Taking sides: Learning and voting

Christopher H. Achen

Department of Politics
Princeton University
Princeton, NJ USA
achen@princeton.edu

Richard Sinnott

Department of Politics and
Geary Institute
University College Dublin
Dublin, Ireland
richard.sinnott@ucd.ie

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Abstract

We set out a simple Bayesian model for turnout at the polls by expressive voters. We show that it mathematically implies the standard empirical findings about turnout. We also show that it implies a new estimator for turnout, "double probit." Applications of the model to large American and Irish datasets demonstrate that the new model gives better statistical fits than conventional probit, more theoretically interpretable coefficients, more stable estimates across different surveys in the same election, and greater ability to forecast turnout patterns in new elections.

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Introduction

Chapter 1 of Achen and Sinnott (forthcoming) puts forward a framework that suggests, in very broad outline, how the characteristics of institutions and individuals inhibit or promote voter participation. Various chapters in Part II of the same manuscript show how the framework and its core concepts of facilitation and mobilization enable us to sensibly group the many causal factors involved. We begin this paper by summarising these facilitation and mobilization effects and their implications. Then we go one step further by elaborating a formal model (the rational learning model) that spells out certain key processes involved in voter participation and makes a start toward systematizing the theory of turnout.

Facilitation and Mobilisation

Mobilization makes people want to vote. Facilitation makes it easier to do so. The distinction between facilitation and mobilisation is important because the two effects work in quite different ways. Most importantly, policies that facilitate voting by making it easier to get to the polls will have no effect on those who are so little mobilised that they see no benefit from voting and feel no duty to appear at the polls. Yes, the two factors substitute for each other in one sense: Sufficient mobilisation will overcome low facilitation, as when impoverished citizens walk for miles to cast their votes in the first election in a new democracy. But it is critical to understand that the reverse is not true. Sufficient facilitation will not overcome an absence of mobilization. Making voting easier will not raise turnout among those who do not wish to vote, any more than making broccoli cheaper will induce people to eat it who despise that particular vegetable. This simple fact is responsible for the disappointing effect of eased voter registration procedures in recent American elections. It is the *combination* of facilitation and mobilisation that gets voters to the polls, and a sensible model of turnout must incorporate that insight.

One of the advantages of the framework is that it suggests theoretical interpretations of what would otherwise be mere correlations between socio-demographic characteristics and turnout. Take the well known relationship between occupation and

turnout: In most countries, people in higher-status occupations vote more. But why? One answer may be facilitation, as when professional occupations make it easier to leave work in midday to vote. Or the impact of occupation may point to some resource, such as having one's own car, that makes voting easier. Alternately, occupation may be a proxy for mobilisation effects, as when certain types of occupation expose an individual to communication networks that convey politically relevant information or that generate a collective sense of having a stake in the outcome of an election. The facilitation-mobilization distinction thus sharpens the analyst's theoretical vision and directs attention to the quite different implications that follow from alternate interpretations of simple demographic correlates of the vote.

As a second example, consider the relationship between age and turnout. One of the most striking features of voter turnout is that it is strongly (and curvilinearly) related to age. Middle-aged people vote more than the young or the very old. The analyst may be tempted to fit a simple curve to this relationship (the quadratic has often been used in American studies), as if a single causal process were at work. Once the causal question is asked, however, the distinction between facilitation and mobilisation begins to break down the effect of age into its component parts. Obviously, physical frailty plays a key role in lowering turnout among older voters—an example of lower facilitation. On the other hand, facilitation cannot explain why American sixty year olds vote more than fifty or forty or thirty year olds. A more likely cause is mobilisation—the growth in political experience causing people to see that elections matter, and thus to acquire a party identification or to take sides in some other way. Thus the convenient quadratic form for the effect of age in American turnout studies meshes together two quite different processes. Hence it comes under theoretical suspicion. It seems unlikely to be precisely right in America, and even less likely to fit the experience of other countries. As we shall demonstrate, these suspicions are confirmed once a better theoretical foundation for voter turnout is developed.

This brings us the notion of learning that is central to our explanatory model.

Learning and Voting

Travelling in an unfamiliar foreign country at election time can be a bewildering experience. Candidates and parties take over the streets and airwaves, exciting their followers, but they pass by in a confusing whirl for the tourist, in whom they excite no desire to participate in the election. At such times, one is forcefully reminded that no one is born with the knowledge and the skills that voting requires. Voting is a learned expertise, and the expertise is acquired over the course of many years' living in a political system.

In this respect, voting resembles many other complex life skills required in contemporary societies—driving a car, holding a job, buying a house, or entering a marriage. These competencies require a complex mixture of abilities and experience. They are primarily learned, not innate. The learning begins, at the earliest, in late childhood, and may not begin in earnest until the late teens or early twenties. Thus teenagers customarily have no more than apprentice skills, as the high automobile accident and divorce rates among young adults testify. But because learning continues over a lifetime, by middle age most people have acquired a collection of practical skills that make conventional family life routine. In prosperous Western societies, they have a home whose mortgage payments they meet, one or more cars that they drive safely, and often children as well, whom they raise successfully. Moreover, by middle age, the great majority of citizens vote in consequential elections.

The central argument of this chapter, then, is that learning is critical to voting, just as it is to other complex adult skills. This seemingly banal observation turns out to have dramatic consequences for the study of turnout. In place of the static propositions that have dominated the literature, it illuminates the dynamics: The voters are constantly changing, and our interpretations need to take account of their development as they get older.

This emphasis on learning shapes the search for explanations. Why do countries differ in their rates of turnout? Within each country, why do elections at different levels of government produce distinctly different rates of voting? Within a country at a given election, why do different kinds of voters turn out at different rates? To answer such questions, we look first to differences in learning in order to explain the differences in outcomes.

Consider again the impact of age on turnout. As we mentioned, older voters appear at the polls more often than the young. Hence political observers decry political disengagement among teenagers and young adults, and special efforts are made to mobilise them with appeals from popular music stars and sports figures.

What is less often realised is that there is no sharp break in turnout between the youngest eligible citizens and adults in their thirties. To be sure, turnout rises as people enter their late twenties and thirties. Particularly in national elections in countries with high turnout, this initial rise in young adulthood can be steep. But in fact, turnout continues to increase steadily over the life-cycle. Adults in their fifties vote more than adults in their forties, and those in their sixties vote more than either, a pattern that emerges clearly in large surveys with small sampling errors. Figure 12.1 displays three such surveys, demonstrating the steady increase in turnout up to age 75 in Ireland and America and up to age 65 in an average of 22 European countries. Only the infirmities that come with old age seem to limit further increases. And in sub-national elections in lower turnout countries, the rise may be virtually linear over the life course, with steady gains at every age and no sharp jump in young adulthood. (For example, see the American case in Achen and Sinnott forthcoming, chapter 8.)

Thus policy efforts directed at getting the young to be polls make sense, but not if they are formulated on the assumption that there is something unique about the circumstances of the young that creates low turnout. The evidence shows clearly that, for voter turnout as for other skills such as driving an automobile, learning continues

over a lifetime.[1] Even the middle-aged are still improving. Young voters have the most to learn, but the difference from their elders is one of degree and not of kind.

The view that age is a proxy for learning also alerts us to instances in which age will not affect the voters in the usual fashion. For example, when a group of voters are new to the political process, as women were in the first decades after female enfranchisement, age will not represent their actual experience with politics. Hence we expect their turnout rates to have lagged behind those of men the same age, just as Tingsten discovered (1937, chap. 1). Here as elsewhere in the study of turnout, focusing on learning produces a clearer understanding of just what proxy variables measure. In consequence, it leads to a clearer view of the evidence, detailed expectations about nonlinear or interactive effects, and, in sum, a more accurate causal interpretation of all the evidence.

The process of interpreting age as learning is not complete, however, until we specify what it is that the voters learn over their lifetimes. One possible answer, that they accumulate knowledge and information so that they can better understand politics, turns out to be incorrect. Middle-aged people are generally not better informed about politics (Delli Carpini and Keeter, 1996, pp. 201-202).[2] Nor are they more interested in politics or more acquiescent to the norm of voting (Campbell *et al*., 1960, pp. 494-495).[3] However, the one bit of information that does grow over the lifetime in democracies is partisan attachment, as Converse (1969) famously demonstrated long ago. Not just the simple *fact* of attachment measured by surveys, but the *depth* and *stability* of it, generated by experience with partisan outcomes, is what older people know and continue to learn.

Not everyone learns an attachment, of course. Some people learn that they are genuinely different ideologically from any of the parties and thus that they should *not*

[1] In the U.S., for example, accident-free driving rises sharply after the teenage years, trends steadily upward for several decades, and flattens out at about age 60. Then after age 80, reduced physical skills lead to a decline (ZZ). Voter turnout follows just the same pattern.

[2] Recent declines in newspaper reading and other information-gathering among the young have created a generation gap in knowledge among Americans, but as Delli Carpini and Keeter note, this appears to be a cohort effect rather than a consequence of age itself. No such gap existed in prior decades.

[3] Wolfinger and Rosenstone (1980, pp. 49-50) argue that those without college education grow more knowledgeable and interested over the life-cycle, while those with a college degree actually decline in political knowledge, thus making the average effect zero.

have an attachment. And in some political systems, where the parties are transitory but where salient political cleavages such as religion, ethnicity, region, or social class structure the political system, the voters may learn their attachments to those political organizing principles instead. But in a stable democracy, however the key political divisions are arrayed, the older population as a whole is more aligned to those divisions than the young, and so age will proxy for that kind of learning.

In most systems, parties will represent the main political cleavages, and so we refer to the voters' grasp of these divisions as "partisanship," defined not as a survey response but rather as the underlying strength and reliability of attachment to a party or to other continuing political divisions in the society. In the remainder of this chapter, "party" will be used in this broad sense, to mean the continuing divisions in a society that structure political choices from one election to the next.

Thus, in summary, *we take partisanship in this broad sense to be the central continuing aspect of political life that citizens are learning.* We interpret partisanship not primarily as a psychological identity, and certainly not as a survey response, but rather as long-term experience with the political parties or other stable divisions in political life. Interpreting partisanship that way directs attention to learning.

This perspective also explains why age has the effects it does: Older citizens have more experience, have learned more, and thus have firmer partisan attachments. Thus we are no longer restricted to bald statements that "older citizens vote more" or to lamentations over "the problem of youth turnout." Instead, we expect that in a stable political system, age will have effects on voters of the form familiar from psychological learning theory: The voter continues to learn over the entire healthy part of the life-cycle, but at a less rapid rate as the voter matures, just as Figure 12.1 indicates. Thus voter turnout acquires an interpretable dynamic.

Moreover, age is now assigned a concrete substantive interpretation. It is no longer just a demographic, but rather a stand-in for what the voter knows about the main lines of political division in his or her society, typically summarised by the strength of party attachment. Age does not give the partisan direction of that attachment. To know which parties the voters favour, we have to ask them. But we can often do

without the direction if we know the strength, and for voters with a partisan identity of one sort or another, age is the right proxy for its strength. Of course, the details of the relationship will vary with context. By its nature, learning will not always proceed in uniform increments with age, for example, nor will different generations have had identical experiences from which to learn. Context matters, and no mechanical statistical specifications will fit all contexts and all countries. We assert only that, regardless of context, what the voters have learned is what we need to understand.

