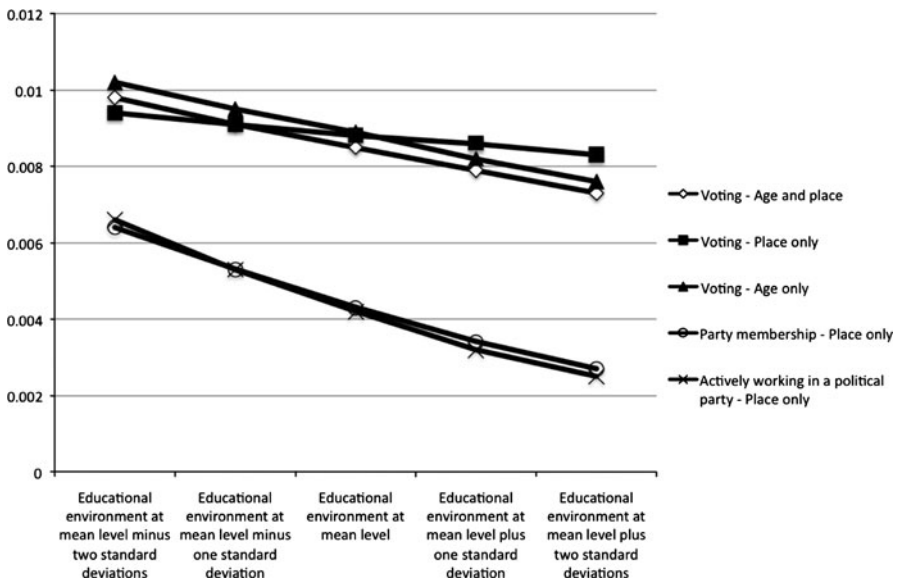
Table 6 Marginal effects of individual-level years of education at different levels of education in the educational environment, using logit results

Dependent variable:	Voting	Voting	Voting	Party membership	Actively working in a political party
Marginal effects derived from: Unit of aggregation for educational environment:	Model 1 A: Age and place	Model 2 B: Place only	Model 3 C: Age only	Model 8 B: Place only	Model 11 B: Place only
Educational environment at mean level minus two standard deviations	0.0098*** (0.0015)	0.0094*** (0.0013)	0.0102*** (0.0025)	0.0064*** (0.0016)	0.0066*** (0.0014)
Educational environment at mean level minus one standard deviation	0.0091*** (0.0012)	0.0091*** (0.0011)	0.0095*** (0.0016)	0.0053*** (0.0013)	0.0053*** (0.0010)
Educational environment at mean level	0.0085*** (0.0010)	0.0088*** (0.0010)	0.0089*** (0.0010)	0.0043*** (0.0010)	0.0042*** (0.0007)
Educational environment at mean level plus one standard deviation	0.0079*** (0.0010)	0.0086*** (0.0011)	0.0082*** (0.0011)	0.0034*** (0.0008)	0.0032*** (0.0005)
Educational environment at mean level plus two standard deviations	0.0073*** (0.0012)	0.0083*** (0.0012)	0.0076*** (0.0015)	0.0027*** (0.0006)	0.0025*** (0.0005)

Comment: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Fig. 1 Marginal effects of individual-level years of education at different levels of education in the educational environment, using logit results. *Comment*: See Table 6 for additional details

Table 7 Summary of result

Unit of aggregation	Socially based political participation		Voting	Individually based political participation
	Membership in political party	Active participation in political party		Writing letter to political representatives
A: Age and Place	–	–	Support for the relative education model	–
B: Place only	Support for the relative education model	Support for the relative education model	Support for the relative education model	–
C: Age only	–	–	Support for the relative education model	–

when educational environment measures taking age into account are applied (measure *A: age* and *C: age and place*). The marginal effect diminishes even more for political party activities and party membership; in these cases the marginal effect of individual education is less then half in the high education environment compared to the low education environments. Hence, as hypothesized by the relative education model, as the mean level of education in the environment increases, the effect of individual education decreases. Table 7 summarizes the results and shows on which dependent variables and using which units of aggregation the relative education model is supported.[20]

On the one hand, the results show that as regards participation related to political parties, sorting processes take place at the municipal level. Hence, the relative education model is supported for political party membership and party activities when the educational environment is defined as proposed by Helliwell and Putnam: geographically narrow and wide concerning age. On the other hand, the results show that sorting processes take place in another way in relation to voting. Using any of the three definitions of the educational environment, results show that sorting processes take place in relation to voting.

Conclusion

This paper provides the first in depth evaluation of the relative education model outside the US. A number of previous studies based on data from the US have

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[20] One concern when using this pooled dataset from a period of over 20 years might be whether the simultaneous overall trends towards lower participation and higher education distorts the results. Indeed there is such a trend during the period (as explained in footnote 9). A continuous variable for "time" (year of survey) is included in the analyses to control for this negative trend. Another way to further make sure that this negative trend has not distorted the results is to run the models for each specific year respectively. Results from such models can be provided upon request from the author. In sum results from these models show no systematic distortion in the year-by-year coefficients and the amount of support for the sorting model does not vary over time.

shown support for the argument that the effects of education on political participation are relative rather than absolute. However, we have hitherto not known whether the relative education model is also supported in a more egalitarian country such as Sweden. Despite the fact the Swedish context is a harder test for the relative education model, the results partially support the relative education model. NJS's model gains support on voting and political participation related to political parties, but in the second case only when the educational environment is defined narrow as regards geography. Thus, the relative education model is only proven valid on the socially based forms of political participation when the educational environment is measured at the municipal level. In sum, the results presented in this article strengthen the support for the relative education model since it has been proven valid in a new and very different context that constitutes a harder test for the model. This study thereby confirms that the relative education model of education is not a unique feature of American political culture. Education has indeed an effect on the individual level, but the level of education in the social environment matters as well.

However, results also support Huckfeldt's argument that socially based forms of participation are affected by contextual factors while purely individually based forms are not. Results also lend support to Campbell's argument that the scope of the sorting model should be narrowed since it is found that the individual and non-competitive form of participation under study—writing letters to political representatives—is not affected by education in a relative way. For this forms of participation the level of education in the social environment does not alter the individual level effect of education. Thus, these results provide further support to Campbell's argument that the relative education model put forward by NJS should be revised; it is not reasonable to predict relative education effects on purely individually based and non-competitive forms of political participation.

To conclude, it is worth stressing the important implications of whether the relative education model or the absolute education model makes correct predictions. Determining this is crucial for whether we shall expect increased levels of political participation as a consequence of increased mean levels of education in society. Systematic inequalities in levels of political participation are often considered to be a democratic problem, since it will lead to unequal influence in the political process (cf. Lijphart 1997). On the one hand, if the absolute education model is correct, education can help address this problem, and inequalities in levels of political participation can be mitigated by raising the level of education. On the other hand, if the relative education model is correct, extending education as a means to increase political participation is a futile strategy that will only lead to educational inflation. Disappointingly for proponents of the absolute education model, as regards voting and political party activities, results presented in this article indicate that educational inflation will occur as a consequence of increased aggregated educational levels. Extended education among the citizenry has not lead to correspondingly higher aggregated levels of participation since the individual effect of education decreases as the aggregated level of education increases.

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