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Beyond Equal Rights: Equality of Opportunity in Political Participation

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Abstract

It is well understood that political participation is stratified by socio-economic characteristics. Yet it is an open question how this finding bears on the normative evaluation of the democratic process. In this paper we argue that the equality of opportunity (EOp) concept furnishes an attractive framework to answer this question. Drawing on the analytical tools developed by an expanding empirical literature on EOp we investigate to what extent political participation is determined by factors that lie beyond individual control (*circumstances*) and thus is unfairly distributed. Using rich panel data from the US, we find that a lack of political opportunity is particularly pronounced for contacts with officials, participation in rallies and marches, and membership in political organizations. These opportunity shortages tend to complement each other across activities and persist over time. While family characteristics and psychological dispositions during childhood emanate as the strongest determinants, genetic variation is a small yet significant contributor to unequal political opportunities in the US.

JEL-Codes: D39; D63; D72

Keywords: Equality of Opportunity; Political Participation; Genes

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1 Introduction

Rousseau (1978) supposed that in well-run states "everyone rushes to the assemblies." Judging by that standard Western democracies are in increasingly bad shape as the drop in voter participation is a shared tendency in these countries (OECD, 2015). The lack in political participation and the underlying stratification has been researched extensively by scholars of political sociology, who find that participation varies positively with socio-economic status (SES). The SES framework purports that people with lower socio-economic status, as embodied in income and education, dispose of fewer resources to cover the cost of political participation. The importance of SES varies across political activities due to the different nature and amounts of the inputs required (Bénabou, 2000). For instance, formulating a petition to a local representative arguably requires a more comprehensive skill-set than joining a protest march. Campaign contributions require financial leeway and are highly skewed in favor of the upper percentiles of the income distribution. In general, however, the link between education, financial capacity and political participation, as emanating from research in political sociology is stable and likewise accepted among scholars of economics (Bourguignon and Verdier, 2000; Campante, 2011; Milligan et al., 2004).

In spite of the breadth of research undertaken to discern the determinants of political participation, one is tempted to ask how these findings bear on the normative evaluation of democratic outcomes. Verba et al. (1993) suggest that a verdict on the legitimacy of democratic outcomes depends on the extent to which political inactivity is self-inflicted instead of being attributable to factors beyond individual control. In later writings these authors formulate this requirement more explicitly by highlighting the importance of "equity in the conditions or opportunities afforded to a player [in the political game]" (Verba, 2006). Yet in spite of the wide appreciation of the normative importance of political opportunities, no rigorous empirical investigation has been forthcoming to this date (Brady et al., 2015).

In this paper we estimate equality of opportunity (EOp, or IOp for inequality of opportunity) in political participation in the United States. To be sure, we are interested in *effective* opportunities as opposed to merely *formal* opportunities. In the US the right to vote is unrestricted – as is the right to free speech and association. What we address in this work is the extent to which differences in the capacity to negotiate these formal opportunities are due to factors beyond individual control. We focus on the following seven forms of participation: (i) vote registration for the 2000 Presidential election, (ii) vote casting in the 2000 Presidential election, (iii) contact to officials, (iv) participation in rallies or marches, (v) membership in political organizations, (vi) volunteering in civic organizations, and lastly (vii) the vote frequency in statewide and local elections. Thereby we speak to two distinct branches of existing literature.

First, we widen the scope of the existing (economic) literature on EOp by considering a new outcome dimension, namely political participation. Research to date has focused

on income (Björklund et al., 2012; Ferreira and Gignoux, 2011; Pistolesi, 2009), education (Brunori et al., 2012) or health outcomes (Fleurbaey and Schokkaert, 2009; Rosa Dias, 2009). Furthermore, to the best of our knowledge this is the first work that expands the set of circumstance variables by genotype information. By virtue of the fact that "genes are fixed, they represent the purest measure of biological inheritance" (Fowler et al., 2008) and thus should be of particular interest in the estimation of EOp.

Second, the determinants of political participation are vastly researched in the field of political sociology (for comprehensive overviews: Barrett and Brunton-Smith, 2014; Verba et al., 2012). In addition to indicators of SES the literature has considered a host of different variables that are of interest from an equal-opportunity perspective. One group of works has focused on immutable personal characteristics such as race (Verba et al., 1993), sex (Schlozman et al., 1995), age and cohort (Blais et al., 2004). Another group has considered influence factors that are not strictly immutable but play out before the age of consent, such as parental political participation (Niemi and Jennings, M. Kent, 1991; Plutzer, 2002), local networks in the area of upbringing (Gimpel et al., 2006), or voluntary participation in youth organizations (McFarland and Thomas, 2006). All these factors have been analyzed in their own right but have not been used to construct a comprehensive measure of IOp – a gap that will be addressed in this paper.

Our results suggest significant IOp along each considered dimension of political participation, especially with respect to contacts to officials, participation in rallies and marches, and the membership in political organizations. In all of the aforementioned dimensions we calculate type-specific dissimilarity indexes of more than 50%. It is noteworthy that opportunity disadvantages do not set-off each other across different dimensions. Disadvantages in either activity are positively correlated with opportunity disadvantages in other forms of political participation. Furthermore, our results suggest that opportunity disadvantages persist over time. Family circumstances and psychological dispositions as a child consistently exert the strongest influence on unequal opportunities across all forms of political participation. We find a statistically significant influence of genetic information on IOp, which however is small in magnitude in comparison with the previously mentioned circumstance groups.

In the following section we outline the conceptual framework as well as the associated estimation strategy. In section 3 we describe the data set, followed by the presentation of the results in section 4. Lastly, we conclude with section 5.

2 Conceptual Framework

EOp is a framework for the normative assessment of the distribution of some desirable outcome p, such as health status, education or income. It is rooted in a philosophical discourse on the principles of distributive justice. The underlying normative cut – that people should be held responsible for their choices only, not for factors beyond their con-

trol – resonates in the most prominent contributions to this branch of the philosophical discourse (Arneson, 1989; Cohen, 1989; Dworkin, 1981; Rawls, 1971; Sen, 1979). On the one hand, the normative principle implies that inequality is unacceptable if it is rooted beyond the sphere of individual control. It is the task of social policy to correct the outcome distribution, for instance by means of transfer payments in the case of income. On the other hand, *equality of outcomes* is not a demand of justice as long as we reject the idea that the human endeavor is perfectly deterministic. To the extent that inequality is a result of individual effort, proponents of EOp accept the outcome distribution as fair.

The formalization of the EOp principles by Roemer (1998) has stimulated an extensive body of literature in the field of economics (see Ferreira and Peragine, 2015; Roemer and Trannoy, 2015, for recent overviews). Particularly the normative and econometric properties of different measurement approaches have been an area of in-depth interest (Van de gaer and Ramos, 2016).

The Normative Status of Political Participation It is beyond the ambit of this work to put forward a comprehensive account of the normative status of political participation. Yet we want to sketch why political participation is a desirable outcome that warrants the quest for equal opportunity.

Rousseau (1978) considers three attributes that make political participation inherently desirable (for a discussion see Pateman, 1970, ch.2). First, it fosters civic education in the sense that a political act always involves some strategic reasoning that requires the actor to put herself in the shoes of her fellow citizens. Second, political participation entails freedom understood as being one's own master. Exercising one's say in the process of elaborating policies, the laws to which one is subjected are self-prescribed rather than externally imposed. Lastly, according to Rousseau political participation fosters a sense of belonging within a community. These notions indicate some *inherent* value in the act of participation as such.

Moreover, by means of participating in the political process the constituents of a jurisdiction can influence policies, the consequences of which are fed back to themselves. Thus political participation also has an *instrumental* function in protecting the citizen's (private) interests. An illustrative example is furnished by the debate on why the seminal Meltzer and Richard (1981) model for redistribution fails to garner empirical support. One prime contender among other explanations is the assertion that the distribution of political influence is biased in the direction of the income distribution (among others Karabarbounis, 2011). That alone would be unproblematic if the preferences of the participating population were entirely congruent with the abstaining fraction. However this assumption seems to be contradicted by the finding that "[i]n particular, women, youth and African-Americans appear to have stronger preferences for redistribution" (Alesina and Giuliano, 2011). Henceforth, if political activity was stratified by these circumstance characteristics, the participation bias would re-enforce existing inequalities by discounting the call for

increased redistribution.

Analytical Approach In line with the underlying normative principle, we decompose the observed outcome distribution $F(p)$ into a fair and an unfair component. From an EOp perspective, $F(p)$ would be fair if it was entirely determined by factors that lie within the realm of control of individuals i. To operationalize this idea, the empirical literature draws on the concepts of *circumstances* and *efforts* – the underlying assumption being that a set of circumstances Ω and a set of efforts Θ jointly determine the outcome of interest p. Standard examples of circumstances are the biological sex, skin color or the educational achievement of parents. Examples of effort in the context of political participation are common indicators for socio-economic status such as educational achievement and income, or individual behaviors that are targeted towards information gathering, such as news consumption. The relation between these components can be described by a function $g : \Theta \times \Omega \mapsto \mathbb{R}^+$.

It is reasonable to assume that the distribution of efforts is not orthogonal to circumstances. For example, on the one hand the gender wage gap is the result of discriminatory processes in the labor market. On the other hand, it has been shown that females have increased their labor supply in response to a shrinking gender wage gap (Mulligan and Rubinstein, 2008). To phrase it in the terms of EOp: females adjusted their effort in response to reduced discrimination based on the circumstance variable "gender". To the extent that we want to correct for efforts that are endogenous to circumstances, the relation of interest can be expressed in the following reduced form:

$$p = g(\Omega, \Theta(\Omega), \epsilon), \tag{1}$$

where circumstances Ω and endogenous effort $\Theta(\Omega)$ are considered as root-causes of unfair inequality, whereas differential effort net of circumstance influence ϵ yields the fair share of inequality.

To operationalize this idea econometrically we rely on a method of measurement which the literature refers to as the *ex-ante* approach.[1] Based on the number of realizations x_j of each circumstance $C^j \in \Omega$ we can partition the population into a set of types T, where the number of types is given by $K = \prod_{j=1}^{J} x_j$. Assume that there were only two relevant circumstance variables, say biological sex (C^1={Male; Female}) and family background (C^2={Rich; Poor}) with two realizations each. Since $x_1 = x_2 = 2$ we can decompose the population into $K = 4$ types (Table 1).

Perfect EOp would prevail if all types $T^k \in T$ faced the same opportunity set and the observed variation in outcomes was a pure result of differential effort. As we can only observe realized individual choices instead of the underlying opportunity space, we use the type-specific mean realization of the outcome of interest $\mu^k(p)$ as an estimator of

[1] It is ex-ante in the sense that the need for compensation is determined without regard to the realization of individual effort. See Van de gaer and Ramos (2016) for more details.

Table 1: Example of Type Set

	Male	Female
Rich	Type 1	Type 2
Poor	Type 3	Type 4

the respective opportunity set. Drawing on the previous type decomposition, we would conclude that Type 1 faced a larger opportunity set for voting than Type 2, if the average turnout of the former group exceeded the average turnout of the latter.

Following this logic, we fit a logit model with circumstances C_i^j as the only right-hand side variables. Note that we use a logit model in our main specifications as activities of political participation are measured in binary variables (see section 3):[2]

$$\ln\left(\frac{p_i}{1-p_i}\right) = \sum_{j=1}^{J} \beta_j C_i^j. \tag{2}$$

Recall that the observed outcome p_i is determined by the function $g(\Omega_i, \Theta_i(\Omega_i), \epsilon_i)$, where ϵ_i represents residual effort net of circumstance influence. Then, by calculating predicted probabilities based on equation 2, we effectively sterilize the outcome distribution from the fair inequality component ϵ. This yields the estimator for the type-specific opportunity set $\mu^k(p)$, since $C_i^j = C_h^j \, \forall \, i, h \in T^k$:

$$\mu^k(p) = \frac{\exp(\sum_{j=1}^{J} \hat{\beta}_j C_i^j)}{1 + \exp(\sum_{j=1}^{J} \hat{\beta}_j C_i^j)}. \tag{3}$$

The resulting distribution of $\mu^k(p)$ is called *smoothed* distribution, here denoted as Φ. Note that any inequality in Φ exclusively relates to differences in circumstances and thus conflicts with the ethics of EOp: the higher the dispersion in Φ, the more variation in $F(p)$ is explained by circumstances, the higher IOp in political participation.

Equations (2) and (3) illustrate that this procedure yields a lower bound of IOp in political participation. Variation explained by circumstance variables that are not included in the estimation, is captured in the error term ϵ and therefore attributed to the fair share of inequality. Thus, expanding the circumstance set under consideration always increases the variation in the smoothed distribution Φ unless these circumstances are orthogonal to the outcome of interest (see Ferreira and Gignoux, 2011; Niehues and Peichl, 2014, for thorough discussions). As it is very unlikely that any data set captures all relevant circumstance variables, the outlined estimator of IOp cannot exceed its true value.