We have lingered over the age variable to spell out how the learning perspective structures the interpretation of a well-known influence on voter turnout. The same process can be used to give meaning to other demographic and attitudinal variables. The same approach (and the same caveats) apply to them as well. Thus in the next section, we first set out the model of turnout we favor, then we survey a set of demographic variables briefly, indicating how the learning perspective produces an integrated view of how those traditional explanatory factors influence the voter's decision to go to the polls.

An Integrated View of the Influences on Voter Turnout

Why do people go to the polls? We begin with an informal discussion, extending the treatment we laid out in Chapter 1. Much of the argument is familiar from prior work, but we add one critical element stemming from the simple observation that no one is born wanting to vote. People must learn.

The exposition of the model in this chapter is informal. Those interested in greater precision are directed to Achen (2006), where the mathematical details are filled in. Here we concentrate on the main intuitions, focusing especially on the consequences for empirical applications.

Several decades of efforts to interpret voting as instrumentally rational, beginning with Downs (1957, pp. 36-50, 260-276), have now made it clear that no such explanation will account for the large turnouts in major elections across the democracies (Blais, 2000). No one vote matters. Implicitly if not explicitly, the voters understand that. They vote for other reasons.

As we briefly noted in Chapter 1, voting is not instrumental but *expressive*. As political scientists have long recognized, the voters have a sense of acting together with others on behalf of a shared goal, and they derive satisfaction from doing so (Merriam and Gosnell 1924, chap. 7; Lazarsfeld *et al.* 1944, chap. 5; Milbrath, 1965, 12-13). They do not imagine that their own personal effort will make the difference, but they do want to be part of a common effort. The "others" may be members of a social group with whom the voter identifies (perhaps a race, ethnicity, or religion); or they may simply be fellow supporters of a party or candidate. Thus there is fulfilment in voting, even though not of a directly instrumental kind.

As many have noted, voting is of the same nature as saluting a flag or cheering a favourite sports team. Neither act is instrumentally rational, and thus they will seem mysterious to those whose explanatory repertoire is confined to self-interested motivations. But there is little doubt that people have a capacity for supporting inexpensive group efforts. Precisely why this is so has been the subject of a very large literature, which we do not enter into here.[4] We rely instead on everyday experience in every country, which confirms that if the voters see that an election is important, and if the costs of appearing at the polls are not very large, then most democratic citizens will appear at the polling stations.

The difficulty most non-voters experience is that in a typical election, they are poorly informed. They may not know whether the election is important, and if they do know, they may be unsure which choices they should make. Hence they are unwilling to invest the effort to find the answers in an information-poor environment. That is, in principle they would be willing to express themselves and to become part of some larger group engaged in a meaningful common enterprise. But they may never learn of the enterprise, and they may not know which group is appropriate for them to support. It seems not worth the trouble. Hence they do not appear at the polls.

[4] The occasional rational choice theorist would have it that people are simply making a cognitive error in going to the polls. However, the great importance of joint efforts in hunter-gatherer bands may have genetically advantaged those who often cooperate instinctively even when it does not benefit them, compared both to the naïve, who always cooperate regardless of cost, and to the sharpies, who always calculate their self-interest. In addition, informal social pressures reinforce low-cost altruistic cooperation, as Berelson et al. (1954, 25) noted long ago. (Similar remarks appear in Rosenstone and Hansen 1993, 23.) On the latter view, canonical "rational" thinking of the sort one sees in many economic models of voting can be clumsily irrational in a purely self-interested sense.

This way of thinking about the decision to vote accounts for two characteristics of non-voters that are often noted: They don't know, and they don't care (for example, Merriam and Gosnell 1924, 167-168, 183-194). In turn, those two characteristics are seen as leading back to the sociological forces that create their personal circumstances. Those more isolated from personal, political party, and media communications are all less likely to care about politics. Caring less, they learn less. The result is both lower perceived stakes and less ability to choose well. The costs of voting are likely to overwhelm these weak impulses to vote. Hence those whom the social structure leaves in an ignorant and apathetic state are likely to drop out of the political arena.

The model incorporates this traditional political science wisdom in a simple way. The voter is assumed to vote if the benefits of voting exceed the costs, as in any rational choice model. However, the benefits are assumed to be expressive in character, not instrumental.

The costs are interpreted as usual in the rational choice tradition, and in accord with the substantive findings of the last half-century. Among the costs of getting to the polls are time lost from work or family, risk of crime in dangerous neighbourhoods, risk of accident in bad weather, and so on. Hence the voter appears at the polls if:

Benefits of Voting > Costs of Voting

where

Benefits = Utility of Casting an Expressive Vote

and

Costs = Cost of Going to the Polls

The remainder of the model specifies how the voter learns. Its logic specifies that there are three different critical sources by which the voter might learn which

candidate or party to support. The first is the effect of the current campaign, as experienced primarily in the media. As Chapter 2 demonstrated for EU elections, Chapter 8 showed for the American case, and as much prior research has confirmed, better informed citizens are more likely to vote.

The second source of learning is partisanship, which we conceptualise as a mix of parental socialization and the citizen's own experience, as many studies in various countries has demonstrated, beginning with Campbell *et al.* (1960). This effect is often overlooked in empirical work, but as we shall show, its impact is powerful, particularly on those who are relatively less informed. In effect, it acts as a cognitive shortcut for those with sufficiently strong partisan attachments.

The third and last effect is mobilisation contact from a trusted source, such as a spouse, friend, or party worker. This effect, re-emphasized recently by Rosenstone and Hansen (1993), is important for those with less information and weak partisanship, who are often the "socially excluded." Following Rosenstone and Hansen, we think of it as a substitute source of information.

The formal model incorporating each of these effects is the simple Bayesian model for the case in which information arrives in independent, normally distributed increments with known variances, a special case that has seen several applications to voting theory and some extensions during the past decade and a half (Achen, 1992, 2002; Bartels, 1993, 2002; Gerber and Green, 1998). However, it has not been used previously to account for turnout.

Applied to the turnout problem, this simple Bayesian model reduces in the two-party case to this expression:

$$\textbf{Expected Utility of Voting for Preferred Party} = \frac{A}{B} - \mathbf{C} \qquad \textbf{(1)}$$

where

$A = h_1$(Campaign Information) + h_2(Partisanship) + h_3*(Contacts from Trusted Sources),

B = h_1 + h_2 + h_3

with **h_1, h_2,** and **h_3** being the "precision" (inverse of the variance) of the information from each source(Achen, 2006), and

C = a constant (the cost of voting)

As partial differentiation will demonstrate, this specification implies that the impact of each explanatory variable on the utility of voting will be concave in form, with an effect that diminishes at higher values. In fact, the effect will tend to zero at sufficiently large values of each explanatory variable. Moreover, the model implies interaction effects: The impact of one variable will diminish as the values of any other variable increases in size. All this is quite different from the usual statistical specifications models for turnout, in which utility is a *linear* function of the explanatory variables. Thus utility grows at the same rate indefinitely as each variables increases, and the impact of any one variable is entirely independent of the size of the others. In short, the model implies that conventional linear specifications are quite wrong, and will result in biased estimates.

In the model of this chapter, each person will typically have a distinctive value of the precisions **h_1 ,h_2, h_3**, so that average effects in the population will be a mixture of different concave shapes. However, it is well known that a sum of concave functions, each with a (horizontal) asymptote as its argument goes to infinity, is concave with the same sort of asymptote. A familiar class of functions with this property are the cumulative distribution functions (cdf) of unimodal probability densities, evaluated to the right of the mode. For example, the right half of a cumulative normal (Gaussian) distribution function has the desired property. Linear transformations of a normal cdf allow for arbitrary starting points and asymptotes. Hence, because the various sectors of a right-half normal cdf have a desirable variety of concave shapes, we use it to approximate the concave function implied by the model. Thus utility is modeled as a linear function of the normal cdf, with the explanatory variables as arguments to the cdf. Therefore, as an approximation of Equation (1):

Expected Utility of Voting ≈ δ + γΦ(Information, Partisanship, Contact) - C

Adding a stochastic disturbance term (assumed normally distributed independently of the explanatory variables) then generates a probit form for the probability of voting, although not the simple linear probit model available as a standard procedure in statistical packages. Here we have a probit function inside a probit function, hence we refer to the model as "double probit":

Pr(Voting) ≈ Φ[θ + κΦ(Information, Partisanship, Contact) – C]

This model can be estimated by standard maximum likelihood techniques. To ease the interpretation, it may be written as:

Pr(Voting) ≈ Φ{δ + γ[2Φ(Information, Partisanship, Contact) – 1] }

where **δ = θ – C** and **γ = κ/2.** Since the minimum value of **Φ(.)** with non-negative argument is 1/2 and maximum is 1, the quantity inside square brackets ranges from 0 to 1. Hence **δ** is the utility of voting when information and partisanship are negligible, and **δ + γ** is the utility of voting as information and partisanship tend to infinity.

Neither mathematical models nor qualitative discussions comprehend more than a fraction of reality, of course, and this statistical specification is no exception. For example, behind this model and off-stage is the fact that political and social institutions structure the information that voters receive. The result is a flow of information to which voters are exposed. Then, over their lifetimes, the voters update their knowledge dynamically in a sensible and rational manner, responding at the polls each time according to what they have learned. The latter process is what the model studies in detail. The model treats the sources of these flows as exogenous and given—aspects of reality not explicitly included. But of course they have their own importance, and we will occasionally refer to them during our discussion. (See Figure 12X.)

This simple framework for thinking about turnout, though partial and incomplete in several respects, nevertheless turns out to be quite powerful. It mathematically implies many of the standard findings about turnout, and it also generates novel forecasts of a more subtle kind, which are confirmed by the data. Lastly, the model also implies a new way to do statistical modelling of turnout, which fits the data substantially better than the logit and probit models in current use, as demonstrate below. In short, the model attempts to supply the missing micro-foundations for voter turnout.

Our approach may be contrasted with another prominent view, in which voting is an act directed toward supporting democracy (Downs 1957) or fulfilling a moral duty (Blais 2000). Indeed, surveys show that most citizens feel that they should vote. In the 2000 Annenberg Study, for example, 71% of Americans in the post-election survey agreed or strongly agreed that they felt guilty when they failed to vote. Even among those who reported that they had not voted, nearly half said they felt guilty. Similarly, 68% of the respondents in the 2002 Irish National Election Survey said that they would feel guilty if they failed to vote, and fully 88% said that they had a duty to vote in a national election.

Yet more than a third of Americans fail to vote even in high-visibility presidential elections. In several European countries, turnout rates in national elections are only a bit better than the American numbers. And in less important elections such as those for the European Parliament or for the American Congress, more than half the eligible population may stay away from the polls. Clearly, duty alone is not enough. The static concept of duty encounters difficulty in explaining the low turnout for minor elections or the large surges in turnout when Adolf Hitler, Franklin Roosevelt, or other polarizing figures are on the ballot.