To obtain a scalar measure of IOp we subject Φ to two inequality metrics. First, we calculate the Gini index which is a default measure in many works on inequality. Second, we construct a dissimilarity index which is applied in various works on EOp with discrete

[2]The results are robust towards using logit, probit or linear probability estimations. See section 4.

outcomes (Foguel and Veloso, 2014; Paes de Barros et al., 2008). The dissimilarity index, based on which we will present most of our results, is constructed as follows. In a first step we calculate the dispersion in opportunities:

$$T = \frac{1}{2N} \sum_i \left| \mu^k(p) - \frac{1}{N} \sum_i \mu_i^k(p) \right|. \tag{4}$$

The term within the absolute value brackets indicates by how much a type-specific advantage level diverges from the average realization within the sample. Note that the second term within the brackets corresponds to the mean of both $F(p)$ and Φ as the error terms in a logit estimation sum up to zero. The division by two is for interpretive purposes. As the sum of positive divergences from the average cancels with sum of negative divergences, T can now be interpreted as the number of opportunities that would have to be redistributed in order to obtain the fair outcome. In a second step we scale the dispersion measure by the average realization within the sample to obtain the dissimilarity index:

$$D = \frac{T}{\frac{1}{N} \sum_i \mu_i^k(p)} = \frac{T}{\mu} \tag{5}$$

We can interpret D as the share of opportunities that is unfairly distributed.

3 Data

The data set for this research endeavor needs to satisfy two conditions. First, given the lower bound nature of the IOp estimator it needs to provide a large set of circumstance variables in order to cushion the downward bias of our results. Second, it needs to include indicator variables for political participation.[3] The one study that strikes a balance between both requirements is the *National Longitudinal Study of Adolescent to Adult Health* (Add Health). Add Health is a four-wave panel study that focuses on health-related behaviors and the causes of health outcomes. Initial information was collected in 1994/95 on adolescents in grades 7-12 ($N = 20,745$) drawing on a stratified sample of 80 High Schools in the US. In addition to in-depth interviews with adolescents, questionnaires were administered to school representatives, parents and roughly 90,000 students of the sampled schools. Importantly, the survey data is linked to additional contextual data from other data sources such as the Census of Population and Housing, the School District Databook or the Statistics of the US Bureau of the State Government Finances. In the two most recent waves all respondents observed in Wave 1 ($N = 15,170$ and $N = 15,701$, respectively) had achieved the age of consent, which makes it feasible to extract outcome variables on different political activities, such as vote casting.

[3] In the US context surveys with an explicit focus on political behavior, such as the *American National Election Study* (ANES) perform poorly with respect to the first requirement. The reverse holds true for longitudinal studies which allow the construction of finely grained type partitions, such as the *National Longitudinal Study of Youth* (NLSY79) and the *Panel Study of Income Dynamics* (PSID).

Before proceeding with a description of the variables of interest, we want to give an account of our understanding of political participation for the purpose of this work. Barrett and Brunton-Smith (2014) describe political participation as including all activities influencing the development and implementation of public policy and the selection of representatives entrusted with this process. According to this view *participation* can be contrasted to *engagement* to the extent that the former refers to activities rather than to psychological dispositions, attitudes and interests. Thus, self-identified interest in politics or ideological leanings are beyond the realm of *participation*. Moreover, *political* participation can be contrasted to *civic* participation, where the latter relates to voluntary activity to the benefit of fellow human beings or the public good. Thus, community services, donations to and fundraising activities for charities are beyond the realm of the *political*. In practice, however, there is a fine line between civic and political participation as evidenced by the fact that non-political organizations, such as religious communities, often serve as recruitment vehicles for political action (Verba et al., 1993). This leads us to abstract from this second division.

According to this delineation Add Health provides information on the following forms of political participation: (i) vote registration for the 2000 Presidential election, (ii) vote casting in the 2000 Presidential election, (iii) contact to officials, (iv) participation in rallies or marches, (v) membership in political organizations (vi), volunteering in civic organizations, and lastly (vii) the vote frequency in statewide and local elections. Information on activities (i)-(vi) is sourced from Wave 3 (respondent age: 18-26) and captured in binary variables indicating whether the respective activity was undertaken within the last 12 months. Information on activity (vii) is sourced from Wave 4 (respondent age: 24-32) and captured in a self-reported, ordinal variable with four expressions, ranging from "always" and "often" to "sometimes" and "never". For the purpose of this work we decompose this variable into two binary variables indicating whether people consider themselves to be "always-voter" or "never-voter". In addition we estimate IOp in income acquisition in order to obtain a sense of the relative magnitude of IOp in political participation. Table 2 provides summary statistics for the outcome variables.

Table 2: Outcome Variables (Summary Statistics)

	N	Mean	Mean (Weighted)	SD	SD (Weighted)	Min	Max
Wave 3 (2001/02)							
Personal Income (k$)	13273	13.597	13.394	16.367	15.477	0.000	500.909
Registered (2000)	14087	0.719	0.710	0.450	0.454	0.000	1.000
Vote (2000)	13991	0.439	0.419	0.496	0.493	0.000	1.000
Contact Official	14129	0.026	0.028	0.160	0.164	0.000	1.000
Rally/March	14129	0.034	0.032	0.182	0.177	0.000	1.000
Political Org.	14099	0.022	0.021	0.147	0.142	0.000	1.000
Volunteer Work	14099	0.285	0.279	0.451	0.449	0.000	1.000
Wave 4 (2008)							
Personal Income (k$)	14314	34.745	34.146	44.826	43.988	0.000	999.995
Vote Always	14549	0.247	0.232	0.431	0.422	0.000	1.000
Vote Never	14549	0.325	0.348	0.468	0.476	0.000	1.000

Note: In the weighted columns summary statistics are corrected for sampling procedure and sample attrition until Wave 3 and 4, respectively.

Circumstance variables are derived from the first wave of Add Health, when the vast

majority of respondents was younger than 18 years of age. We exclude all respondents older than 17 in the first wave.[4] This restriction is not innocuous. All applied researchers on EOp need to decide which individual characteristics they are willing to treat as circumstances. For the purpose of this work we treat the entire child biography up to the age of 18 as a circumstance and thus do not hold children responsible for any of their prior choices.[5]

The circumstances we consider are grouped in $m = 11$ categories, i.e. $\Omega = \sum_m \Omega^m$. The first set includes demographic information such as age, migration status and race. Second, we consider family background information, for instance the education of parents, the number of siblings and the self-perceived quality of the child-parent relationship. Third, we take account of variables that are indicative for the quality of the respondent's social life as a child. Fourth, the childhood neighborhood is evaluated among others in terms of its safeness and a host of different demographic and socio-economic indicators. The fifth set captures characteristics of the school the respondent went to. Among others we take account of the average class size and the educational achievement of teachers. Sixth, the ability of respondents is evaluated in terms of the standardized Picture Vocabulary Test Score (PVT) and whether the respondent skipped or repeated any grades. Aspects of religiosity – captured in the seventh group – are represented by the parent's frequency of attending service and the self-rated importance of religion. Eighth, the respondent's physical condition during childhood is evaluated along various dimensions ranging from physical restrictions due to disabilities, over ratings of attractiveness, to a measure for the Body Mass Index (BMI). Ninth, we integrate a battery of questions on psychological dispositions such as suicidal intentions, self-ratings of intelligence and expectations for one's later life. In group ten we take account of risk behaviors including drug and alcohol abuse of both the respondent and her friends during childhood. Lastly, we include a battery of binary indicators for the respondent's genetic endowment. The evolving interest in genes as mediators of environmental influences that determine political participation is a noteworthy recent development in the political science literature (Alford et al., 2005; Benjamin et al., 2012; Fowler et al., 2008; Fowler and Dawes, 2008). The genetic data used in this work was sourced in the fourth wave of Add Health for a sample of approximately 15,000 respondents.[6] In view of the breadth of circumstances considered, a thorough description of each circumstance variable cannot be given here. The interested reader is relegated to Table 10 in the Appendix, where summary statistics on all circumstances are disclosed.

The analysis is conducted using the provided set of sampling weights in order to correct for the sampling procedure and sample attrition across waves. Hence our analysis is nationally representative for adolescents enrolled in grades 7-12 in 1994/95.

[4]Due to this restriction, the age range in our sample decreases from 18-26 (24-32) to 18-24 (24-30) for Wave 3 (Wave 4) outcome variables.

[5]In principle it is possible to specify the responsibility cut-off at an earlier age, say 12 or 16, which would restrict the eligible set of circumstances Ω. See Hufe et al. (2015) for a discussion.

[6]For a more detailed discussion of the genetic variables see section 4.3.

4 Results

Table 3 lists the main results. While the following discussion is exclusively based on results from the logit estimates, Table 3 also includes results from linear probability and probit models, in order to demonstrate the robustness of our results to different distributional assumptions.

Table 3: Results Overview

Outcome	N	Ø	Estimator	Diss. Index	Gini
Registered (2000)	8142	72.2%	Logit	9.5%	0.131
			Probit	9.5%	0.130
			OLS	9.2%	0.130
Vote (2000)	8111	42.2%	Logit	19.8%	0.270
			Probit	19.6%	0.269
			OLS	18.9%	0.265
Contact Official	8170	2.8%	Logit	59.7%	0.757
			Probit	59.8%	0.756
			OLS	58.1%	0.826
Rally/March	8170	3.0%	Logit	55.4%	0.713
			Probit	55.1%	0.709
			OLS	54.1%	0.763
Political Organization	8147	2.1%	Logit	63.0%	0.790
			Probit	62.6%	0.783
			OLS	61.5%	0.877
Volunteer Work	8147	28.7%	Logit	24.0%	0.328
			Probit	23.8%	0.327
			OLS	23.1%	0.325
Vote Always	8145	23.1%	Logit	22.4%	0.311
			Probit	22.6%	0.314
			OLS	21.8%	0.309
Vote Never	8145	33.6%	Logit	24.5%	0.333
			Probit	24.4%	0.333
			OLS	23.5%	0.330

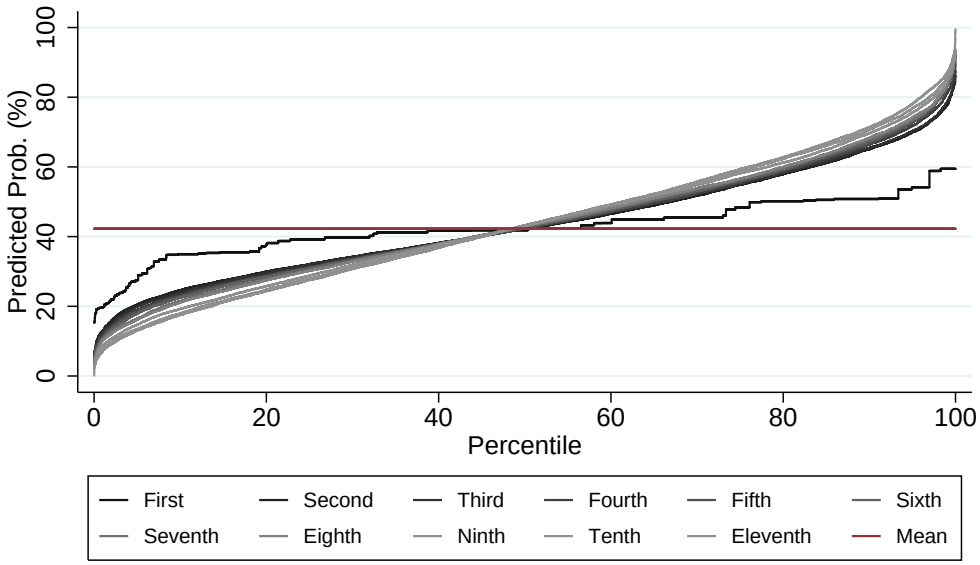
Note: Results are based on all available circumstances. Ø corresponds to the sample average participation rate with respect to the activity of interest. The last two columns yield two different measures of IOP, the dissimilarity index and the Gini-coefficient in type-specific propensities to participate in the activity of interest.

4.1 EOp in Political Participation

Figure 1 illustrates opportunity dispersion for vote casting in the 2000 Presidential elections. The y-axis shows participation propensities in percent. Types are arranged in order of increasing advantage along the horizontal axis. At the 0 percentile we have the most disadvantaged type, defined as the type with the lowest mean participation rate in the 2000 Presidential election. At the 100th percentile we have the most advantaged type, defined analogously. The gray lines show the smoothed distribution Φ associated with the use of different circumstance sets. The lighter the shade of gray the larger the circumstance set under consideration. Lastly, the red line indicates the mean participation rate within the entire sample.