No duty is absolute, of course, so that the duty hypothesis might be interpreted to mean that people judge the stakes in an election, along with the costs of learning whom they should favor, to see whether they should actually fulfil their duty in this particular election. If the election seems important, and if they have a clear idea of whom to support, then fulfilling their duty will seem worthwhile. That view blends nicely with our own perspective, namely that people vote for the expressive benefit of

registering their political preferences when they see that the election is important and when they have an alternative they favor. In short, we would argue that a sophisticated version of the duty-to-vote hypothesis turns into something very like the framework proposed here, and that in many applications, the same statistical framework will serve for both. Of course, different explanatory variables will be required (or if proxy variables are being used, then at least a different explanatory framework).

Implications for Explaining Turnout

To get a model connected to politics, its terms must be identified with concrete aspects of the problem at hand. For example, previous research has demonstrated that partisanship strengthens over time in stable democracies with clear party differentials, simply because the parties are more or less fixed features of the political landscape. But the issues and personalities in each campaign have to be learned from scratch each time, from media, interest groups, parties, and other sources. Typically, one cannot use campaign knowledge from in prior campaigns, since the issues and personalities have changed substantially. In other words, to a good first approximation, campaign information helps the citizen each time, but that kind of knowledge does not cumulate over the life course.[5] By contrast, the political parties do persist over time, so that prior experience with them can be cumulated to help form partisanship.

Incorporating substantive assumptions like these into the turnout model, we set up the following measurement correspondences:

- Education is treated as a measure of "intellectual capital," so that it measures how easily the citizen acquires campaign information and thus also how much information actually is acquired. Education may be more important in some countries than others, depending on how necessary it is for acquiring campaign information.

[5] The assumption that campaign knowledge does not accumulate accounts for the relatively low level of political knowledge of the population. It also explains non-obvious features of the data: For example, in the 2000 Annenberg survey of the American electorate, interviewer-assessed political knowledge of the current campaign is unrelated to age once education is controlled. That is an impossible result if campaign knowledge accumulates.

- Age (more precisely, age – 18 years) proxies for political experience with the parties, and thus for the precision of partisanship: "life experience is a substitute for school" (Wolfinger and Rosenstone, 1980, p. 60).
- Serious political media usage (typically newspaper reading rather than television watching) is taken as a proxy for campaign information acquired.
- Contact by a trusted source who encourages the citizen to vote is treated as a short-cut supply of campaign information.
- Church attendance, marital status, and length of community residence are taken as indicators of strength of social ties. These variables are standard in the literature on social connectedness.
- Self-assessed "interest in the election" is regarded as the respondent's assessment of the importance of the election.
- Self-assessed "caring about the outcome" is assumed to measure the respondent's judgment of the utility difference between the candidates or the parties.
- All aspects of ease of voting—Sunday voting, longer poll hours, convenient polling locations, availability of postal/absentee voting, and so on—are treated as reducing the cost of voting.

With these mappings, the model just set out proves remarkably congenial for generating concrete predictions about voter turnout. For example, taking first or second partial derivatives in Equation (1), with the proxy variables substituted for what they measure (e.g., substituting age for strength of partisanship), suffices to derive all eleven of the key empirical generalizations from previous literature, which we listed in Chapter 1. That is, the model predicts what we already know, and this provides some confirmation that its assumptions work sensibly.

More usefully, the model implies many other less familiar results from the literature, and some that appear to be entirely new. For example, the model implies that (on a probit or logit scale):

12. Personal contact from a trusted source will have greater effect on the turnout of the less engaged and less informed (Berelson et al., 1954, pp. 174-177; Glaser, 1962, p. 34). In Ireland, where a majority of 2002 survey respondents report personal

contact by a party, contact makes a greater difference to the turnout of the young, the Independents, and those with just primary education, for example.

13. Information about the candidates makes more difference to the turnout of the young.

14. Age does not improve the turnout of educated citizens as much as that of the less educated.

Here for reasons of space, we illustrate in detail just the latter proposition, demonstrating that it is verified empirically in two very different political systems, the U.S. and Ireland.

First, note that the its implications from Equation (1) refer to the *utility* of voting, not to the fact of turnout itself. That is, they are specified on the probit scale of underlying utilities, not on a scale of turnout percentages. Thus for testing implications, turnout fractions *p* should be transformed via the inverse normal cumulative distribution function, $\mathbf{\Phi}^{-1}(p)$, before being analysed, a transformation that is now available in all standard statistical packages.[6] The probit transformation stretches the ends of the scale, so that proportions near zero or one are "pulled out" to lengthen the scale. Transforming proportions in this way has been standard in statistics for half a century because it makes sense on both statistical and substantive grounds. Statistically, it avoids artificial curvilinearities induced by the floor and ceiling effects of having proportions bounded between zero and one. Substantively, it takes account of the political fact that raising turnout from 50 to 55 percent is much easier than raising it the same five percentage points from 90 to 95 percent.

Thus the transformed effects nearly always fit the data better. First, they avoid *faux* nonlinearities due to using the wrong scale. Second, for studying turnout they are more sophisticated politically, as Wolfinger and Rosenstone (1980, pp. 11-12) pointed out a quarter century ago. In short, percentages are fine for descriptive work, but

[6] Logit transformations are virtually equivalent and would also work well.

when we are assessing empirical generalizations and causal relationships, all turnout effects should be displayed on a probit or logit scale.

Finally, it is important to see that none of the three propositions just stated cannot be tested by dropping the variables into logit and probit programs, with turnout as the dependent variable and linear effects imposed by assumption. For here the predicted effects are *interactive* in their effect on the utilities, meaning that the impact of the variables changes depending on the values of other variables. But that is precisely what dropping variables into statistical packages assumes away. All effects are assumed to be linear and additive, with no interactions. The model set out here implies that we can better capture actual causal impacts with guidance from a nonlinear specification.

The difference in explanatory approaches between informal statistics and a formal model can be seen in the accompanying figures. Figure 12.2 gives the impact of age on voter turnout (probit scale) for four different education levels—not as they really are, but as probit and logit *assume* they are. The effects are linear in age and parallel by education group: That is what linear-in-coefficients models assume.[7] When probit or logit are run from standard statistical packages, the researcher is implicitly telling the program to impose this shape on the data.

The model used in this chapter has different implications. By its logic, highly educated people become well informed more easily and are less in need of their partisanship. On the other hand, older people have strong partisan attachments and are less in need of education to sort out their preferences. In short, education should have its strongest effect on young people, who have weak partisan attachments, while age has its strongest effect on the less educated, who have less campaign information. The resulting pattern predicted by the model is given in Figure 12.3. The lines are closer together at the top (education makes less difference for older citizens) and the slope of the top line is flatter (age makes less difference for the well educated).

[7] Sometimes researchers add a quadratic term to cope with the downturn in turnout after age 75. Here we simplify by dropping those over age 75 for two reasons. First, the dropoff is unlikely to be exactly quadratic. Second, modelling the frailties of old age is a medical specification, and we are not doctors of *that* kind.

Figure 12.2 thus gives the expected relationships under conventional statistical-package assumptions, while Figure 12.3 gives the relationships implied by the model of this chapter. Figures 12.4, 12.5, and 12.6 give the *actual* relationships in three political systems where the data permit a careful test. Figure 12.4 is based on the large 2000 Current Population Survey done by the American Census Bureau (with nearly 100,000 respondents). Figure 12.5 gives the corresponding picture for the Irish Quarterly National Household Survey, which is the largest single-country European sample (about 25,000 respondents), and Figure 12.6 gives the average result across 22 European countries (about 38,000 respondents from the 2002-2003 European Social Survey). In each case, the result is exactly the same: The conventional statistical approach implies the wrong shape for the curves, while the formal model based on substantive political knowledge gives the correct relationship.[8]

Thus in addition to implying the standard empirical findings in the literature, the turnout model implies statistical relationships quite different from those conventionally assumed, and those relationships are confirmed by the data. Demographic variables, however, take us only so far. It is always preferable to work with variables closer to the causal relationship, namely information and partisanship. However, proxy variables are sometimes necessary because most surveys and virtually all aggregate data have no direct measures of how much the voter knows about the campaign, and aggregate data have no measures of strength of partisanship. In some cases, proxy variables will also work well. In the United States, the relationship to turnout of age and education is a strong one, for example, and we illustrate their use below. In other countries, proxy variables may be more difficult to find.

A few relative large surveys, happily, do have measures of knowledge and partisan strength, and these give us the opportunity to test the model more directly. Figure 12.7 shows how information and partisanship influenced turnout in the 2000 American presidential race, using a very good measure of campaign information taken

[8] Wolfinger and Rosenstone (1980, p. 59) derive similar nonlinearities on a percentage scale by forecasting from a probit model with quadratic functions in age and education, but here we wish to avoid both specific functional forms. Thus our plots show, not forecasts from a model, but just the raw data, and they are displayed on a probit scale to assess true nonlinearities independent of floor and ceiling effects.

from the answers to a long battery of questions (e.g., "Is it Bush or Gore who wants to let individual Americans invest part of their Social Security funds in a private fund?"). Figure 12.8 gives a similar graph for turnout in the 2002 Irish general election, substituting an index of media use for the knowledge measure in Figure 12.7.

Here the relationships and tests are necessarily rougher, since we have only a rank-order scale for strength of partisanship, and information levels can be measured only approximately. However, both graphs show the same pattern as the age and education graphs, confirming both that the model's implications are correct and also that simple linear specifications in probit or logit are incorrect.

The Example of Contact

The interactive nature of the model has implications also for contact from a trusted source—the third source of voter information. Merriam and Gosnell (1924) carried out randomised experiments in the 1920s in Chicago, sending postcards to people to remind them to go to the polls and vote. He discovered that his contact efforts had quite different effects on different groups of people. Black people, who voted at a low level, showed little effect. White ethnics, who voted at a high rate, also showed little effect. It was middle class, better off Chicagoans in the "Gold Coast" area who responded most strongly to Gosnell's mobilisation efforts.

Gosnell speculated that blacks were largely outside the political process at this point, with a low stake in expressing their political views. On the other hand, the ethnics had already been mobilised to vote by the Chicago political machine. Thus neither was likely to feel additional motivation from a mail appeal. By contrast, the middle class citizens were inside the process but not part of the machine, and so the reminder made a difference. Don Green's recent experiments in New Haven, Connecticut found a similar pattern--very different responses to mobilisation efforts among different groups.

These differential effects are *contextual*—varying impacts of the same stimulus on different classes of citizens. And they are easily derived mathematically from the

model. Thus we arrive at the same implication for contact as for our measures of information and partisanship, or for age and education. Simply dropping "party contact" into a probit or logit equation misspecifies the equation. We need to look carefully at the effect on different groups of people if we are to see the effects correctly.

Statistical Fits

We now proceed to test double probit against the conventional probit alternative.[9] In several instances, we also compare the fit using the scobit estimator proposed by Nagler (1994), who demonstrated statistically what Glaser (1962) had found graphically, that something was amiss with conventional probit specifications for voter turnout.