In total 42.2% of the respondents stated to have turned out at the polls, which at first glance appears to be a very high estimate of turnout within the age group 18-24. For instance, based on CPS data the US Census Bureau (Jamieson et al., 2002) estimates

Figure 1: Type-Specific Opportunity Sets for Voting in the 2000 Presidential Election



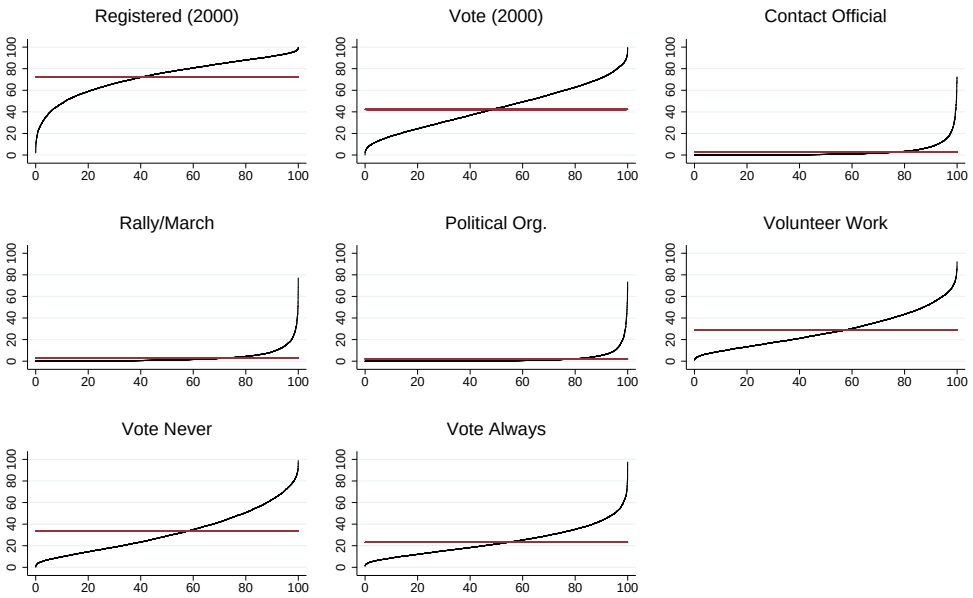
Note: All estimates are based on the logit estimator. The following circumstance sets are introduced sequentially: First (Demographics), Second (Family), Third (Social Life), Fourth (Neighborhood), Fifth (School), Sixth (Ability), Seventh (Religion), Eighth (Physical Condition), Ninth (Psychological Condition), Tenth (Risk Behavior), Eleventh (Genetic Endowment). The maroon line yields the mean participation rate with respect to the activity of interest. At the 100th percentile we have the probability of participation for the most advantaged type, at the 0 percentile the equivalent for the most disadvantaged type.

a turnout rate of 36.1% for the same age group.[7] The gray lines show the mean participation level for each type according to various circumstance sets. The darkest line considers demographic information only. Here, the most advantaged type at the 100th percentile participated with a probability of slightly more than 59%. At the other end of the spectrum, the most disadvantaged type turned out with a probability of less than 16%. These differences are reinforced as we sequentially introduce the remaining circumstance categories: family, social life, neighborhood, school, ability, religion, physical condition, psychological condition, risk behavior, and genetic endowment. Accounting for the full set of circumstances the probabilities approach 99% and 1% for the most extreme types, respectively. Figure 1 highlights the fact that our measurement approach delivers a lower bound of IOp: the dispersion in type-specific participation propensities grows larger with the introduction of each additional circumstance set. In terms of the dissimilarity index, IOp attains a value of 19.8% with the most extensive circumstance set (see Table 3 for an overview of all scalar measure results).

Figure 2 documents that IOp varies strongly over the different forms of political participation. Among the activities under consideration vote registration is most fairly distributed from an EOp perspective. Only the lowest percentiles of the smoothed distribution fall

[7] To some extent this difference is driven by coding differences. In the CPS refusals and non-responses are coded as non-voters (Hur and Achen, 2013), while we exclude them from the analysis. However, even when redefining the voting variable to match the CPS definition, average turnout in our sample amounts to 41.9%. Taken together these facts suggest that misreporting due to desirability bias (Ansolabehere and Hersh, 2012) is relevant in our sample.

Figure 2: Comparison of Type-Specific Opportunity Sets



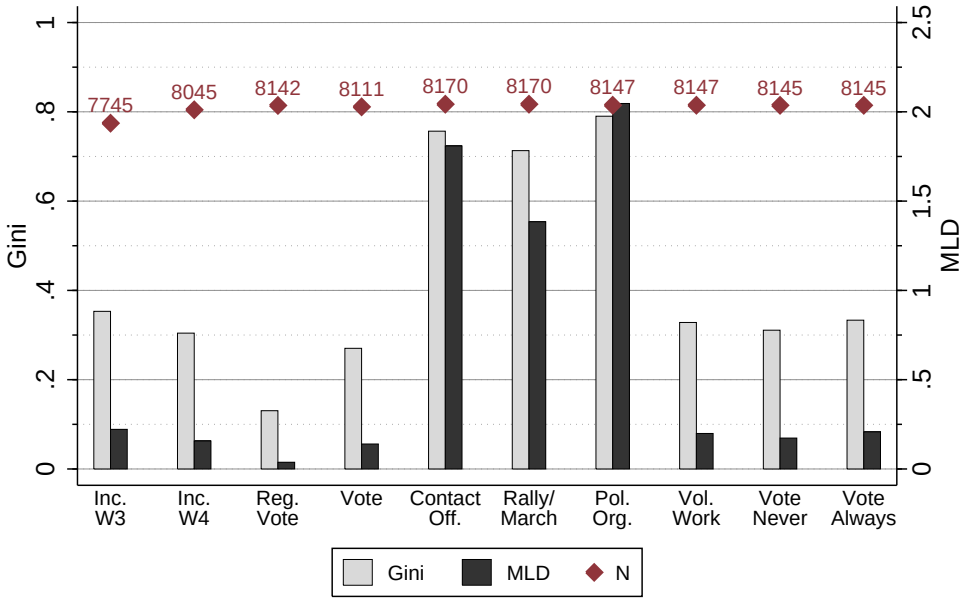
Note: All estimates are based on the logit estimator. The maroon line yields the mean participation rate with respect to the activity of interest. At the 100th percentile we have the probability of participation for the most advantaged type, at the 0 percentile the equivalent for the most disadvantaged type. Results are based on all available circumstances.

short in opportunities in comparison with the remaining types. The associated dissimilarity index attains a value of 9.5% (Table 3). The reverse holds true for contacts to officials, participation in rallies and marches, and the membership in political organizations. Here only the most advantaged types engage politically, whereas the vast majority of types have a very low propensity to participate in these activities. This is reflected in dissimilarity indexes of more than 50% for these activities (see Table 3). Vote casting and voluntary engagement in civic organizations take a middle ground between both extremes, with 19.8% and 24.0% respectively.

For the purpose of obtaining a better understanding of the relative magnitude of EOp in political participation, we compare IOp in political participation with IOp in income acquisition. To date the latter has been the most extensively researched outcome dimension by scholars in this literature. Figure 3 plots the Gini coefficients and the mean log deviation (MLD) of the smoothed distributions of gross personal income in Wave 3 and 4 as well as the various dimensions of political participation. We additionally consider the MLD as an inequality metric, as it has been the most widely used index in research on IOp in income acquisition.

The vast differences in the Gini measures and the MLDs for political activities are consistent with the results presented previously in terms of the dissimilarity index. Contacts to officials, participation in rallies and marches and engagement in political organizations are most unjustly distributed from an equal-opportunity perspective. Voting and voluntary work take a middle ground, while the registration to vote evokes the least normative

Figure 3: Comparison to IOp in Gross Personal Income



Note: The grey bars yield the mean log deviation for the smoothed distribution of the respective variable of interest. The maroon diamonds show the number of observations used for estimation. All results except for the income variables are based on the logit estimators. Results for the income variable are based on OLS.

concern. The MLD of the smoothed distribution Φ of gross personal income attains a value of 0.22 in Wave 3 and 0.16 in Wave 4. This is higher than other estimates of IOp in annual income in the US based on PSID data (Niehues and Peichl, 2014).[8] However it still considerably falls short of IOp in the most unjustly distributed dimensions of political participation.

4.2 Complementarity and Age Convergence

To this stage it has been shown that IOp in political participation does exist to varying degrees along the activities of interest. In the following we want to address two potential objections that could challenge the normative import of our findings.

First, concerns about existing injustices in the democratic process could be mitigated if opportunity sets in political activities were substitutes rather than complements. In the case of substitutability, a disadvantaged type in one dimension would be among the advantaged types in other dimensions. For instance one could imagine that types lacking trust in elected institutions prefer to advocate their interest in form of rallies and protest marches instead of drafting a petition to a government representative. Therefore, these types would not be cut out from the political realm on opportunity grounds per se. Rather one would conclude that different types use different channels of political participation.

[8] Differences may arise from different sample compositions between our data set and the PSID used by Niehues and Peichl (2014). However, note that we include a more comprehensive circumstance set than the former work, which by necessity implies an upwards correction of the lower bound estimate. See our previous discussion in section 2.

To the contrary, in the case of complementarity a disadvantage in one dimension would be accompanied by disadvantages in all other dimensions as well. Panel 1 of Table 4 lists correlations of type-specific propensities for all modes of participation drawn from Wave 3 of Add Health.

Table 4: Type-Specficic Propensity Correlations

	Registered (2000)	Vote (2000)	Contact Official	Rally/ March	Political Org.	Volunteer Work	Vote Never	Vote Always
Wave 3 (2001/02)								
Registered (2000)	1.000							
Vote (2000)	0.761***	1.000						
Contact Official	0.208***	0.296***	1.000					
Rally/ March	0.289***	0.346***	0.341***	1.000				
Political Org.	0.183***	0.229***	0.324***	0.246***	1.000			
Volunteer Work	0.449***	0.539***	0.345***	0.375***	0.295***	1.000		
Wave 4 (2008)								
Vote Never	-0.704***	-0.776***	-0.254***	-0.344***	-0.194***	-0.509***	1.000	
Vote Always	0.500***	0.565***	0.209***	0.323***	0.213***	0.338***	-0.641***	1.000

Note: *,** and *** indicate statistical significance at the 10%, 5% and 1%-level, respectively. All coefficients are weighted to account for sampling procedure and sample attrition through waves 3 and 4.

The fact that all correlations are significantly positive points to the conclusion that opportunities for different political activities are complements rather than substitutes: a high type-specific propensity to vote goes hand in hand with a positive propensity to contact an official, to participate in a rally and to engage in both political and civic organizations.

The second potential objection goes as follows: it has been shown that initial differences in political behavior tend to converge over the life cycle irrespective of socio-economic characteristics (Plutzer, 2002). Therefore, concerns about existing injustices could be mitigated if opportunity sets in political activities quickly converged over the life cycle of citizens. Since the results presented thus far are exclusively based on respondents aged 18-24, some may argue that they represent IOp in *political initiation* rather political participation tout court. To address this concern we can make use of the participation categories *Vote Never* and *Vote Always*. As outlined in section 3, the question on the regularity of participation in local and statewide elections is drawn from Wave 4 of Add Health, i.e. when each respondent was six years older in age compared to the previous wave. Employing the full circumstance set the dissimilarity index for participation in every election attains a value of 22.4%. Reversely, the dissimilarity index for never casting a vote in any election attains a value of 24.5% (Table 3). In spite of the fact that these questions on voting behavior are not directly comparable to the ones in Wave 3, we can infer that unequal opportunities continue to exist in Wave 4. Furthermore, Panel 2 of Table 4 shows that types with a higher propensity to be "always-voter" are more likely to engage in all dimensions of politi-

cal activity measured in Wave 3. Reversely, being a "never-voter" is consistently negatively correlated with political engagement in the previous wave.

To conclude, neither is it the case that political opportunities across different activities substitute each other, nor do type-specific propensities to engage politically quickly converge over time. Thus the normative concern implicit in our previous results remains in place.

4.3 Genetics and EOp

As mentioned previously, this is the first work that explicitly exploits genetic variation in the measurement of EOp. Therefore, we will devote this section to a more thorough discussion of the influence of genetic circumstances on EOp.

There is philosophical controversy on whether the genetic endowment of a person provides a ground for compensation. Clearly genes are part of the natural lottery and are beyond individual control. Yet some argue that the ethical principle of self-ownership takes priority over the value of equal opportunities, leading to the conclusion that people have a legitimate claim on life outcomes rooted in their genetic make-up. For instance, in his seminal contribution Rawls (1971) argues that "fair equality of opportunity" only requires compensation for social circumstances, but not for natural circumstances.

To date the empirical literature on EOp at most accounts for proxy variables for genetic circumstances. Björklund et al. (2012), for instance, use IQ measures from the Swedish Military Enlistment Battery measured at age 18. Yet as the authors remark, it is not clear to what extent such ability measures reflect nature (genetic endowments) or nurture (childhood circumstances). In humans genetic information is stored on 46 chromosomes, half of which are received from each of the biological parents respectively. Chromosomes contain chains of the macromolecule deoxyribonucleic acid (DNA). DNA is composed of two strands of sugar and phosphate molecules that are connected by corresponding base pairs. Adenine (A) always pairs with thymine (T) while guanine (G) always pairs with cytosine (C). The two strands coil around each other to form the famous double helix structure. In total, one set of chromosomes consists of 3.3bn base pairs of which 3% are protein coding (exons), whereas the remainder is believed to have a regulatory function (introns). Genes are segments of the DNA that are involved in the coding of proteins. Genetic differences are denoted as alleles (or polymorphisms). As one chromosome is inherited of each parent, children also inherit one allele for a particular gene from each parent.

Add Health provides two different sorts of genetic markers:[9] variable number tandem repeats (VNTR) for six genes (MAOA, DRD4, DAT1, DRD5, MAOCA1, HTTLPR) and single-nucleotide polymorphisms (SNP) in the genes HTTLPR, DRD2, COMT and 5HTT. VNTRs code repeats of base pair sequences on a gene. For instance, the enzyme monoamine oxidase A (MAOA) is involved in the degradation of serotonin in the brain. It is coded

[9]For more information on genetic markers in Add Health see Smolen et al. (2013)

on the gene MAOA, which contains a 30 base pair sequence, which varies between 2 and 5 repeat units depending on the allelic expression. The two repeat (2R) and the three repeat (3R) expression are believed to be more efficient in the transcription of the necessary amino acids for the formation of the MAOA enzyme than the alternative expressions. Deficiencies in the degradation of serotonin have been shown to be negatively correlated with pro-social behaviors, which in turn led political scientists to hypothesize that low-expressing MAOA VNTR's lead to lower degrees of political participation (Fowler and Dawes, 2008). Instead of recording genetic variation with respect to base pair repeats, SNPs indicate alternations in the base pairs at a particular locus. For instance, the SNP rs12945042 refers to the 5HTT gene. At this particular location of the DNA, the majority base pair C-G is replaced by a T-A base pair in the minority allele. As MAOA, 5HTT is involved in the degradation of serotonin. Thus, to the extent that one allele is more transcriptionally efficient than the other, we would expect differential political participation across the carriers of the different allele expressions. Note that in contrast to VNTRs genetic variation due to SNPs can take at most three expressions. A person can inherit the minor allele from none, one, or both biological parents. For one gene (HTTLPR) we use a combination of both VNTRs and SNPs. Previous research has shown that a minor allele SNP (G) on long versions of the HTTLPR VNRT is less active than long versions with the more common variant (A). Thus shorter versions of this VNTR should be analyzed jointly with long versions that carry the minor allele SNP. The more active alleles are indicated as L' while the less active alleles are coded as S' (see Table 10).

In general the genetic information in Add Health is relatively limited. To date genome-wide sequencing has detected 84.7mn SNPs and 60,000 structural variants of which VNTRs are a subset (Altshuler et al., 2015). Thus, the genetic circumstance set employed in this study is far from capturing the entirety of genetic variation causally related to political participation.[10]

Table 5 shows results on IOp in political participation with respect to different circumstance scenarios. The first line of each panel repeats the benchmark IOp measure accounting for all available circumstances (see Table 3) for each dimension of interest. Drawing on bootstrapped standard errors, we contrast this measure with two alternative scenarios.

First, we calculate IOp using circumstance sets based on genetic information only. We see that a relatively small fraction of IOp is explained independently by the set of available genetic markers. This finding is unsurprising in view of the paucity of genetic information in our data set. Political participation is a highly polygenic trait, i.e. a large amount of genetic variants with very small individual effect sizes explain the heritability

[10]Obviously this will lead us to underestimate the impact of genetic circumstances. To some extent this downward bias is mitigated by the fact that alleles are in linkage disequilibrium. This property states that the correlation of alleles increases with their proximity on the respective chromosome (Altshuler et al., 2015). It will bias the point estimates of the specific genetic variants upwards but brings us closer to the true amount of variation in political participation explained by genetic information.

Table 5: Genetic Influence (Bootstrapped Results)

Outcome	N	Circ. Set	Diss. Index	Lower CI	Upper CI	Difference (p-value)
Political Participation						
Registered (2000)	8142	All Circumstances	9.5%	8.7%	10.4%	
		Genetic Endowment Only	2.5%	1.9%	3.2%	7.0(0.000)
		W/o Genetic Endowment	9.2%	8.3%	10.0%	0.4(0.000)
Vote (2000)	8111	All Circumstances	19.8%	18.4%	21.2%	
		Genetic Endowment Only	4.8%	3.6%	5.9%	15.0(0.000)
		W/o Genetic Endowment	19.2%	17.8%	20.6%	0.6(0.001)
Contact Official	8170	All Circumstances	59.7%	55.2%	64.1%	
		Genetic Endowment Only	23.6%	18.4%	28.8%	36.0(0.000)
		W/o Genetic Endowment	56.3%	51.7%	60.9%	3.3(0.001)
Rally/March	8170	All Circumstances	55.4%	50.6%	60.2%	
		Genetic Endowment Only	20.6%	15.1%	26.1%	34.8(0.000)
		W/o Genetic Endowment	51.7%	47.1%	56.3%	3.7(0.000)
Political Organization	8147	All Circumstances	63.0%	56.9%	69.1%	
		Genetic Endowment Only	23.4%	16.7%	30.1%	39.6(0.000)
		W/o Genetic Endowment	58.8%	52.9%	64.7%	4.2(0.001)
Volunteer Work	8147	All Circumstances	24.0%	22.2%	25.8%	
		Genetic Endowment Only	5.9%	4.3%	7.4%	18.1(0.000)
		W/o Genetic Endowment	23.3%	21.5%	25.0%	0.7(0.004)
Vote Always	8145	All Circumstances	22.4%	20.5%	24.4%	
		Genetic Endowment Only	9.1%	7.3%	11.0%	13.3(0.000)
		W/o Genetic Endowment	21.3%	19.3%	23.2%	1.1(0.001)
Vote Never	8145	All Circumstances	24.5%	23.0%	26.1%	
		Genetic Endowment Only	7.4%	5.9%	8.9%	17.1(0.000)
		W/o Genetic Endowment	23.8%	22.3%	25.4%	0.7(0.002)
Other Outcomes						
Personal Income W3 (k$)	7745	All Circumstances	23.3%	18.9%	27.8%	
		Genetic Endowment Only	3.0%	1.2%	4.8%	20.3(0.000)
		W/o Genetic Endowment	21.7%	17.4%	26.0%	1.7(0.007)
Personal Income W4 (k$)	8045	All Circumstances	30.7%	27.1%	34.2%	
		Genetic Endowment Only	10.6%	8.4%	12.9%	20.1(0.000)
		W/o Genetic Endowment	28.8%	25.4%	32.2%	1.9(0.000)
Very Good/Excellent Health	8180	All Circumstances	14.5%	13.4%	15.6%	
		Genetic Endowment Only	3.6%	2.7%	4.5%	10.9(0.000)
		W/o Genetic Endowment	14.2%	13.1%	15.3%	0.3(0.020)
High School Diploma	8180	All Circumstances	4.7%	4.1%	5.4%	
		Genetic Endowment Only	1.4%	1.0%	1.8%	3.3(0.000)
		W/o Genetic Endowment	4.6%	3.9%	5.2%	0.1(0.004)
(Some) Tertiary Educ.	8179	All Circumstances	18.3%	17.2%	19.4%	
		Genetic Endowment Only	4.6%	3.8%	5.5%	13.7(0.000)
		W/o Genetic Endowment	18.1%	17.0%	19.2%	0.2(0.015)

Note: Confidence intervals at the 95%-level and p-values are calculated based on bootstrapped results with 1000 draws. p-values refer to one-sided tests, as to whether the inclusion of the respective circumstance set causes a statistically significant upwards correction of the IOp measure.

of political participation. For comparison take a recent genome-wide association study that investigated genetic variants associated with educational attainment (Okbay et al., 2016). The authors found 74 SNPs that showed a significant association with educational attainment measured in years of schooling. Jointly these SNPs explained only 0.43% of the observed variation in the outcome variable while the strongest association of a single SNP yielded a R^2 of 0.035%.

Second, we remove genetic information to obtain a standard set of circumstances as it has been used in previous research on IOp. Focusing on the p-values in the last column, we can conclude that the integration of genetic endowments into the set of circumstances indeed provides a statistically significant upward correction of all IOp measures.

To confirm the importance of genetic information we repeat this procedure for other outcomes that are prominent in the literature: personal gross income, self-rated health status and two measures of educational achievement. Again the genetic circumstance set causes a statistically significant upward correction of the IOp measure. This finding is

particularly relevant as most applied research on EOp relies on a lower bound estimation method (Niehues and Peichl, 2014). The information we use with respect to childhood circumstances is already comprehensive in comparison to previous works on IOp. Thus one could have expected that much of the genetic variation was already reflected in the set of childhood circumstances which are shaped subsequent to the natural lottery of distributing genetic endowments. The fact that genetic information still provides an independent upward correction of IOp indicates that the increasing availability of large-scale genetic data sets may be fruitfully exploited in future empirical works of IOp.[11] Add Health itself plans to sequence its available saliva samples, which will make available genome-wide information that goes far beyond the candidate genes used in this study. Once available, this data could be used to construct polygenic risk scores (Dudbridge, 2013) that compile relevant genetic information for thousands of SNPs into one index variable.

4.4 Underlying Mechanisms

It is important to note that it is beyond the ambit of the current analysis to establish causal claims on the influence of specific circumstances on the existing political opportunity structure in the US. To guide policy, however, it is indispensable to move beyond the exploratory approach of the current analysis and to gain an understanding of the mechanisms at play.[12] After all, is it neighborhood characteristics or demographics (or any other factor) that drives the opportunity gap in political participation? Depending on the answer policy recommendations may be radically different. To respond to this quest we rely on two decomposition exercises. First, we use the Shapley value decomposition methodology proposed by Shorrocks (2012) to display which circumstance group provides the strongest contribution to IOp as presented in Table 3. Second, we introduce selected effort variables into the analytic framework for the purpose of analyzing the extent to which the different circumstance groups exert an indirect influence through individual effort. Hereby we rely on a recent methodology developed by Gelbach (2016).

In contrast to other decomposition methodologies, the Shapley value procedure overcomes the issue of path-dependency in evaluating different contribution factors. Therefore it delivers unbiased and additive decomposition results, i.e. the calculated contributions sum to the total measure of inequality. We implement the decomposition as follows. There

[11] Furthermore it is conceivable to use genetic data to refine empirical estimates of IOp with respect to different philosophical accounts. To the extent that childhood circumstances are correlated with genetic endowments, current estimates of IOp implicitly treat returns to genetic endowments as ethically objectionable and thus take a contested normative standpoint. To correct for this shortcoming one could adjust the empirical framework used in this work. Similar to our approach one would use genetic circumstances as controls in equation 2. However subsequently they would be neglected in the construction of the smoothed distribution (equation 3). The result would be the *true* measure of IOp net of genetic influence as coefficients on childhood circumstances were no longer biased by correlations with antecedent genetic factors. This procedure, however, requires a data set with genetic information akin to the one used for the purpose of this analysis.

[12] For instance Kanbur and Wagstaff (2014) question the policy relevance of the existing EOp literature on these grounds.

are 11 circumstance groups (Ω^m with $m = 11$): demographics, family, social life, neighborhood, school, ability, religion, physical condition, psychological condition, risk behavior, genetic endowment. Starting from the full circumstance set, we now sequentially eliminate each circumstance group and run the estimation procedure outlined in section 2. To take account of the inherent path dependency we repeat this exercise for each possible elimination sequence. We difference the results for the dissimilarity indexes prior to and after the elimination of each circumstance group. Calculating the weighted average over all possible elimination sequences then gives the effect of a circumstance group. The second column of Table 6 shows the previously calculated measure of the dissimilarity index. The first column to the right of the respective circumstance group indicates its absolute percentage point contribution to the dissimilarity index. The rightmost column shows the relative contribution in percent. We limit the presentation of the results to the top three circumstance groups per outcome dimension. The full list of results is appended in Table 11.

Table 6: Shapley Value Decomposition

Outcome	Diss. Index	Ω^m	Contrib.	in %
Registered (2000)	9.5%	Family	2.0pp	21.0%
		Psychological Condition	1.5pp	16.0%
		Demographics	1.2pp	12.5%
Vote (2000)	19.8%	Family	4.0pp	20.3%
		Psychological Condition	3.5pp	17.7%
		Risk Behavior	2.0pp	10.1%
Contact Official	59.7%	Family	13.7pp	23.0%
		Psychological Condition	10.4pp	17.4%
		Genetic Endowment	7.5pp	12.5%
Rally/March	55.4%	Family	13.0pp	23.5%
		Psychological Condition	8.3pp	14.9%
		Genetic Endowment	6.7pp	12.2%
Political Organization	63.0%	Family	11.5pp	18.3%
		Psychological Condition	11.2pp	17.8%
		Genetic Endowment	7.7pp	12.3%
Volunteer Work	24.0%	Family	4.7pp	19.8%
		Psychological Condition	4.2pp	17.4%
		Risk Behavior	3.0pp	12.5%
Vote Always	22.4%	Family	4.2pp	18.6%
		Psychological Condition	3.6pp	16.0%
		Neighborhood	3.3pp	14.9%
Vote Never	24.5%	Family	5.4pp	22.2%
		Psychological Condition	4.5pp	18.3%
		Demographics	2.2pp	9.1%

Note: The Shapley decompositions in this table are based on the results from the logit estimator. The last two columns indicate the Shapley value contribution of the respective circumstance set.

For each activity the results are ordered in decreasing magnitude of contribution. Among the circumstance groups under consideration, *Family* stands out as the one group that consistently ranks as the top contribution factor. This finding is consistent with previous studies that have confirmed the particular importance of parental education in the intergenerational transmission of political participation (Brady et al., 2015). Furthermore, the circumstances related to the child's psychological condition are the second most important contributors to all considered dimensions of political participation. Most variables considered in this group relate to the concept of self-efficacy understood as the "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over the events that affect their lives" (Bandura, 1998). Therefore, our finding

confirms previous research that considers a sense of political self-efficacy as one of the determining factors of political participation (Finkel, 1985). To the contrary, given its prominence in the academic literature (Jones-Correa and Leal, 2001) the small influence of the religious background of the respondents is striking. A similar conclusion holds for the categories *Social Life*, *School*, *Ability* and *Physical Condition*, all of which account for less than 10% of the explained variation in each activity of interest.