We begin with the American CPS sample. Since it has no attitudinal or party ID variables, we use proxies. First, we define a variable "systemtime" as the respondent's age minus 18 years. Thus the variable captures time since becoming eligible to vote. That plus education are the explanatory factors. However, since age and systemtime produce exactly the same fit and receive the same coefficient in both ordinary probit and scobit, and since age is more conventional, we use age in those equations. Systemtime is theoretically more appropriate in double probit and not quite equivalent to age there due to the absence of a constant term, so it is retained in that model.[10] In other respects the same variables are used in each model, with the exception that we add the usual age² term to the probit specification, so that it has four coefficients as well. The model comparison then is fair---same data, same dependent variable, same number of coefficients for all three models.[11]

By running hundreds of probits over several decades and by using additional parameters, careful empirical work has approximated what theory suggests. Because the traditional empirical fits are well honed, we expect log--likelihoods to improve

[9] Much of his section is borrowed from Achen (2006).
[10] If double probit is run with age instead of systemtime, the log likelihoods change by less than a hundreth of a percentage point, leaving the model comparisons unchanged in every respect. The coefficients, too, change only trivially, though the change of explanatory variable alters the scale of δ and γ and makes their intepretation much less intuitive.
[11] Age was entered as age in years; systemtime as age minus eighteen years. Education was coded linearly from one to six, using the same categories as in Figure 1.

when double probit is used, but not dramatically. The larger gains will come instead in theoretical interpretability, in the abolition of ad--hoc specification fixes such as age² and education², and in predictive portability across contexts, as we show below.

To avoid the complexities of young people away at college, the very high residential mobility of Americans, the historical complexities of immigrant and minority voting experience, and the frailties of old age, all the samples studied here consist of native--born white Americans between the ages of 25 and 70 who have lived at their current address five years or more. The results of the first comparison are given in Table 1.[12]

As expected, the log--likelihood is somewhat better for double probit, meaning, of course, that it fits better. Its t--ratios are also generally better than those of the other models, and a great deal better than scobit's. The standard five--parameter version of probit with two quadratic terms is not as good as double probit with just four coefficients, as the fourth column shows. Even scobit with age, age², education, and education², giving it six coefficients, fits these data slightly less well (log--likelihood = -11751.4) than double probit with just four parameters (coefficients not shown).

The double probit estimates also make substantive sense. The values of δ and γ are just what they should be, implying that very few American citizens would vote with no information, while all but a few would vote with perfect information. Pleasingly, too, the age and education variables enter the double probit link function linearly: There is no need for quadratic terms. (In fact, when those quadratic terms are added to double probit, they take on substantively tiny and highly statistically insignificant coefficients.) Put the other way around, the quadratic terms in conventional probit specifications are the statistically necessary distortions and loss of degrees of freedom induced by using an inappropriate model.[13]

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[12] All computations were carried out with STATA 9, using the ml model lf procedure for double probit. (See the Appendix.) Thus asymptotic standard errors were computed numerically. The model conditions on age and education and assumes fixed coefficients, so that survey sampling weights were not used except in purely descriptive presentations like Figure 1. Examination of all age and education groups showed extremely small differences between weighted and unweighted turnouts and no systematic effects.

[13] Only when probit and scobit are given all the Taylor series expansion terms, including both quadratic terms and an interaction term between education and age, do they match the double probit performance (though with twice as many parameters). This implies that empirical researchers who want to avoid tying themselves to a particular theoretical framework and those who have only probit or logit software

The same pattern occurs when the 1998 (midterm) CPS is analyzed with the same sample definition and the same variables (not shown). Double probit's log--likelihood is again better than those for the four--parameter versions of probit and scobit by approximately the same proportion as in the 2000 presidential election (-15975.08 vs. -16003.22 and -15975.20, respectively). Probit with five parameters is again inferior to double probit with four. Double probit's coefficients have the same sensible interpretations as before. The implied fully--informed turnout is somewhat lower, as is appropriate for a midterm election.

A third comparison of fits was done with the 2000 Annenberg survey, chosen because it has a considerably larger sample than the 2000 American National Election Survey. We applied the same models to these data, with the statistical sample defined in the same way.[14] However, the Annenberg sample's turnout rate is nine percentage points higher in the group analyzed, probably due to the Census Bureau's higher response rate and thus the presence of more non--voters in their sample.

Table 2 shows the results. Again double probit gives a slightly better fit than probit or scobit, but the more interesting object of study is the coefficients. Double probit finds very similar coefficients to those in Table 1, with all t--ratios exceeding 3.5 here, as befits the fact that this sample is drawn from the same population of people in the same election as Table 1 and that the sample size is relatively large. Probit, on the other hand, suddenly finds that the age term is probably small (its coefficient has dropped to 2% of its former value with a wide standard error), and scobit's standard error for education has gone up by a factor of ten. The four--parameter version of probit has only one statistically significant coefficient (for education), and scobit has none at all. These anomalies with probit and scobit in comparing Tables 1 and 2

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should at minimum control for age, age^2, education, education^2, an interaction term age*education, mobility, mobility^2, the variable of interest and its square, plus all the first--order interaction terms such as mobility*age, variable--of--interest*age, variable--of--interest*education, and so on. (Dummy variables might be used for the categories of age and education instead of linear and squared terms, but then each dummy must be interacted.) The proliferation of variables is the price paid for using a less appropriate estimator, but the estimated impact of the variable of interest, appropriately calculated using all the terms in which it appears, has a much better chance of being correct than in the usual linear-in-variables probits and logits.

[14] The one exception is that Annenberg has no variable for being native--born, so that non--native--born U.S. citizens are included in this sample. With Latinos and Asians already excluded, this difference will affect very few observations.

might lead to all sorts of queries about sampling biases, survey house effects, and so on. Instead, the fault lies first with conventional probit specifications: The probit and scobit coefficients will move around in different sampling frames and different contexts for reasons having nothing to do with the underlying causal reality.

The Annenberg study can also be used to test the effects of partisanship and information directly, since unlike the CPS, it has survey questions addressing those topics, albeit with the usual survey noise.[15] We add a squared party ID term out of fairness to probit, since that parallels that squared age term that appears in most turnout models. Again all the models have the same number of parameters.

Table 3 gives the results. Again double probit does better than probit or scobit, and its coefficients retain sensible interpretations. Scobit in particular fails to achieve a reliable set of estimates; its standard errors have exploded. As expected, the imprecise questions mean that not everyone who appears to be at the low end of information and partisanship actually is poorly informed, and so the intercept δ is somewhat larger than when age and education are used. But the theoretical expectations generated by the Bayesian model are again confirmed.

Next, we assess the ability of double probit to forecast across different contexts. As noted at the beginning, good theory should be able to do so, while ad hoc specifications should fail. To carry out the test, the 2000 presidential election parameter estimates were computed. Then one extra parameter λ was added to each of the four--parameter versions of double probit, probit, and scobit, representing the effect of a midterm election. For probit and scobit, since the conventional models contain no theoretical expectations about what happens to their coefficients in lower turnout elections, the parameter λ was added linearly inside their link functions in the customary way. In effect, it simply modifies the intercept. For double probit, the λ

[15] Information levels were coded linearly from the interviewer summary ratings: A=4, B=3, C=2, D or F=1. For partisanship, the coding was: strong=4, weak=3, leaning independent=1, true independent=0. Of course, being a "strong" partisan is ambiguous. It conflates position with firmness. In this and other ways---interviewer measurement error, respondent vagueness, and the simple linear codings of categories---these measures are very noisy and the estimates cannot be taken at face value for any of the estimators. Moreover, with the weak data, all the estimators struggled with poor standard errors---scobit immediately and double probit with the addition of quadratic terms. Probit's sampling errors held up a bit better, although its log--likelihood never matched that of double probit with equal numbers of parameters.

parameter was interacted with the effect of education, since in the theory, education represents the effect of campaign information, which is what changes at midterms. We do not expect a similar change in party identification.

Thus using the same homogeneous sample as before, the forecasting procedure was as follows:

1. Estimate each model in the 2000 CPS sample with age and education as predictors, plus age² for probit to keep the number of parameters equal across models. To improve the fit, dummy variables were used for the various categories of education. (The six education categories do not quite produce equally spaced effects.) Thus all models had eight parameters, including five dummy variables for education. Double probit again fit best, though the log--likelihood differences were small.
2. Add the parameter λ and modify it until the average forecast from the 2000 model matches the overall turnout in the midterm. For probit, for example, this means keeping the education dummies, age, and age² coefficients but lowering the 2000 intercept until the predicted turnout is that of 1998. The same approach was used for scobit, though without the age² term. For double probit, all the education dummy coefficients were reduced proportionately until the 1998 turnout was matched.
3. Applying the coefficients from the 2000 fit along with the estimated λ to the respondents in the 1998 election sample, compute their forecasted turnout. Then compare these 1998 forecasts with the actual 1998 outcomes.

The result is that all three models predict extremely well in the middle--education categories---usually within a percentage point or two---and reasonably well in the lowest education categories, usually within a few percentage points. The only substantial and consistent difference among the model forecasts emerged among those citizens with a college degree or graduate work. That difference is displayed in Figure 2. There it is clear that double probit is substantially better, as its forecasts generally go through the data points while probit and scobit are consistently too high by 5-10 percentage points. In particular, as expected from the Bayesian model, double probit predicts that turnout among the well educated will drop more at midterms than our conventional specifications expect. That prediction is amply confirmed.

Thus double probit models allow us to forecast accurately across contexts, while the conventional probit and scobit specifications do not. Bayesian theory provides the specification guidance that makes better forecasts possible.

Finally and briefly, we present estimates in Table 4 for double probit vs. probit in the Irish Quarterly National Household Survey. This census bureau, unlike its American counterpart, was willing to ask its respondents whether they would reply to some questions related to voting. Three of every five respondents agreed to do so, with no strong relationship to age or education in the pattern of refusals.[16] The explanatory variables are strength of partisanship on a 1-4 scale (essentially none, leaning, weak, and strong), and a dichotomous variable for whether the respondent read a national newspaper regularly. As in the American data, we omit respondents under age 25 because of residential mobility for schooling and those over 70 for reasons of physical frailty. Since Ireland has very few non-white or non-native-born eligible voters, and since residential mobility is vastly less than in the U.S., no constraints based on these factors were imposed.

Ireland has undergone an economic and social revolution in the past twenty years, and the party system, based on the divisions of the Civil War in the 1920s, are increasingly irrelevant to younger cohorts. Religious observance has also declined dramatically among younger citizens. Hence we add dummy variables for those aged 25-34 and 35-44.

The results are shown in Table 4. Double probit is again a better fit than probit with the same number of coefficients, and its parameters fit the Irish case. The squared party ID term proves statistically helpful in ordinary probit but unnecessary in double probit, indicating again that double probit gives a cleaner theoretical interpretation. We also tried party contact as an additional variable—an interesting test because well over half the Irish report having a party official call at their home. These results (not shown) are quite similar to those of Table 4: Again double probit fits better, and the coefficients other than that for party contact remain virtually unchanged. In sum,

[16] The youngest respondents refused more often, but they are excluded from the sample analyzed here.

double probit turns out to work successfully in Ireland. The new estimator passes its first test outside the American political context.[17]

Conclusion

Voter turnout is low in most democratic countries except in the most important national contests, and in some countries it is disappointing even in high-stakes elections, such as American presidential contests. Among the inexperienced young nearly everywhere, turnout is particularly depressed. The resulting pool of excluded, poorly informed, and inexperienced voters, who have the right to vote but do not exercise it, is troubling for democratic theory and an invitation to exploitation by demagogues. Raising voter turnout is important.