A novel procedure proposed by Gelbach (2016) focuses on the change of a coefficient of interest when introducing additional covariates. Thereby the researcher is able to tease out the extent to which the coefficient of interest in a restricted regression is biased due to correlation with other determining factors. We employ this methodology in order to detect those circumstance groups that exert a particularly strong *indirect* influence on political participation through selected effort variables. As the Shapley value decomposition Gelbach's method is path independent, i.e. it is irrelevant in which order the researcher introduces additional covariates.

The logic of the decomposition is most easily illustrated by a simple example.[13] Assume the outcome of interest was voting in the 2000 Presidential election, having a high school degree was the sole effort variable, and having rich parents was the sole circumstance of interest. We want to explain the share of the educational gap in vote participation that is explained by differential financial endowments of parents. First, we regress the vote participation on both the child's educational achievement (effort) and parental financial endowment (circumstance). On the circumstance variable, we obtain the coefficient β_j which can be interpreted as the impact of rich parents on vote casting conditional on educational achievement. Say $\beta_j = 0.2$, i.e. offspring of rich parents had a 20 percentage points higher propensity to turn out at the polls than individuals that grew up in poor households. In a second step, we regress the financial endowment of parents on the educational achievement of their children. On the effort variable we now obtain the coefficient γ_l^j that is indicative for the financial composition of parent households of the two effort groups. Say $\gamma_l^j = 0.1$, i.e. observing an individual with a high school degree, it is 10 percentage points more likely that this person grew up in a rich instead of a poor household. Gelbach (2016) shows that the product of both coefficients, $\Delta^j = \beta_j * \gamma_l^j$, yields exactly the participation gap attributable to the specific circumstance variable. In our example, $\Delta^j = \beta_j * \gamma_l^j = 0.2 * 0.1 = 0.02$, i.e. 0.02 percentage points in the observed participation gap between high school graduates and drop-outs are caused by differential financial endowments in parental households. Or alternatively: if education was equally distributed across households regardless of parental financial endowments, stratification by high school graduation status would shrink by 0.02 percentage points.

Table 7 lists summary statistics for our effort variables of choice.[14] We use four variables

[13] A more formal illustration of this method is provided in Appendix A.3.

[14] Alternatively, these variables could also be called responsibility factors. While this label may be intuitively more compelling it is important to note that our interpretation of EOp complies with Roemer's control view as opposed to the Fleurbaey and Maniquet (2011) formulation (see also Trannoy, 2016, for a

Table 7: Effort Variables (Summary Statistics)

	N	Mean	Mean (Weighted)	SD	SD (Weighted)	Min	Max
Wave 4 (2008)							
PVT Score W3	18392	100.025	101.634	14.930	14.515	13.000	146.000
Highschool Diploma	14151	0.896	0.884	0.305	0.321	0.000	1.000
(Some) Tertiary Educ.	14153	0.487	0.472	0.500	0.499	0.000	1.000
Log Personal Income W3	13280	8.340	8.330	2.632	2.635	0.000	13.124
Inst. Trust	14100	0.532	0.544	0.499	0.498	0.000	1.000
Identify with Pol. Party	13955	0.348	0.329	0.476	0.470	0.000	1.000

Note: In the weighted columns summary statistics are corrected for sampling procedure and sample attrition until Wave 3.

to proxy SES: ability measured by the PVT score in Wave 3, educational attainment measured by whether individuals graduated from high school and whether they had some tertiary education, and lastly the logarithm of personal income in Wave 3. Clearly, all of these SES proxies are effort variables to the extent that it is (partially) under the discretion of individuals to achieve the desired level of status. We furthermore construct a binary variable for institutional trust which takes value one if a person claims to trust the government at either central, state or local level.[15] Trust is an effort as it affords knowledge and information on behalf of the truster with respect to the trustee (Levi and Stoker, 2000), both of which are under the (partial) control of individuals. Similarly, we account for party identification as an effort variable under the assumption that partisan preferences are informed by political knowledge and information gathering on policy issues (Niemi and Jennings, M. Kent, 1991).

Table 8 presents results from regressing the measures of political participation on the set of effort variables, once unconditional and once conditional on the full set of circumstances. The associated change in coefficients on the effort variables is denoted by $\beta_l - \beta_l^{\Omega} = \Delta$.

succinct comparison.). Therefore, we stick to his original wording for internal consistency.

[15] In principle we could measure trust at each of the three levels and consider them independently. As trust in the different levels of government is highly collinear (correlations of close to 90%), we prefer to rely on the aggregate measure of institutional trust.

Table 8: Effort Regression

Effort	β_l	β_l^Ω	Δ	β_l	β_l^Ω	Δ	β_l	β_l^Ω	Δ	β_l	β_l^Ω	Δ
	Registered (2000)			Vote (2000)			Contact Official			Rally/March		
Ability	0.003***	0.002***	0.001***	0.003***	0.003***	0.000	0.001***	0.001***	0.000**	0.001***	0.001**	0.000***
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
High School Diploma	0.108***	0.085***	0.023***	0.098***	0.059***	0.040***	-0.016*	-0.018**	0.002	-0.007	-0.007	-0.000
	(0.027)	(0.026)	(0.008)	(0.021)	(0.021)	(0.009)	(0.009)	(0.009)	(0.003)	(0.006)	(0.007)	(0.003)
(Some) Tertiary Educ.	0.091***	0.083***	0.008	0.138***	0.100***	0.038***	0.023***	0.016***	0.008***	0.030***	0.022***	0.008***
	(0.014)	(0.016)	(0.007)	(0.016)	(0.017)	(0.007)	(0.005)	(0.005)	(0.003)	(0.005)	(0.005)	(0.003)
Log Personal Income W3	0.002	0.001	0.001	-0.001	-0.001	0.001	0.001	0.000	0.000	-0.000	-0.000	-0.000
	(0.003)	(0.002)	(0.001)	(0.003)	(0.003)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)
Inst. Trust	0.030**	0.028**	0.002	0.030**	0.029**	0.001	0.005	0.006	-0.001	-0.003	-0.002	-0.001
	(0.014)	(0.014)	(0.005)	(0.014)	(0.014)	(0.005)	(0.005)	(0.005)	(0.002)	(0.005)	(0.006)	(0.002)
Identify with Pol. Party	0.204***	0.172***	0.033***	0.331***	0.288***	0.043***	0.035***	0.033***	0.002	0.036***	0.032***	0.004**
	(0.013)	(0.013)	(0.005)	(0.016)	(0.016)	(0.005)	(0.006)	(0.006)	(0.002)	(0.006)	(0.007)	(0.002)
N	7353	7353		7327	7327		7373	7373		7372	7372	
R^2 adj.	0.103	0.164		0.170	0.235		0.033	0.056		0.027	0.044	
	Political Organization			Volunteer Work			Vote Always			Vote Never		
Ability	0.000*	0.000	0.000***	0.002***	0.002***	0.001**	0.001	0.001	-0.000	-0.003***	-0.002***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)
High School Diploma	-0.006	-0.003	-0.003	0.067***	0.058***	0.008	0.023	0.007	0.017**	-0.104***	-0.048*	-0.057***
	(0.007)	(0.007)	(0.002)	(0.017)	(0.019)	(0.008)	(0.021)	(0.022)	(0.007)	(0.027)	(0.025)	(0.009)
(Some) Tertiary Educ.	0.026***	0.023***	0.003	0.236***	0.187***	0.049***	0.069***	0.059***	0.010	-0.137***	-0.090***	-0.047***
	(0.004)	(0.005)	(0.002)	(0.015)	(0.016)	(0.007)	(0.014)	(0.015)	(0.007)	(0.015)	(0.016)	(0.007)
Log Personal Income W3	-0.000	0.000	-0.000	0.000	0.003	-0.003***	-0.005*	-0.003	-0.002**	0.002	0.001	0.001
	(0.001)	(0.001)	(0.000)	(0.002)	(0.002)	(0.001)	(0.003)	(0.003)	(0.001)	(0.003)	(0.003)	(0.001)
Inst. Trust	-0.000	0.002	-0.002	0.036***	0.022*	0.014***	0.006	0.014	-0.008*	-0.060***	-0.061***	0.001
	(0.005)	(0.004)	(0.001)	(0.013)	(0.014)	(0.004)	(0.013)	(0.013)	(0.004)	(0.014)	(0.014)	(0.005)
Identify with Pol. Party	0.020***	0.019***	0.001	0.073***	0.064***	0.010**	0.166***	0.138***	0.028***	-0.213***	-0.161***	-0.052***
	(0.005)	(0.005)	(0.001)	(0.015)	(0.015)	(0.005)	(0.015)	(0.015)	(0.004)	(0.014)	(0.014)	(0.005)
N	7359	7359		7359	7359		7344	7344		7344	7344	
R^2 adj.	0.015	0.038		0.112	0.152		0.051	0.093		0.128	0.201	

Note: *,** and *** indicate statistical significance at the 10%, 5% and 1%-level, respectively. Standard errors are robust to heteroskedasticity. Regression results are based on the OLS estimator. Δ is the difference between β_l and β_l^Ω, i.e. the point estimate of the respective effort variable with and without circumstance controls.

It is noteworthy that SES as measured by ability and educational achievement are strong determinants of political participation across most dimensions of activity, whereas the independent influence of personal income is negligible. Only with respect to being an "always-voter" personal income exerts a small negative effect significant at the 10%-level.[16] However, this effect vanishes when controlling for individual circumstances. Similarly, identification with a political party consistently exerts a significant positive influence on political participation across all dimensions under consideration. The evidence on the influence of institutional trust is somewhat mixed. People that claim to trust the government on average register and vote with a higher probability of around 3 percentage points as opposed to non-trusting individuals. Furthermore, more institutional trust is significantly correlated with a higher propensity for volunteer work and a lower probability of being a "never-voter". The coefficients on all effort variables for which we find a statistically significant relation to political participation are attenuated when accounting for the full set of individual circumstances.

In Table 9 we present results of the decomposition of the change in coefficients according to the eleven circumstance groups: $\Delta = \sum_m \Delta^m$. For each outcome-effort dyad we present the top three contributors to Δ conditional on β_l, β_l^Ω and Δ^m being significant at least at the 10%-level. Columns 1 and 2 indicate the outcome-effort dyad, while Column 4 and 5 show the coefficient change Δ in absolute and relative terms. The last three columns show the results of the decomposition by circumstance group, again both in absolute and relative terms.

Table 9: Gelbach Decomposition

Outcome	Effort	Δ	in %	Ω^m	Δ^m	in %
Registered (2000)	Ability	0.001*** (0.000)	37%	Demographics	0.001** (0.001)	130%
				Family	0.001*** (0.000)	56%
				Psychological Condition	0.000* (0.000)	20%
	High School Diploma	0.023*** (0.008)	21%	Religion	0.007*** (0.002)	33%
				Risk Behavior	0.005** (0.003)	24%
				School	0.004* (0.002)	17%
	Identify with Pol. Party	0.033*** (0.005)	16%	Demographics	0.010* (0.005)	30%
				Religion	0.005*** (0.002)	14%
				Family	0.005** (0.002)	14%
Vote (2000)	High School Diploma	0.040*** (0.009)	40%	Genetic Endowment	0.031* (0.017)	78%
				Demographics	-0.028* (0.016)	-72%
				Family	0.014*** (0.005)	36%
	(Some) Tertiary Educ.	0.038*** (0.007)	27%	Demographics	-0.049*** (0.017)	-130%
				Genetic Endowment	0.035** (0.018)	94%
				Family	0.026*** (0.005)	68%
	Identify with Pol. Party	0.043*** (0.005)	13%	Demographics	0.012* (0.007)	28%
				Neighborhood	0.007***	16%

Continued on next page

[16] It is small in the sense that a 10% increase in personal income decreases the likelihood of being an "always-voter" by 0.05 percentage points. Note that the negative effect obtains conditional on all other effort variables, for example the educational status of a person.

Table 9 – *Continued from previous page*

Outcome	Effort	Δ	in %	Ω^m	Δ^m	in %
					(0.002)	
				Psychological Condition	0.006***	14%
					(0.002)	
Contact Official	Ability	0.000**	19%	Family	0.000*	49%
		(0.000)			(0.000)	
	(Some) Tertiary Educ.	0.008***	33%	Family	0.005***	66%
		(0.003)			(0.002)	
				Religion	0.001*	14%
					(0.001)	
				School	-0.001*	-11%
					(0.001)	
Rally/March	Ability	0.000***	36%	Physical Condition	0.000*	7%
		(0.000)			(0.000)	
	(Some) Tertiary Educ.	0.008***	26%	Family	0.005***	67%
		(0.003)			(0.002)	
				Risk Behavior	0.003*	33%
					(0.001)	
				School	-0.001*	-13%
					(0.001)	
	Identify with Pol. Party	0.004**	11%	Family	0.002***	50%
		(0.002)			(0.001)	
				Psychological Condition	0.001*	28%
					(0.001)	
				Social Life	-0.001**	-26%
					(0.000)	
Volunteer Work	Ability	0.001**	30%	Psychological Condition	0.000***	59%
		(0.000)			(0.000)	
				Ability	-0.000***	-39%
					(0.000)	
				Religion	-0.000***	-20%
					(0.000)	
	(Some) Tertiary Educ.	0.049***	21%	Family	0.017***	35%
		(0.007)			(0.005)	
				Risk Behavior	0.013***	26%
					(0.003)	
				Psychological Condition	0.011***	23%
					(0.004)	
	Inst. Trust	0.014***	39%	Risk Behavior	0.007***	47%
		(0.004)			(0.002)	
	Identify with Pol. Party	0.010**	13%	Demographics	-0.009**	-96%
		(0.005)			(0.004)	
				Religion	0.008***	87%
					(0.002)	
				Psychological Condition	0.003**	35%
					(0.001)	
Vote Always	Identify with Pol. Party	0.028***	17%	Neighborhood	0.006***	23%
		(0.004)			(0.002)	
				Family	0.004**	15%
					(0.002)	
				Psychological Condition	0.004**	13%
					(0.001)	
Vote Never	Ability	-0.001***	34%	Genetic Endowment	0.001**	-118%
		(0.000)			(0.001)	
				Family	-0.001***	94%
					(0.000)	
				Demographics	-0.001*	93%
					(0.001)	
	High School Diploma	-0.057***	54%	Family	-0.025***	44%
		(0.009)			(0.005)	
				Genetic Endowment	-0.025*	43%
					(0.013)	
				Demographics	0.023*	-41%
					(0.013)	
	(Some) Tertiary Educ.	-0.047***	34%	Demographics	0.044***	-93%
		(0.007)			(0.017)	
				Family	-0.036***	77%
					(0.005)	
				Genetic Endowment	-0.035**	74%
					(0.017)	
	Identify with Pol. Party	-0.052***	25%	Neighborhood	-0.008***	14%
		(0.005)			(0.002)	
				Family	-0.006**	11%
					(0.002)	
				School	-0.006***	11%
					(0.001)	

Note: Gelbach decompositions are based on the OLS estimator. Δ is the difference between β_l and β_l^{Ω}, i.e. the point estimate of the respective effort variable with and without circumstance controls. The last two columns indicate the contributions of the respective circumstance sets to Δ.

For the sake of brevity, we will focus the discussion on voting in the 2000 Presidential election. Let us focus on the aggregate impact of circumstances, Δ, first. In the case of voting in 2000, the impact of the two variables on education are most strongly stratified by circumstance factors. If the aggregate impact of circumstances on the probability of obtaining a high school degree had been neutralized, the participation gap between high school graduates and drop-outs would have been 4 percentage points (or 40%) lower in

this election. Analogously, the turnout gap between those who went to college and those who did not would have been lowered by 3.8 percentage points (27%) if factors beyond individual control had been uncorrelated to the probability of obtaining at least some tertiary education. In general the results indicate that circumstances are a strong contributor to the observed stratification of political participation by educational status, ranging from 21% in the dyad *Tertiary Education-Volunteer Work* up to 54% in the dyad *High School Diploma-Vote Never*. In the case of party identification the relevant range lies somewhat lower between 11% (*Rally/March*) and 25% (*Vote Never*). As regards institutional trust, we detect only one statistically significant relationship: a neutralization of circumstance influence on institutional trust would decrease the stratification of volunteer work between trusting and non-trusting individuals by 1 percentage point (14%).

The last two columns of Table 9 further decompose the aggregate indirect impact of circumstances through effort into the contributions of the eleven circumstance groups. It is noteworthy that not all circumstance groups have a dis-equalizing indirect effect on political opportunities in the US. To the contrary some circumstances mitigate the differential influence other circumstance groups exert. For instance in the case of vote casting in the 2000 Presidential election, genetics were the strongest contributors to the stratification along the high school graduation divide. 78% of the 4 percentage point impact of circumstances could be attributed to this circumstance group, i.e. stratification between high school graduates and non-graduates would have been 3.1 percentage points lower if genetics were uncorrelated to the probability of obtaining the respective degree. The contrary conclusion holds for demographic circumstances. Had public policy been successful in mitigating the influence of demographics on the probability of graduating from high school, the participation gap would have increased by 2.8 percentage points. This result is mainly driven by differential patterns in high school graduation rates and vote casting across the sexes. Females had a lower participation ($\beta_j = -0.393$) but higher graduation rates ($\gamma_l^j = 0.073$) than their male counterparts. Combining both estimates $\Delta^j = -0.393 * 0.073 = -0.029$, which corresponds to the total equalizing contribution of demographics ($\Delta^m = -0.028$). A similar pattern is observable for the influence of demographics (and biological sex in particular) on vote casting via differential tertiary education ($\Delta^j = -0.393 * 0.085 = -0.033$, $\Delta^m = -0.049$). To the contrary, the overall effect of demographics via partisanship is dis-equalizing ($\Delta^m = 0.012$). These results highlight that a mitigation of circumstance influence on effort variables will instill heterogeneous effects along different forms of participation. In this particular case, an opportunity equalizing policy targeted at demographic differences would have decreased stratification by partisanship, while it would have magnified stratification by educational achievement.

Lastly, a comparison of the Gelbach decomposition with the Shapley value exercise suggests that the patterns of indirect circumstance influence via selected effort variables differ strongly from overall circumstance impact. While the results from the Shapley value decomposition suggests that family background characteristics and psychological

dispositions during childhood consistently are the strongest contributors to the observed opportunity structure in political participation, the pattern of indirect influence is less clear. In the case of vote casting in the 2000 Presidential election, demographics evolve among the top three contributors for all effort variables that could be robustly associated with the outcome of interest. To the contrary, psychological dispositions only play a role via the partisanship channel ($\Delta^m = 0.006$). Family background exerts a strong influence through SES measured by educational attainment ($\Delta^m = 0.014$ and $\Delta^m = 0.026$ for high school graduation and tertiary education, respectively). Overall, the impact of the eleven circumstance groups appears to be highly specific to the respective outcome-effort dyad.

5 Conclusion

In this work we have presented the first estimates of EOp in political participation. Using rich panel data from the US, that allows us to track children into adulthood we have used circumstance variables, i.e. factors beyond individual control, from eleven different areas (demographics, family, social life, neighborhood, school, ability, religion, physical condition, psychological condition, risk behavior, genetic endowment) to partition the sample into types. Based on this type partition we have constructed a counterfactual distribution that is indicative for inequality in political participation as predicted by circumstances only, i.e. the share of inequality that is unfair from an equal opportunity perspective.

We found that political opportunities are particularly unjustly distributed with respect to contacts to officials, participation in rallies and marches, and the membership in political organizations. Furthermore we have shown that a lack of opportunity in one dimension is complemented by restricted opportunities in other dimensions of political participation and that these inequalities do not vanish following the phase of political initiation. Among the different factors influencing EOp in political participation, the family background and psychological dispositions during the childhood of individuals stand out as the factors that consistently contribute in an important manner to all considered forms of political participation. The indirect influence of circumstances through effort variables is sizable. However in comparison to the overall impact of circumstances on political participation the influence patterns across the different forms of participation are less clear and dependent on the respective outcome-effort dyad. The integration of genetic circumstances yields a relatively small, yet statistically significant upward correction of our lower bound IOp measure. This suggests that much of the variation due to the genetic lottery is reflected in circumstances that are observed without genotype information. Nevertheless it is important to recall that the amount of genetic information used in this study is rather limited. The human genome is believed to consist of about 25,000 genes (Plomin et al., 2008) of which we cover only a tiny fraction in our genetic circumstance set. Thus the amount of genetic influence on IOp may be shown to be greater in future research as the availability of genetic databases expands.

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A Appendix

A.1 Circumstance Variables (Summary Statistics)

Table 10: Circumstance Variables (Summary Statistics)

	N	Mean	Mean (Weighted)	SD	SD (Weighted)	Min	Max
Demographics							
Female	19263	0.509	0.498	0.500	0.500	0.000	1.000
Race: White	19255	0.579	0.703	0.494	0.457	0.000	1.000
Race: Black	19255	0.213	0.150	0.409	0.357	0.000	1.000
Race: Asian	19255	0.065	0.036	0.247	0.187	0.000	1.000
Race: Other Non-White	19255	0.143	0.110	0.350	0.313	0.000	1.000
Born in US	19262	0.915	0.942	0.279	0.234	0.000	1.000
Birth/Year: '76	19263	0.000	0.000	0.007	0.000	0.000	1.000
Birth/Year: '77	19263	0.200	0.183	0.400	0.387	0.000	1.000
Birth/Year: '78	19263	0.213	0.177	0.410	0.382	0.000	1.000
Birth/Year: '79	19263	0.204	0.177	0.403	0.382	0.000	1.000
Birth/Year: '80	19263	0.167	0.184	0.373	0.387	0.000	1.000
Birth/Year: '81	19263	0.129	0.166	0.336	0.372	0.000	1.000
Birth/Year: >'81	19263	0.087	0.112	0.281	0.315	0.000	1.000
Family							
Orphan (Mother)	19263	0.041	0.023	0.198	0.149	0.000	1.000
Orphan (Father)	19263	0.133	0.101	0.339	0.301	0.000	1.000
No Father in HH	19263	0.296	0.264	0.457	0.441	0.000	1.000
No Mother in HH	19263	0.055	0.051	0.228	0.220	0.000	1.000
HH-Size: <3	19258	0.224	0.242	0.417	0.429	0.000	1.000
HH-Size: 3	19258	0.316	0.337	0.465	0.473	0.000	1.000
HH-Size: 4	19258	0.234	0.232	0.423	0.422	0.000	1.000
HH-Size: 5	19258	0.121	0.104	0.326	0.306	0.000	1.000
HH-Size: 6	19258	0.051	0.043	0.221	0.203	0.000	1.000
HH-Size: >6	19258	0.054	0.042	0.226	0.200	0.000	1.000
No Siblings	19263	0.207	0.219	0.405	0.414	0.000	1.000
# Siblings: 1	19263	0.376	0.394	0.484	0.489	0.000	1.000
# Siblings: 2	19263	0.252	0.241	0.434	0.428	0.000	1.000
# Siblings: 3	19263	0.108	0.095	0.310	0.293	0.000	1.000
# Siblings: 4	19263	0.035	0.030	0.183	0.171	0.000	1.000
# Siblings: >4	19263	0.023	0.021	0.149	0.142	0.000	1.000
English @ Home	19261	0.892	0.929	0.310	0.258	0.000	1.000
Educ. Mom: HS/Voc. School/GED	19252	0.380	0.406	0.485	0.491	0.000	1.000
Educ. Mom: College Dropout	19252	0.119	0.115	0.324	0.320	0.000	1.000
Educ. Mom: College/Professional	19252	0.252	0.242	0.434	0.428	0.000	1.000
Not in HH/Don't Know/No Degree	19252	0.248	0.237	0.432	0.425	0.000	1.000
Educ. Dad: HS/Voc. School/GED	19249	0.258	0.280	0.438	0.449	0.000	1.000
Educ. Dad: College Dropout	19249	0.079	0.083	0.270	0.275	0.000	1.000
Educ. Dad: College/Professional	19249	0.216	0.225	0.412	0.418	0.000	1.000
Not in HH/Don't Know/No Degree	19249	0.446	0.412	0.497	0.492	0.000	1.000
Mom: Blue Collar	19248	0.269	0.261	0.443	0.439	0.000	1.000
Mom: White Collar	19248	0.531	0.552	0.499	0.497	0.000	1.000
Mom: Not in HH/No Job	19248	0.200	0.187	0.400	0.390	0.000	1.000
Dad: Blue Collar	19244	0.201	0.212	0.401	0.408	0.000	1.000
Dad: White Collar	19244	0.465	0.489	0.499	0.500	0.000	1.000
Dad: Not in HH/No Job	19244	0.334	0.299	0.472	0.458	0.000	1.000
HH-Member on Welfare?	19260	0.113	0.100	0.316	0.301	0.000	1.000
Home State: Very Well Kept	19249	0.539	0.567	0.499	0.496	0.000	1.000
Home State: Fairly Well	19249	0.315	0.292	0.465	0.455	0.000	1.000
Home State: Poor	19249	0.098	0.094	0.298	0.293	0.000	1.000
Home State: Very Poor	19249	0.048	0.046	0.213	0.211	0.000	1.000
Parent w/ Disability?	19263	0.112	0.114	0.315	0.318	0.000	1.000
Meals w/ Mom or Dad? >4 d/w	19251	0.659	0.693	0.474	0.461	0.000	1.000
Close to Mom? No Mom in HH	19256	0.055	0.051	0.228	0.220	0.000	1.000
Close to Mom? Not Close	19256	0.029	0.027	0.168	0.162	0.000	1.000
Close to Mom? Somewhat	19256	0.079	0.071	0.270	0.258	0.000	1.000
Close to Mom? Quite a Bit	19256	0.200	0.205	0.400	0.404	0.000	1.000
Close to Mom? Very Much	19256	0.637	0.645	0.481	0.478	0.000	1.000
Close to Dad? No Dad in HH	19255	0.296	0.264	0.457	0.441	0.000	1.000
Close to Dad? Not Close	19255	0.043	0.039	0.204	0.194	0.000	1.000
Close to Dad? Somewhat	19255	0.099	0.096	0.299	0.294	0.000	1.000
Close to Dad? Quite a Bit	19255	0.186	0.199	0.389	0.399	0.000	1.000
Close to Dad? Very Much	19255	0.375	0.402	0.484	0.490	0.000	1.000
Family w/ Suicide Attempt?	19145	0.045	0.044	0.208	0.206	0.000	1.000
Social Life							
Friend Contact/Week: No Contact	19257	0.094	0.092	0.292	0.288	0.000	1.000
Friend Contact/Week: 1-2	19257	0.235	0.230	0.424	0.421	0.000	1.000
Friend Contact/Week: 3-4	19257	0.266	0.268	0.442	0.443	0.000	1.000
Friend Contact/Week: >5	19257	0.404	0.410	0.491	0.492	0.000	1.000
Friend Contact/Week: Other	19257	0.000	0.000	0.012	0.016	0.000	1.000
Socially Accepted? Agree	19234	0.843	0.852	0.364	0.355	0.000	1.000
Socially Accepted? Don't Know	19234	0.115	0.105	0.319	0.307	0.000	1.000
Socially Accepted? Disagree	19234	0.042	0.042	0.201	0.201	0.000	1.000
Friend w/ Suicide Attempt?	19136	0.174	0.179	0.379	0.384	0.000	1.000
Ever in Romantic Relation?	19193	0.546	0.531	0.498	0.499	0.000	1.000
No Sex yet	19113	0.626	0.659	0.484	0.474	0.000	1.000
First Sex (Age): <13	19113	0.050	0.048	0.217	0.215	0.000	1.000
First Sex (Age): 13-16	19113	0.245	0.223	0.430	0.416	0.000	1.000
First Sex (Age): >16	19113	0.062	0.056	0.241	0.230	0.000	1.000
First Sex (Age): Don't Know	19113	0.018	0.014	0.133	0.116	0.000	1.000
Homosexual Attraction	19263	0.035	0.037	0.184	0.189	0.000	1.000
Neighborhood							
Witnessed Shootings? Never	19155	0.872	0.895	0.334	0.307	0.000	1.000
Witnessed Shootings? Once	19155	0.093	0.077	0.291	0.267	0.000	1.000
Witnessed Shootings? > Once	19155	0.035	0.028	0.184	0.166	0.000	1.000
Knife Pulled on You? Never	19160	0.869	0.882	0.337	0.322	0.000	1.000
Knife Pulled on You? Once	19160	0.103	0.093	0.304	0.291	0.000	1.000