In this chapter, we have set out a model for thinking about why people show up at the polls. The key factors are knowledge of the campaign (driven primarily by education), strength of partisanship or ideological attachment (driven primarily by age), and contact by trust sources (driven primarily by social structure and party mobilisation efforts). These factors, embedded in a suitable model of voter learning, were shown to account for the main empirical results in the literature. They were also shown to imply several new relationships, which were verified in multiple national contexts. Thus we have some confidence that the model captures and unifies key empirical relationships currently scattered across a great many books and articles.

The framework also has important policy consequences. For example, if young people show up at the polls in smaller proportions than adults, as they do in virtually every country, we need not imagine that the young are distracted by the search for work, love, and a home of their own, or that they are otherwise engaged in a holiday from adulthood. Creative speculations along those lines appear from time to time in many democracies, and the result in the United States, for example, has been expensive public information campaigns to interest the young in voting by having rock stars and sports figures encourage them to vote. Unfortunately, these efforts

[17] Education is not strongly correlated with turnout in Ireland—the high school educated and the college educated turn out at identical rates. Thus we do not present Ireland fits using proxy variables for information and strength of party ID. We do not know what the appropriate proxies would be.

have been largely ineffectual, probably in major part because they are based on false assumptions. Empirical tests regularly show that the young who lead settled lives do no better than their footloose peers when it comes time to vote (Wolfinger and Rosenstone, 1980, pp. 55-58). The problem is not distraction or lack of free time.

For more successful explanations of low youth turnout, we look to the learning process set out in this chapter. The young need time to learn, so that lower turnout among young people is as inevitable for them as higher automobile accident rates. There is no sharp break in turnout in young adulthood, just a gradual increase as the appropriate skills are acquired.

Of course, dramatically lower youth turnout need not be accepted any more than are dramatically high youth automobile accident rates. In fact, the learning process is recognized and shaped where young people and their vehicles are concerned. To improve young people's driving, many societies mandate driver training classes in secondary schools. In many countries, young people begin with a "learner's permit" for driving, which requires an adult passenger when they drive. And even when permitted to drive alone, the young may be restricted to daylight hours for a year or two. All these restrictions are designed to speed up the learning process and to provide a less demanding environment in which beginners can safely acquire necessary experience. These interventions are successful, as many studies have shown. Successful efforts at getting the young to vote, whatever they may prove to be, will work as successful driver training does—it will start from a clear recognition of the learning problem rather than from an imagined distinct lifestyle led by the young.

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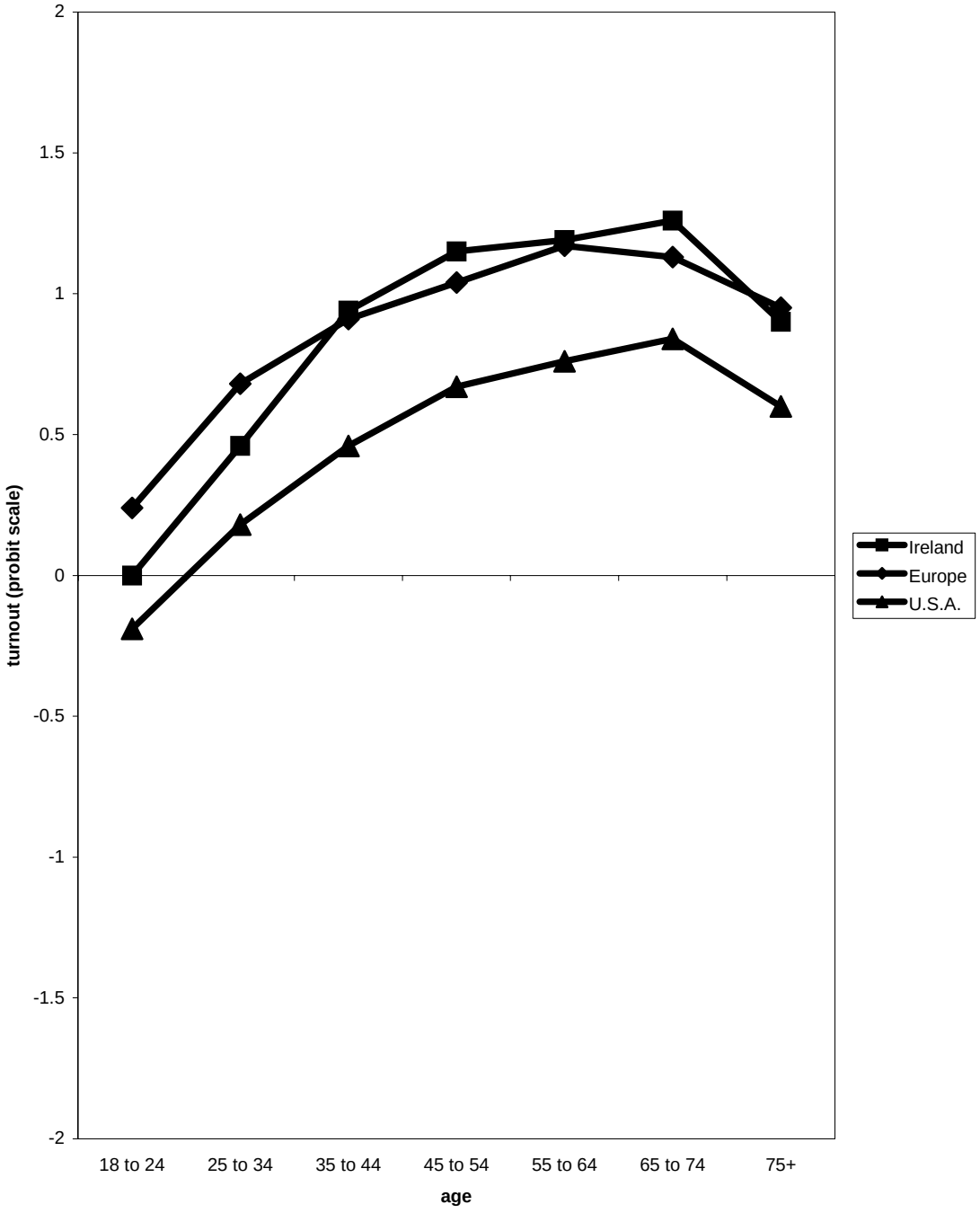
Figure 12.1: Turnout (probit scale) by age in Ireland, Europe and U.S.A.



Source: Ireland – Quarterly National Household Survey, Q3, 2002 (n=24,805)
Europe – European Social Survey, 2002-03 (22 countries, n=38,379)
U.S.A. – Current Population Survey, 2000 (n=74,174)