Continued on next page

Table 10 – *Continued from previous page*

	N	Mean	Mean (Weighted)	SD	SD (Weighted)	Min	Max
Knife Pulled on You? > Once	19160	0.028	0.024	0.164	0.155	0.000	1.000
Private Schools (%, Tract)	19059	0.097	0.088	0.095	0.091	0.000	0.844
25+ w/o HS-Degree (%, Tract)	19096	0.284	0.271	0.144	0.140	0.000	0.874
Educ. Exp. (per capita, County)	19153	674.154	677.025	159.929	156.375	2.542	2281.676
Health Exp. (per capita, County)	19153	142.053	141.747	141.611	156.240	0.000	839.839
Welfare Exp. (per capita, County)	19153	76.399	58.058	103.578	88.500	0.000	473.003
Security Exp. (per capita, County)	19153	89.520	78.343	45.879	39.791	7.481	198.406
Children w/o Both Parents (%, Tract)	19076	0.270	0.251	0.169	0.165	0.012	1.000
Housing Vacancy (%, Tract)	19090	0.083	0.088	0.079	0.082	0.000	0.858
Housing w/o Plumbing (%, Tract)	19088	0.008	0.008	0.015	0.016	0.000	0.297
Median HH Income in k (Tract)	19075	30.887	30.006	13.399	12.558	4.999	125.053
SD HH Income in k (Tract)	19075	25.898	25.519	7.836	7.932	6.916	66.828
Poverty (%, Tract)	19094	0.145	0.144	0.123	0.121	0.000	0.864
Unemployment Rate (Tract)	19079	0.076	0.075	0.048	0.048	0.000	0.658
Pers./Sq.-km (Tract)	19098	1.807	1.388	3.424	3.016	0.000	69.172
Race Dispersion (Tract)	19094	0.317	0.254	0.272	0.241	0.000	0.933
Median Age (Tract)	19094	32.096	32.137	4.395	4.213	12.667	64.580
Foreign % (Tract)	19096	0.103	0.065	0.161	0.117	0.000	0.869
<1 Crime per 100 ppl	19263	0.691	0.792	0.462	0.406	0.000	1.000
1-2 Violent Crimes per 100 ppl	19263	0.274	0.187	0.446	0.390	0.000	1.000
>2 Violent Crimes per 100 ppl	19263	0.035	0.020	0.184	0.141	0.000	1.000
<3 Non-Violent Crimes per 100 ppl	19263	0.225	0.248	0.418	0.432	0.000	1.000
3-6 Non-Violent Crimes per 100 ppl	19263	0.522	0.500	0.500	0.500	0.000	1.000
>6 Non-Violent Crimes per 100 ppl	19263	0.253	0.253	0.435	0.434	0.000	1.000
Mail Vote pre-NVRA	19154	0.730	0.709	0.444	0.454	0.000	1.000
% Working Outside County	19154	0.222	0.243	0.182	0.181	0.017	0.738
Dem./Rep. % in 1992 Vote	19154	0.060	0.038	0.179	0.175	-0.408	0.624
School							
Dist. School: <2km	19263	0.353	0.346	0.478	0.476	0.000	1.000
Dist. School: 2-5km	19263	0.328	0.311	0.469	0.463	0.000	1.000
Dist. School: 5-10km	19263	0.185	0.206	0.388	0.404	0.000	1.000
Dist. School: >10km	19263	0.134	0.137	0.340	0.344	0.000	1.000
Class Size: <20	19263	0.079	0.082	0.269	0.275	0.000	1.000
Class Size: 20-24	19263	0.165	0.191	0.371	0.393	0.000	1.000
Class Size: 25-29	19263	0.308	0.295	0.462	0.456	0.000	1.000
Class Size: >30	19263	0.449	0.433	0.497	0.495	0.000	1.000
% Female Teacher: <25	19263	0.012	0.016	0.109	0.127	0.000	1.000
% Female Teacher: 26-50	19263	0.256	0.199	0.437	0.399	0.000	1.000
% Female Teacher: 51-75	19263	0.359	0.344	0.480	0.475	0.000	1.000
% Female Teacher: >75	19263	0.373	0.441	0.484	0.496	0.000	1.000
% Teacher w/ MA: < 25	19263	0.158	0.113	0.365	0.317	0.000	1.000
% Teacher w/ MA: 26-50	19263	0.304	0.309	0.460	0.462	0.000	1.000
% Teacher w/ MA: 51-75	19263	0.169	0.162	0.375	0.368	0.000	1.000
% Teacher w/ MA: >75	19263	0.368	0.416	0.482	0.493	0.000	1.000
Ability							
Skipped Grade	19252	0.028	0.021	0.164	0.143	0.000	1.000
Repeated Grade	19254	0.204	0.194	0.403	0.395	0.000	1.000
PVT Score W1	14133	130.343	135.715	161.384	171.509	9.000	996.000
Religion							
No Religion	16525	0.063	0.069	0.242	0.253	0.000	1.000
# Parent: Rel. Service 1/Week	16525	0.385	0.367	0.487	0.482	0.000	1.000
# Parent: Rel. Service 1/Month	16525	0.187	0.190	0.390	0.393	0.000	1.000
# Parent: Rel. Service <1/Month	16525	0.238	0.238	0.426	0.426	0.000	1.000
# Parent: Rel. Service Never	16525	0.127	0.136	0.333	0.342	0.000	1.000
No Religion	16522	0.063	0.069	0.242	0.253	0.000	1.000
Parent: Rel. Important	16522	0.889	0.880	0.314	0.325	0.000	1.000
Parent: Rel. Not Important	16522	0.048	0.051	0.214	0.221	0.000	1.000
Physical Condition							
BMI: Underweight	19263	0.134	0.150	0.341	0.357	0.000	1.000
BMI: Normal Weight	19263	0.630	0.614	0.483	0.487	0.000	1.000
BMI: Overweight	19263	0.235	0.236	0.424	0.425	0.000	1.000
Looks: Very Unattractive	19246	0.018	0.018	0.132	0.131	0.000	1.000
Looks: Unattractive	19246	0.046	0.045	0.210	0.207	0.000	1.000
Looks: Avrg. Attractive	19246	0.446	0.444	0.497	0.497	0.000	1.000
Looks: Attractive	19246	0.340	0.341	0.474	0.474	0.000	1.000
Looks: Very Attractive	19246	0.151	0.153	0.358	0.360	0.000	1.000
Health: Excellent	19258	0.280	0.282	0.449	0.450	0.000	1.000
Health: Very Good	19258	0.393	0.396	0.488	0.489	0.000	1.000
Health: Good	19258	0.256	0.254	0.436	0.435	0.000	1.000
Health: Not Good	19258	0.070	0.068	0.256	0.251	0.000	1.000
Permanent Physical Condition?	19253	0.028	0.023	0.165	0.151	0.000	1.000
Use Mobility Device?	19255	0.030	0.028	0.171	0.165	0.000	1.000
Physical Difficulties?	19257	0.048	0.042	0.213	0.200	0.000	1.000
Psychological Condition							
Intelligence? Below Avrg.	19244	0.063	0.068	0.243	0.252	0.000	1.000
Intelligence? About Avrg.	19244	0.394	0.378	0.489	0.485	0.000	1.000
Intelligence? Above Avrg.	19244	0.543	0.554	0.498	0.497	0.000	1.000
Hard Work Pays? Agree	19237	0.737	0.733	0.440	0.442	0.000	1.000
Hard Work Pays? Don't Know	19237	0.184	0.187	0.388	0.390	0.000	1.000
Hard Work Pays? Disagree	19237	0.079	0.080	0.270	0.271	0.000	1.000
# No Suicidal Thoughts	19259	0.869	0.871	0.338	0.336	0.000	1.000
# Suicide Attempts: 0	19259	0.092	0.092	0.289	0.288	0.000	1.000
# Suicide Attempts: 1	19259	0.024	0.025	0.153	0.156	0.000	1.000
# Suicide Attempts: >1	19259	0.015	0.013	0.123	0.114	0.000	1.000
Going to College? No/Little Chance	19211	0.099	0.099	0.299	0.298	0.000	1.000
Going to College? 50:50 Chance	19211	0.147	0.145	0.355	0.352	0.000	1.000
Going to College? Good Chance	19211	0.218	0.211	0.413	0.408	0.000	1.000
Going to College? Almost Certain	19211	0.536	0.545	0.499	0.498	0.000	1.000
Live to 35? No/Little Chance	19204	0.038	0.033	0.191	0.179	0.000	1.000
Live to 35? 50:50 Chance	19204	0.113	0.104	0.317	0.306	0.000	1.000
Live to 35? Good Chance	19204	0.305	0.284	0.460	0.451	0.000	1.000
Live to 35? Almost Certain	19204	0.544	0.578	0.498	0.494	0.000	1.000
Marry 'til 25? No/Little Chance	19206	0.233	0.223	0.423	0.416	0.000	1.000
Marry 'til 25? 50:50 Chance	19206	0.349	0.344	0.477	0.475	0.000	1.000
Marry 'til 25? Good Chance	19206	0.292	0.306	0.455	0.461	0.000	1.000
Marry 'til 25? Almost Certain	19206	0.125	0.126	0.331	0.332	0.000	1.000
Psychological Counseling	19249	0.125	0.125	0.331	0.331	0.000	1.000
Risk Behavior							