Figure 12.2: Turnout as assumed by linear probit and logit models

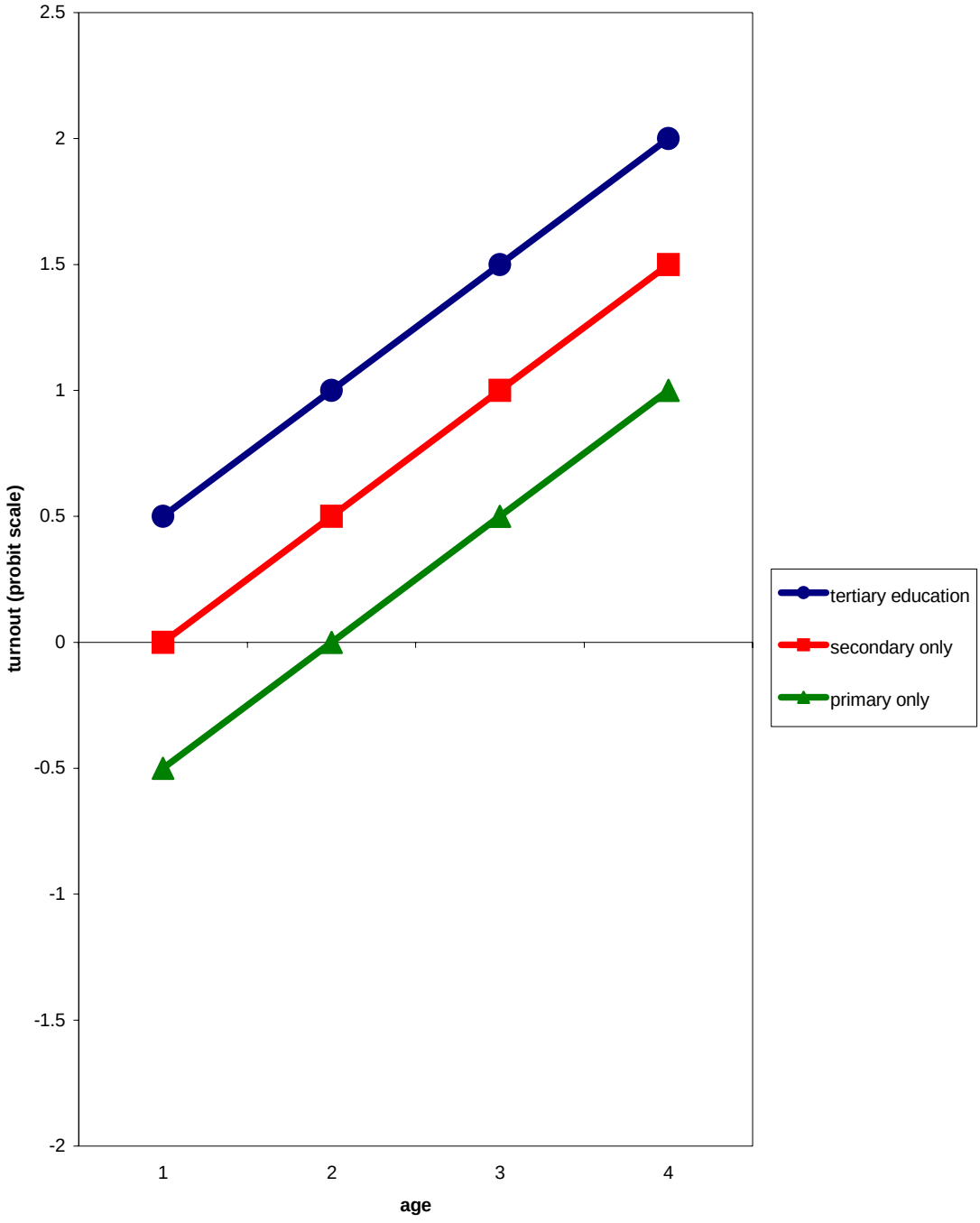


Figure 12.3: Turnout as predicted by the model in this chapter

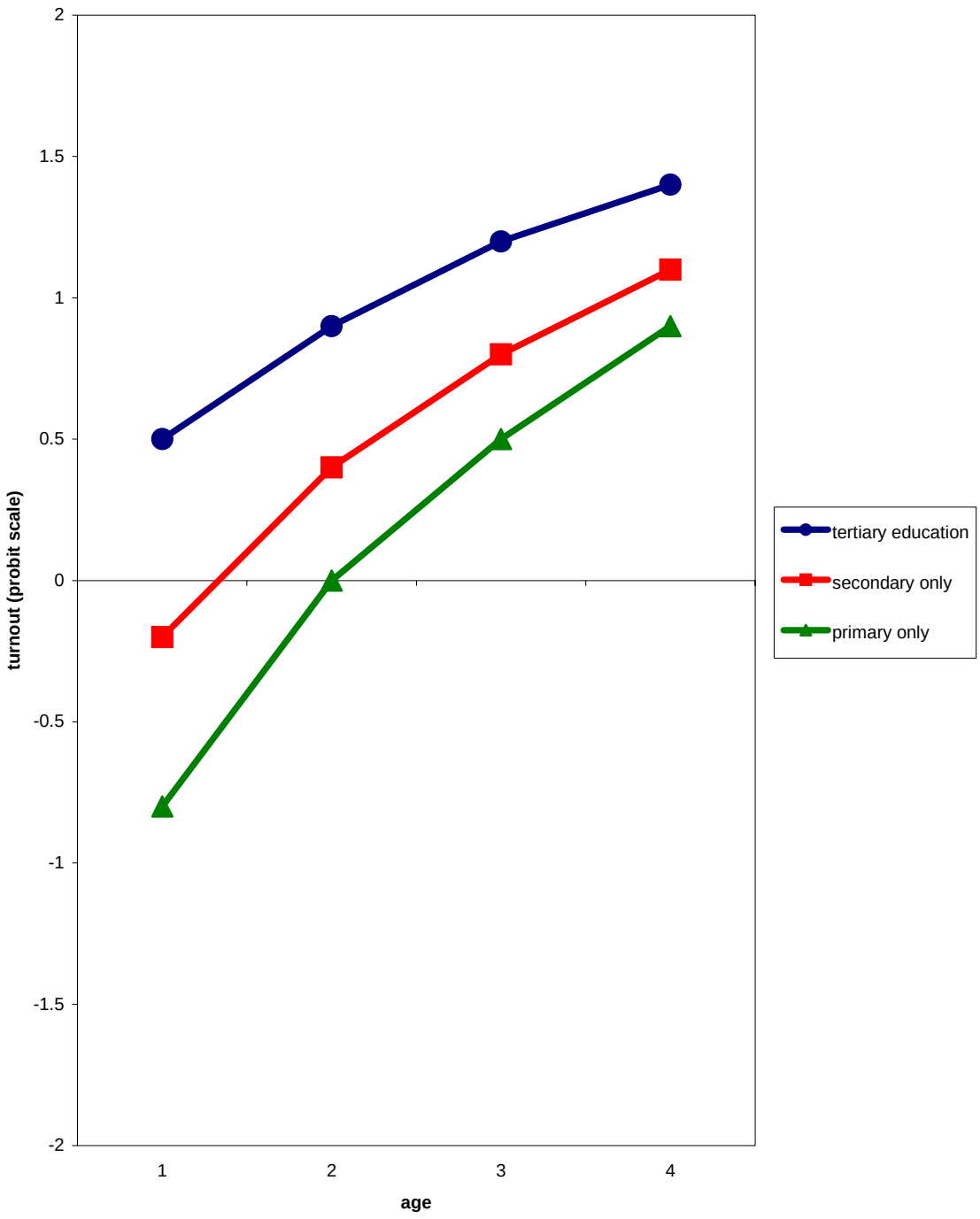
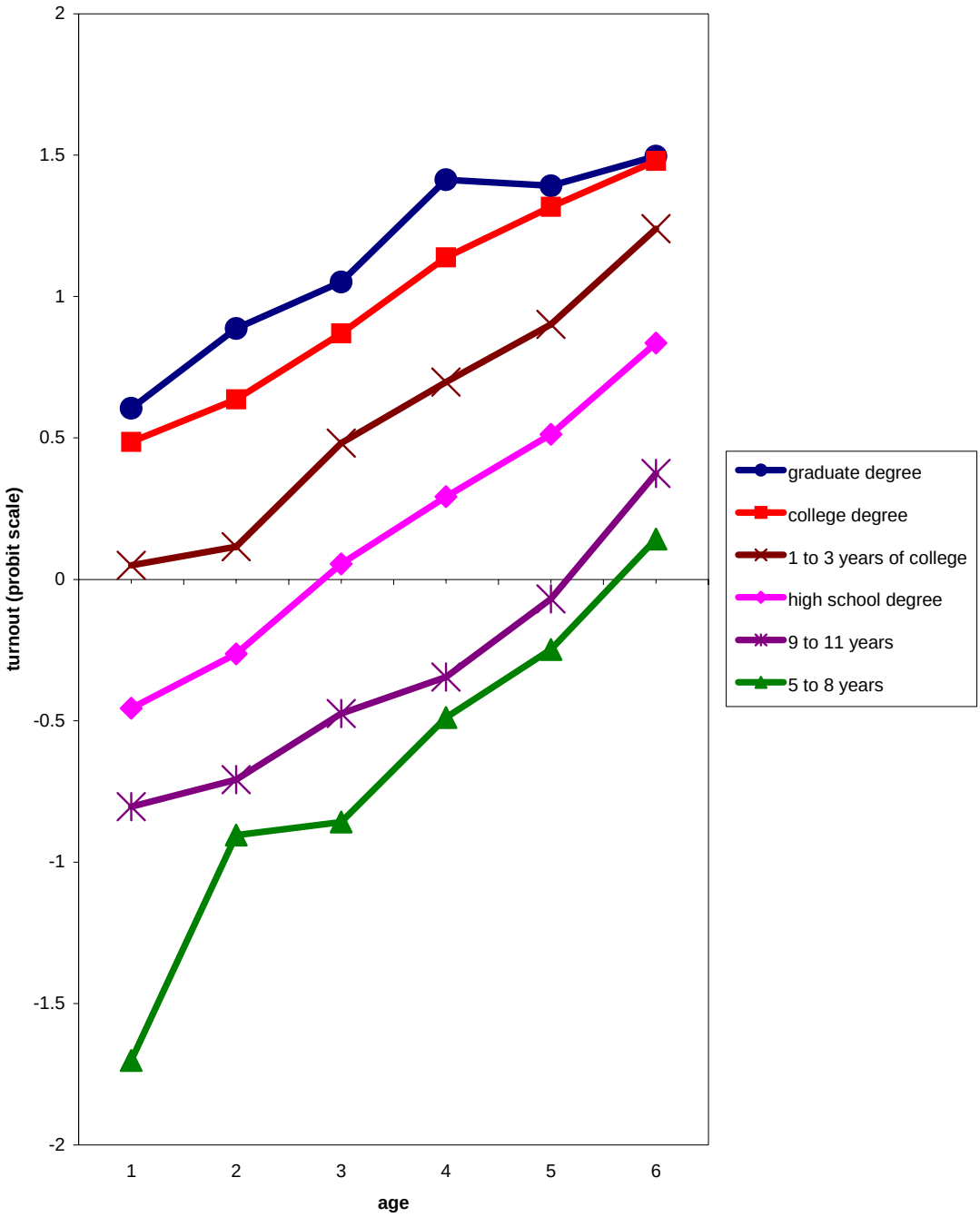
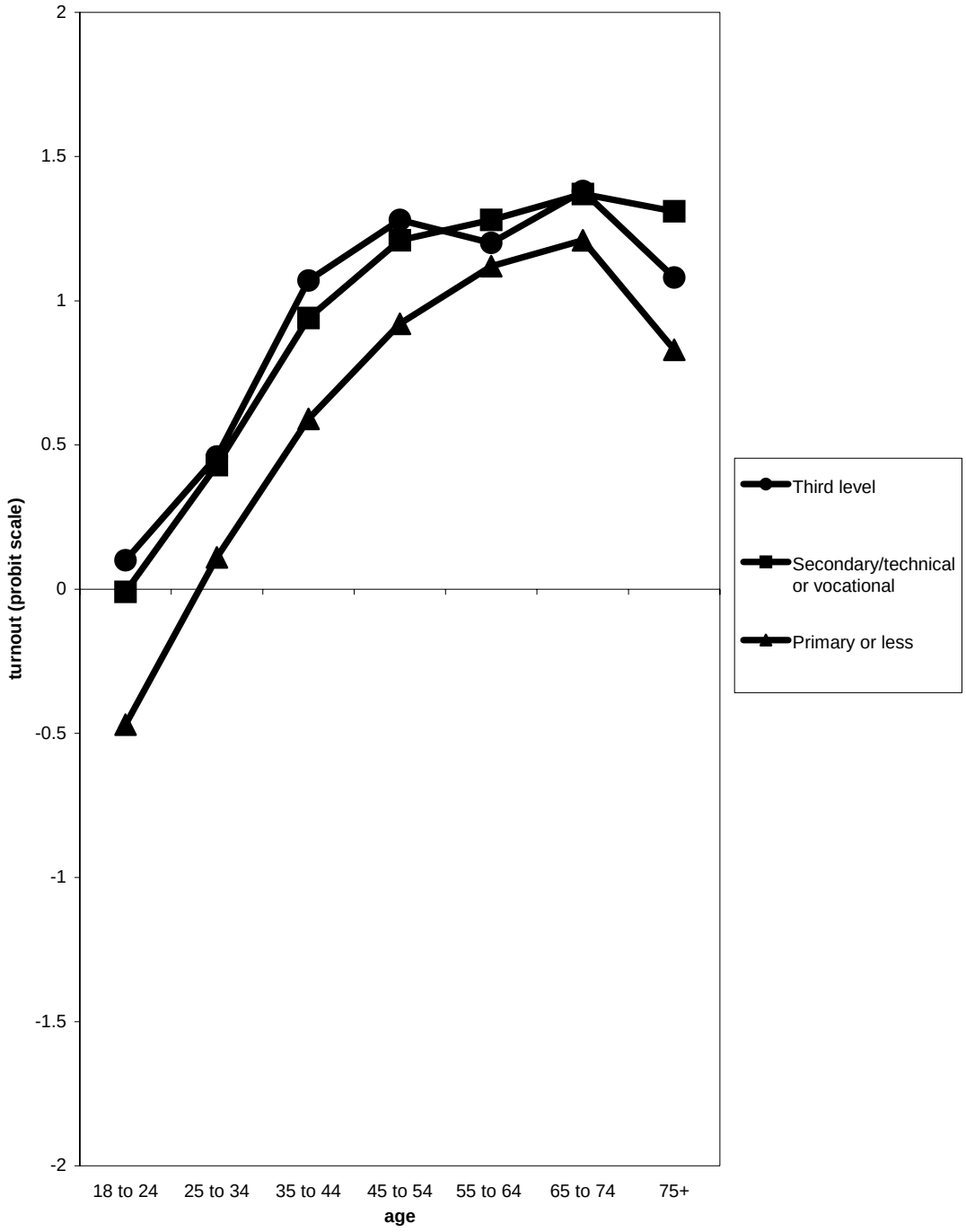


Figure 12.4: Turnout (probit scale) by education by age in the 2000 U.S. Presidential election