Continued on next page

Table 10 – *Continued from previous page*

	N	Mean	Mean (Weighted)	SD	SD (Weighted)	Min	Max
Never Smoked	19250	0.577	0.559	0.494	0.497	0.000	1.000
Not Smoked Regularly	19250	0.230	0.236	0.421	0.425	0.000	1.000
Smoked Regularly	19250	0.193	0.205	0.395	0.404	0.000	1.000
Never Drink	19244	0.541	0.543	0.498	0.498	0.000	1.000
Drink: 1-7/Week	19244	0.093	0.089	0.290	0.285	0.000	1.000
Drink: <1-3/Month	19244	0.197	0.199	0.398	0.399	0.000	1.000
Drink: 1-2/Year	19244	0.169	0.168	0.375	0.374	0.000	1.000
No Smoking Friends	19121	0.549	0.547	0.498	0.498	0.000	1.000
# Smoking Friends: 1	19121	0.205	0.205	0.403	0.404	0.000	1.000
# Smoking Friends: 2	19121	0.128	0.125	0.334	0.330	0.000	1.000
# Smoking Friends: 3	19121	0.119	0.123	0.324	0.328	0.000	1.000
No Drinking Friends	19103	0.445	0.456	0.497	0.498	0.000	1.000
# Drinking Friends: 1	19103	0.211	0.206	0.408	0.404	0.000	1.000
# Drinking Friends: 2	19103	0.154	0.148	0.361	0.355	0.000	1.000
# Drinking Friends: 3	19103	0.191	0.190	0.393	0.393	0.000	1.000
No Weed Smoking Friends	19078	0.652	0.671	0.476	0.470	0.000	1.000
# Weed Smoking Friends: 1	19078	0.156	0.150	0.363	0.357	0.000	1.000
# Weed Smoking Friends: 2	19078	0.095	0.090	0.293	0.286	0.000	1.000
# Weed Smoking Friends: 3	19078	0.097	0.089	0.296	0.285	0.000	1.000
Ever Smoked Weed	19263	0.290	0.274	0.454	0.446	0.000	1.000
Ever Used Cocaine	19263	0.046	0.044	0.209	0.205	0.000	1.000
Ever Used Inhalants	19263	0.074	0.075	0.261	0.263	0.000	1.000
Ever Used Other Drugs	19263	0.092	0.090	0.289	0.287	0.000	1.000
Genetic Endowment							
DAT1 A: >9R	13802	0.598	0.580	0.490	0.494	0.000	1.000
DAT1 A: 3R-9R	13802	0.402	0.420	0.490	0.494	0.000	1.000
DAT1 B: >9R	13802	0.943	0.940	0.233	0.237	0.000	1.000
DAT1 B: 7R-9R	13802	0.057	0.060	0.233	0.237	0.000	1.000
DRD4 A: 2R-3.39R	13815	0.219	0.224	0.413	0.417	0.000	1.000
DRD4 A: 4R-6R	13815	0.731	0.726	0.443	0.446	0.000	1.000
DRD4 A: >6R	13815	0.050	0.050	0.218	0.218	0.000	1.000
DRD4 B: 2R-3R	13815	0.018	0.018	0.134	0.133	0.000	1.000
DRD4 B: 4R-6R	13815	0.605	0.603	0.489	0.489	0.000	1.000
DRD4 B: >6R	13815	0.377	0.379	0.485	0.485	0.000	1.000
MAOA_V A: 2R-3.5R	13825	0.541	0.516	0.498	0.500	0.000	1.000
MAOA_V A: 4R-5R	13825	0.459	0.484	0.498	0.500	0.000	1.000
MAOA_V B: 2R-3.5R	13825	0.092	0.079	0.289	0.270	0.000	1.000
MAOA_V B: 4R-5R	13825	0.446	0.435	0.497	0.496	0.000	1.000
MAOA_V B: Male	13825	0.462	0.485	0.499	0.500	0.000	1.000
HTTLPR A: L'	13838	0.336	0.320	0.472	0.466	0.000	1.000
HTTLPR A: S'	13838	0.664	0.680	0.472	0.466	0.000	1.000
HTTLPR B: L'	13838	0.619	0.634	0.486	0.482	0.000	1.000
HTTLPR B: S'	13838	0.381	0.366	0.486	0.482	0.000	1.000
DRD2 A: A	13693	0.452	0.443	0.498	0.497	0.000	1.000
DRD2 A: G	13693	0.548	0.557	0.498	0.497	0.000	1.000
DRD2 B: A	13693	0.074	0.062	0.262	0.242	0.000	1.000
DRD2 B: G	13693	0.926	0.938	0.262	0.242	0.000	1.000
COMT A: A	13174	0.683	0.711	0.465	0.454	0.000	1.000
COMT A: G	13174	0.317	0.289	0.465	0.454	0.000	1.000
COMT B: A	13174	0.206	0.227	0.404	0.419	0.000	1.000
COMT B: G	13174	0.794	0.773	0.404	0.419	0.000	1.000
5HTT A: C	12872	0.920	0.921	0.271	0.270	0.000	1.000
5HTT A: T	12872	0.080	0.079	0.271	0.270	0.000	1.000
5HTT B: C	12872	0.521	0.504	0.500	0.500	0.000	1.000
5HTT B: T	12872	0.479	0.496	0.500	0.500	0.000	1.000
DRD5 A: 124-132	13525	0.029	0.022	0.169	0.147	0.000	1.000
DRD5 A: 134	13525	0.026	0.029	0.158	0.168	0.000	1.000
DRD5 A: 136	13525	0.042	0.041	0.200	0.198	0.000	1.000
DRD5 A: 138	13525	0.133	0.140	0.340	0.347	0.000	1.000
DRD5 A: 140	13525	0.081	0.081	0.273	0.273	0.000	1.000
DRD5 A: 142	13525	0.090	0.080	0.286	0.271	0.000	1.000
DRD5 A: 144	13525	0.084	0.073	0.278	0.260	0.000	1.000
DRD5 A: 146	13525	0.115	0.109	0.319	0.311	0.000	1.000
DRD5 A: 148	13525	0.332	0.360	0.471	0.480	0.000	1.000
DRD5 A: 150-172	13525	0.067	0.065	0.250	0.246	0.000	1.000
DRD5 B: 126-138	13525	0.022	0.021	0.145	0.144	0.000	1.000
DRD5 B: 140	13525	0.014	0.014	0.120	0.116	0.000	1.000
DRD5 B: 142	13525	0.029	0.027	0.168	0.162	0.000	1.000
DRD5 B: 144	13525	0.039	0.034	0.194	0.181	0.000	1.000
DRD5 B: 146	13525	0.072	0.063	0.258	0.243	0.000	1.000
DRD5 B: 148	13525	0.429	0.433	0.495	0.496	0.000	1.000
DRD5 B: 150	13525	0.181	0.190	0.385	0.392	0.000	1.000
DRD5 B: 152	13525	0.139	0.142	0.346	0.349	0.000	1.000
DRD5 B: 154	13525	0.043	0.050	0.204	0.218	0.000	1.000
DRD5 B: 156-174	13525	0.032	0.026	0.175	0.159	0.000	1.000
MAOCA1 A: 101-113	13574	0.030	0.020	0.172	0.140	0.000	1.000
MAOCA1 A: 109	13574	0.015	0.010	0.120	0.101	0.000	1.000
MAOCA1 A: 111	13574	0.070	0.073	0.255	0.261	0.000	1.000
MAOCA1 A: 113	13574	0.515	0.537	0.500	0.499	0.000	1.000
MAOCA1 A: 115	13574	0.164	0.156	0.371	0.363	0.000	1.000
MAOCA1 A: 117	13574	0.025	0.023	0.156	0.149	0.000	1.000
MAOCA1 A: 119-131	13574	0.182	0.180	0.386	0.384	0.000	1.000
MAOCA1 B: 103-113	13574	0.139	0.143	0.346	0.350	0.000	1.000
MAOCA1 B: 115	13574	0.111	0.105	0.314	0.306	0.000	1.000
MAOCA1 B: 117-119	13574	0.043	0.039	0.204	0.195	0.000	1.000
MAOCA1 B: 121	13574	0.170	0.160	0.376	0.367	0.000	1.000
MAOCA1 B: 123	13574	0.016	0.012	0.124	0.110	0.000	1.000
MAOCA1 B: 125	13574	0.044	0.046	0.204	0.210	0.000	1.000
MAOCA1 B: 127-131	13574	0.018	0.013	0.133	0.113	0.000	1.000
MAOCA1 B: Male	13574	0.460	0.482	0.498	0.500	0.000	1.000

Note: In the weighted columns summary statistics are corrected for sampling procedure and sample attrition until Wave 3.

A.2 Shapley Value Decomposition

Table 11: Shapley Value Decomposition

Outcome	Diss. Index	Ω^m	Contrib.	in %
Registered (2000)	9.5%	Family	2.0pp	21.0%
		Psychological Condition	1.5pp	16.0%
		Demographics	1.2pp	12.5%
		Neighborhood	1.1pp	11.1%
		Religion	0.7pp	7.7%
		Genetic Endowment	0.7pp	7.3%
		Risk Behavior	0.6pp	6.7%
		Social Life	0.6pp	6.3%
		Physical Condition	0.5pp	4.8%
		School	0.4pp	3.8%
		Ability	0.3pp	2.8%
Vote (2000)	19.8%	Family	4.0pp	20.3%
		Psychological Condition	3.5pp	17.7%
		Risk Behavior	2.0pp	10.1%
		Demographics	1.9pp	9.6%
		Religion	1.9pp	9.6%
		Neighborhood	1.7pp	8.8%
		Genetic Endowment	1.2pp	6.1%
		School	1.0pp	5.1%
		Physical Condition	1.0pp	4.9%
		Ability	0.8pp	4.1%
		Social Life	0.7pp	3.6%
Contact Official	59.7%	Family	13.7pp	23.0%
		Psychological Condition	10.4pp	17.4%
		Genetic Endowment	7.5pp	12.5%
		Neighborhood	6.1pp	10.2%
		Risk Behavior	4.7pp	7.9%
		Demographics	3.5pp	5.9%
		Physical Condition	3.4pp	5.7%
		Social Life	3.2pp	5.4%
		School	3.0pp	5.1%
		Religion	2.6pp	4.3%
		Ability	1.6pp	2.6%
Rally/March	55.4%	Family	13.0pp	23.5%
		Psychological Condition	8.3pp	14.9%
		Genetic Endowment	6.7pp	12.2%
		Neighborhood	6.1pp	11.0%
		Risk Behavior	5.9pp	10.6%
		Physical Condition	3.8pp	7.0%
		Social Life	3.8pp	6.9%
		Religion	2.9pp	5.3%
		Ability	2.1pp	3.9%
		School	1.5pp	2.6%
		Demographics	1.3pp	2.3%
Political Organization	63.0%	Family	11.5pp	18.3%
		Psychological Condition	11.2pp	17.8%
		Genetic Endowment	7.7pp	12.3%
		Neighborhood	7.0pp	11.2%
		Risk Behavior	6.2pp	9.8%
		School	4.4pp	7.0%
		Social Life	4.2pp	6.6%
		Physical Condition	4.1pp	6.5%
		Demographics	3.7pp	5.9%
		Ability	1.5pp	2.4%
		Religion	1.4pp	2.2%
Volunteer Work	24.0%	Family	4.7pp	19.8%
		Psychological Condition	4.2pp	17.4%
		Risk Behavior	3.0pp	12.5%
		Neighborhood	2.2pp	9.1%
		Religion	2.1pp	8.8%
		Social Life	1.9pp	8.0%
		Genetic Endowment	1.4pp	6.0%
		Physical Condition	1.4pp	6.0%
		Demographics	1.3pp	5.5%
		School	0.9pp	3.6%
		Ability	0.8pp	3.4%
Vote Always	22.4%	Family	4.2pp	18.6%
		Psychological Condition	3.6pp	16.0%
		Neighborhood	3.3pp	14.9%
		Genetic Endowment	2.9pp	12.8%
		Demographics	2.0pp	8.8%
		Risk Behavior	1.5pp	6.7%
		Physical Condition	1.3pp	5.8%
		Social Life	1.3pp	5.6%
		Religion	1.0pp	4.6%
		School	0.9pp	3.8%
		Ability	0.5pp	2.3%
Vote Never	24.5%	Family	5.4pp	22.2%
		Psychological Condition	4.5pp	18.3%
		Demographics	2.2pp	9.1%
		Neighborhood	2.1pp	8.7%
		Risk Behavior	1.9pp	7.9%
		Religion	1.9pp	7.8%
		Genetic Endowment	1.8pp	7.5%
		Ability	1.3pp	5.5%
		Social Life	1.3pp	5.1%
		Physical Condition	1.1pp	4.5%
		School	0.9pp	3.5%

Note: The Shapley decompositions in this table are based on the results from the logit estimator. The last two columns indicate the Shapley value contribution of the respective circumstance set.

A.3 Gelbach Decomposition

The decomposition is implemented as follows. We propose a set of effort variables Θ and estimate a restricted model with Θ as the only right-hand side variables in order to obtain β_l for each effort $E^l \in \Theta$:

$$p_i = \beta_0 + \sum_{l=1}^{L} \beta_l E_i^l + u_i. \tag{6}$$

In a second step we estimate the unrestricted model including all effort variables and all circumstance variables as defined by the eleven circumstance groups Ω^m. Without a claim to causality, for each effort E^l we obtain the coefficient β_l^Ω, which is indicative of the impact of effort net of circumstance influence. Furthermore, we obtain β_j, i.e. the impact of each circumstance on the outcome of interest:

$$p_i = \beta_0 + \sum_{l=1}^{L} \beta_l^\Omega E_i^l + \sum_{j=1}^{J} \beta_j C_i^j + u_i^\Omega. \tag{7}$$

Note that it is precisely the term $\beta_l - \beta_l^\Omega = \Delta = \sum_m \Delta^m$, that we want to decompose into the contributions of each circumstance group Ω^m.

In a third step we regress each circumstance variable C^j on the set of effort variables Θ:

$$C_i^j = \beta_0 + \sum_{l=1}^{L} \gamma_l^j E_i^l + v_i. \tag{8}$$

As a result we obtain γ_l^j for each effort variable. As demonstrated by Gelbach (2016), the product $\beta_j * \gamma_l^j$ now yields Δ^j, i.e. the share of effort influence that is attributable to circumstance C^j. Summing over all $C^j \in \Omega^m$, then yields Δ^m, the composite influence of the circumstance group of interest.