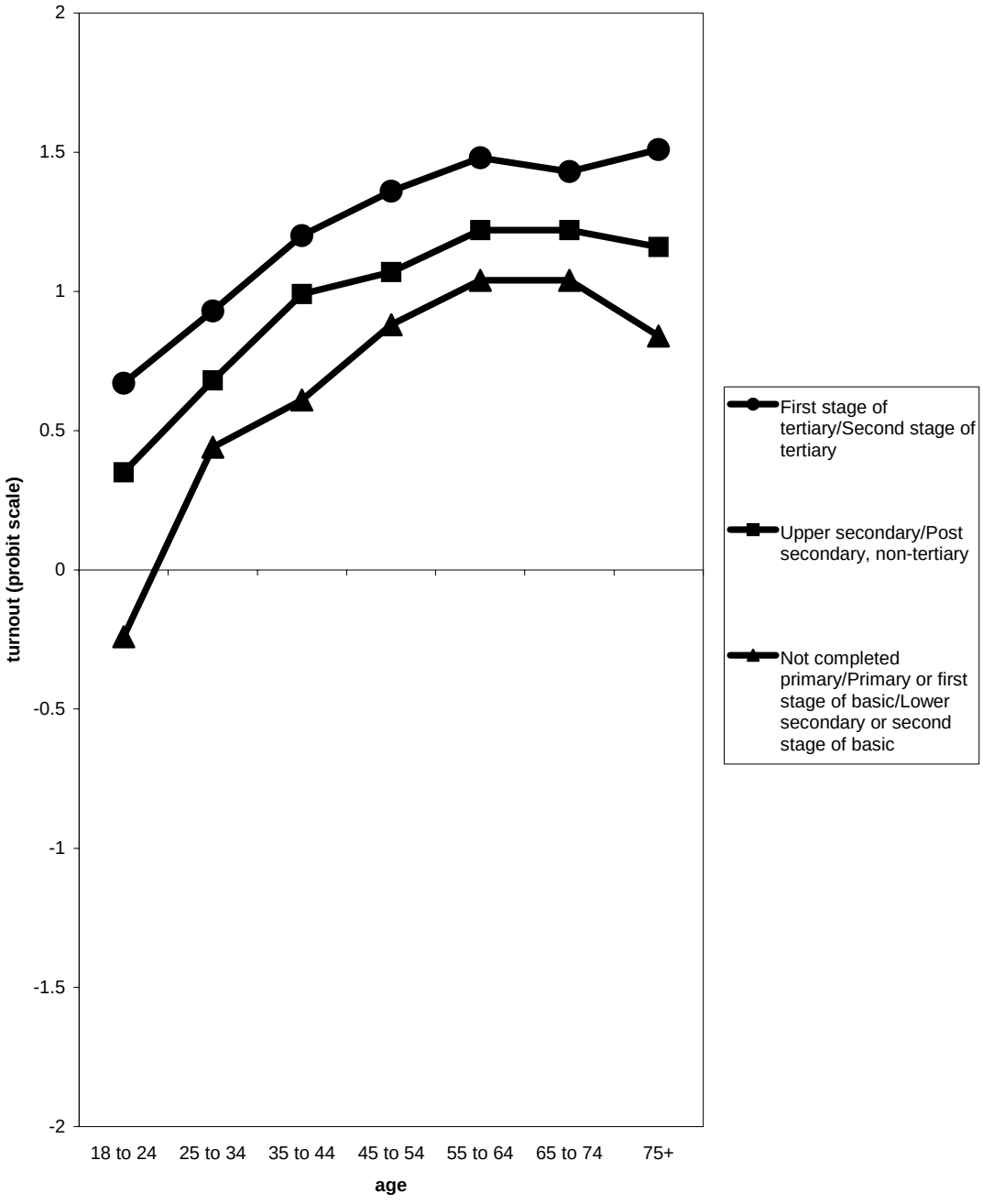
Source: Current Population Survey, 2000, weighted (n=74,174)

Figure 12.5: Turnout (probit scale) by age by education in the 2002 Irish general election



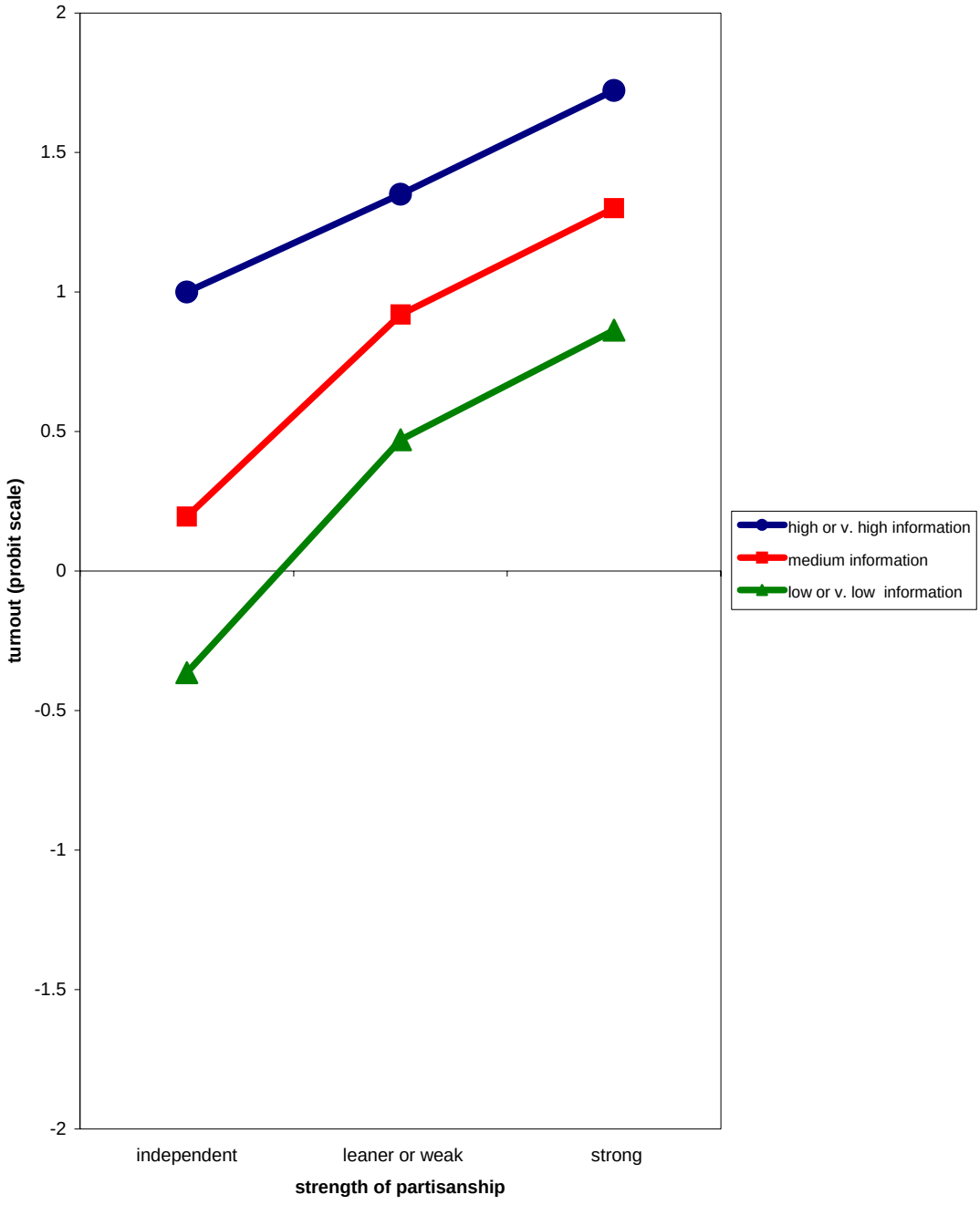
Source: Quarterly National Household Survey, Q3-2002 (n=24,805)

Figure 12.6: Turnout (probit scale) by age by education in the most recent national election in selected European countries



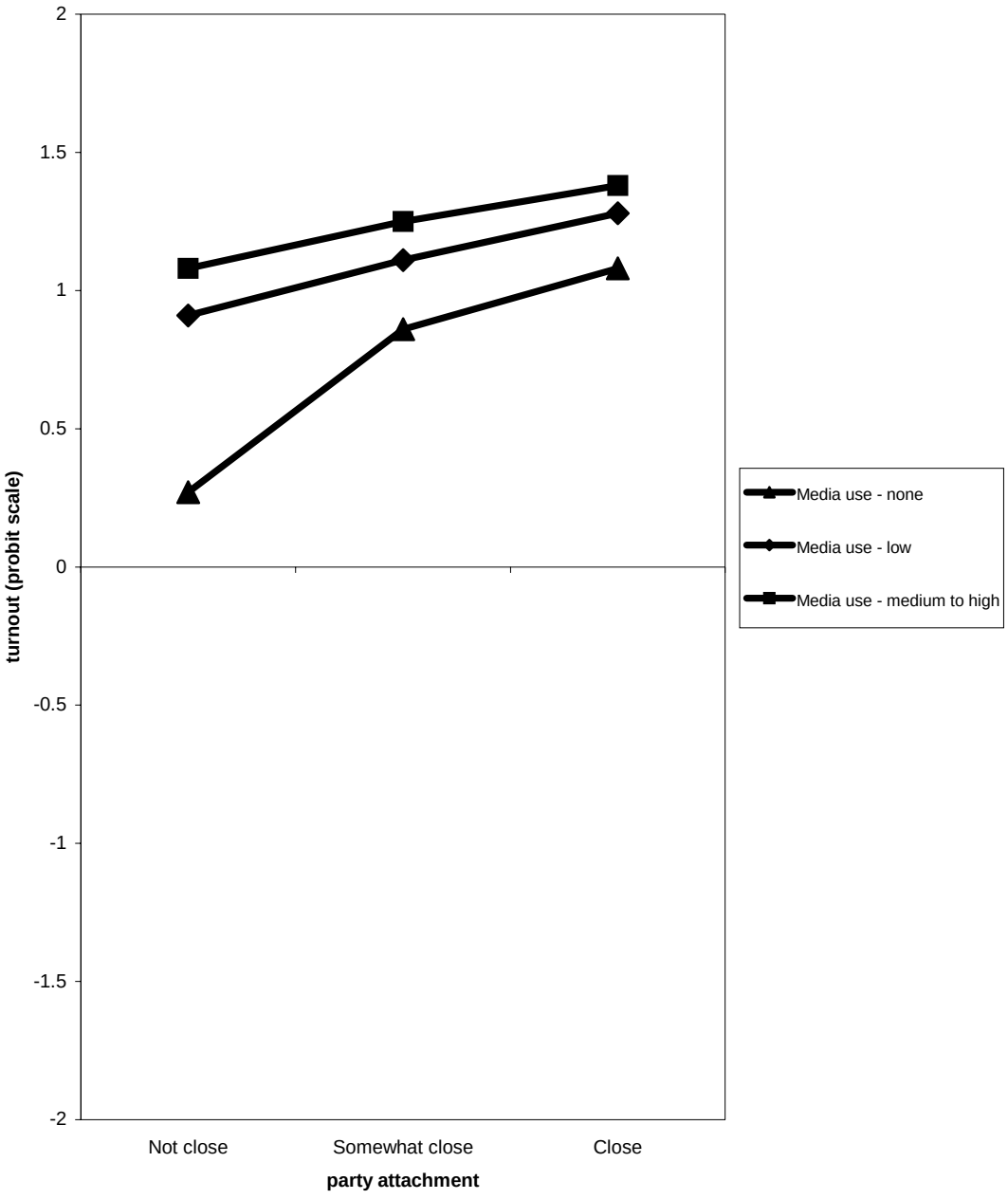
Source: European Social Survey, 2002-03 (22 countries, n=38,379)

Figure 12.7: Turnout by information by partisanship in the 2000 U.S. Presidential election



Source: Annenberg Survey: information level rated by interviewer

Figure 12.8: Turnout (probit scale) by party attachment by media use in the 2002 Irish general election



Source: Quarterly National Household Survey, Q3-2002 (n=24,805)

Table 1. CPS 2000 Turnout Study
(Standard errors in parentheses. N = 25,666)

	probit	scobit	double probit	probit
age/systemtime	.0355 (.00676)	.0610 (.00686)	.00957 (.000671)	.0337 (.00677)
age^2	-.000126 (.0000689)			-.000101 (.0000691)
education	.447 (.00915)	1.199 (.131)	.189 (.0126)	.705 (.0422)
$education^2$				-.0355 (.00563)
constant	-2.242 (.161)	-4.437 (.356)		-2.649 (.174)
scobit α		.547 (.0788)		
δ			-2.424 (.141)	
γ			4.865 (.0976)	
log-likelihood	-11780.1	-11752.0	-11750.5	-11760.46
parameters	4	4	4	5

Table 2. Annenberg 2000 Turnout Study
(Standard errors in parentheses. N = 2765)

	probit	scobit	double probit	probit
age/systemtime	.000486 (.0262)	.0792 (.0615)	.00973 (.00220)	-.0000585 (.0263)
age^2	.000193 (.000265)			.000204 (.000266)
education	.419 (.0328)	1.757 (1.336)	.220 (.0447)	.737 (.165)
$education^2$				-.0414 (.0209)
constant	-.856 (.628)	-4.803 (3.323)		-1.419 (.691)
scobit α		.405 (.333)		
δ			-2.086 (.572)	
γ			4.571 (.363)	
log-likelihood	-820.1	-817.3	-817.0	-818.2
parameters	4	4	4	5

Table 1. CPS 2000 Turnout Study
(Standard errors in parentheses. N = 25,666)

	probit	scobit	double probit	probit

Table 3. Annenberg 2000 Turnout Study
(Standard errors in parentheses. N = 2765)

	probit	scobit	double probit
PID strength	.309	5.718	.223
	(.121)	(26.39)	(.0345)
(PID strength)^2	-.00735		
	(.0358)		
information	.380	8.407	.368
	(.0384)	(38.80)	(.0613)
constant	-.263	-1.849	
	(.129)	(8.683)	
scobit α		.0770	
		(.355)	
δ			-1.212
			(.326)
γ			3.112
			(.256)
log-likelihood	-835.7	-830.1	-827.8
parameters	4	4	4

Table 4. Irish 2002 Quarterly National Household Turnout Study
(Standard errors in parentheses. N = 17,980)

	probit	double probit
PID strength	.249	.354
	(.040)	(.0585)
(PID strength)^2	-.0279	
	(.0156)	
information	.243	.425
(national newspaper)	(.0137)	(.0602)
age 25-34	-.654	-1.064
	(.0289)	(.151)
age 35-44	-.200	-.304
	(.0285)	(.0604)
constant	.791	
	(.0234)	
δ		.764
		(.0230)
γ		.899
		(.0849)
log-likelihood	-7198.3	-7190.4
parameters	6	6

Fig 12X: Political learning and the determinants of electoral participation

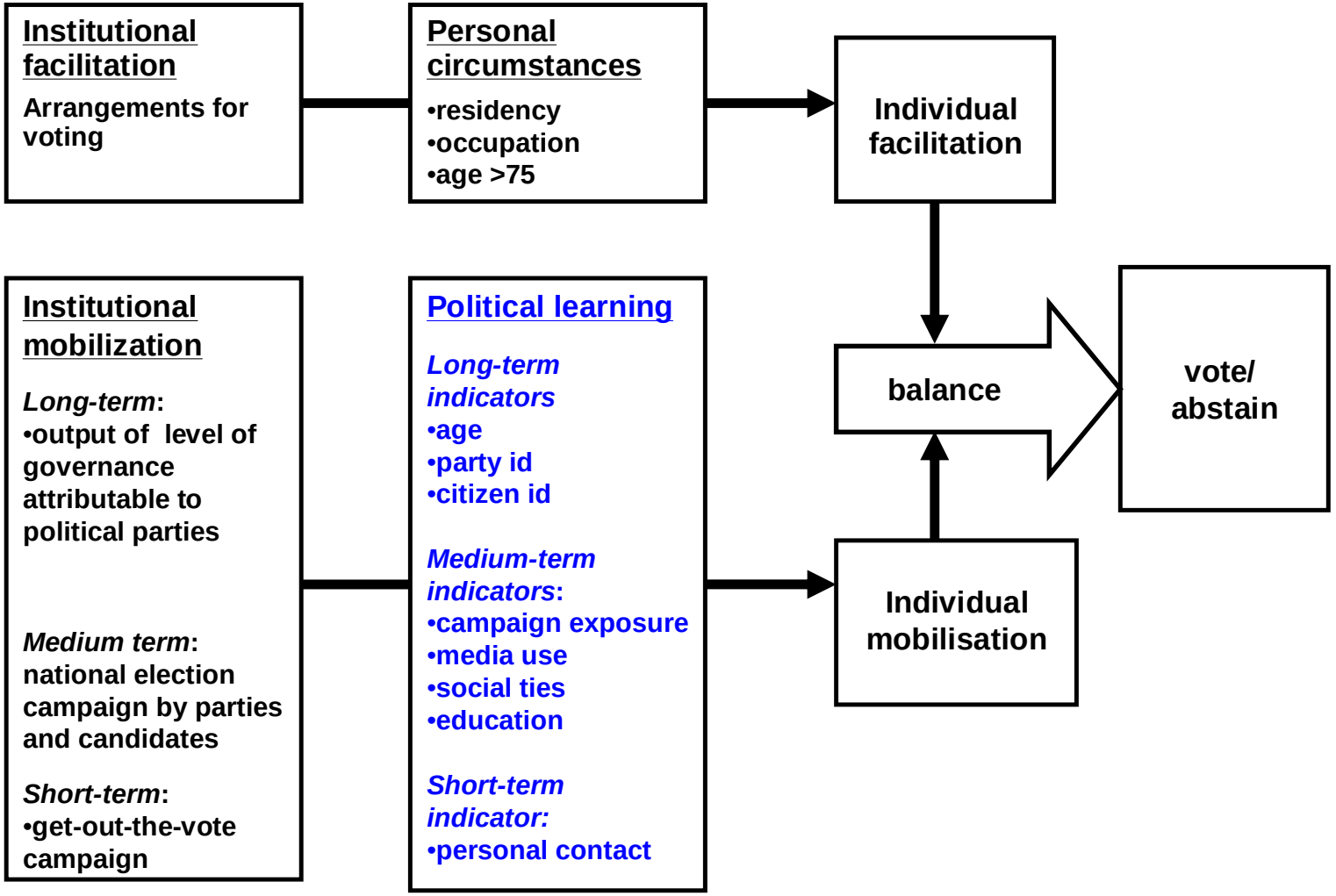


Fig. 2: Double Probit vs. Probit: Age Coefficients in Two 2000 Samples

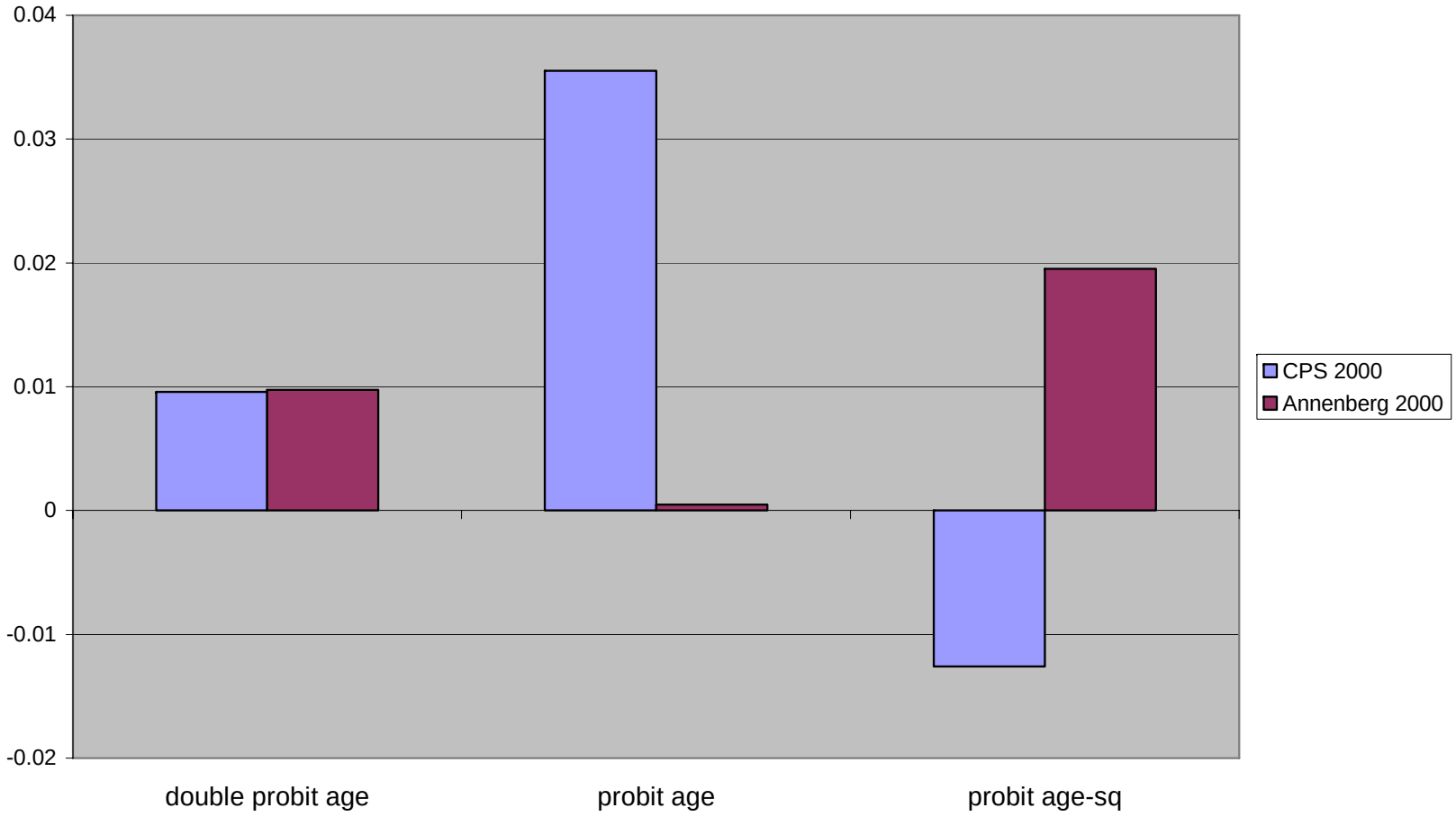


Figure 3: Forecasts of 1998 Turnout from 2000 Data for Native-Born Whites of Stable Residence with BA or more