ACCURACY OF PUBLISHED POLLS CONCERNING THE 2006 ITALIAN PARLIAMENTARY ELECTION
An Analysis of Pre-election Poll Bias Using a New Measure of Predictive Accuracy (*A*)

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Abstract Pre-election polls played a particularly significant role in the 2006 Italian parliamentary elections: the number of published pre-election polls almost doubled in comparison to 2001, almost reaching the threshold of 100; they were constantly evoked by political parties, especially by the center-right coalition (Prime Minister Silvio Berlusconi repeatedly accused pollsters of being biased and favoring the left); new voting rules made them more directly relevant for predicting the future governing majority. In this paper we analyze the accuracy of 73 published polls reporting results pertaining to the April 2006 Chamber of Deputies and apply a new measure of predictive accuracy, *A*, recently introduced in the U.S. context. The final outcome of the election gave the center-left a lead of 0.1%. This veritable "deadlock" came as a great surprise, for virtually all published pre-election polls had acknowledged a 3/4 percentage point lead for the center-left coalition. We attribute the failure of almost all pollsters to predict the actual outcome to various factors: sampling error issues, the fact that by law pollsters have to stop publishing results 15 days before election day, high coverage error due to households having only mobile phones or no phone (almost all polls were done by telephone and calling landlines only), and a possible reluctance of Italian voters to declare their vote for the center-right. The new measure of poll accuracy was easy to adapt and apply to the Italian context, where the two coalitions were used as parties. Information given by pollsters remains, however, too inadequate to engage in comprehensive evaluations of their polls.

Key words: poll accuracy, pre-election polls, bias, Italian parliamentary election.

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THE ITALIAN CONTEXT: PRE-ELECTION POLLS AND THE 2006 ELECTION[*]

Pre-election polls played a particularly significant role in the 2006 Italian parliamentary elections for many reasons. Firstly, despite widespread dissatisfaction with the outgoing center-right government, the ample lead in opinion polls (and consequent expectation of victory) enjoyed by the center-left after its successful performance in the 2005 regional elections had faded by the beginning of this year and appeared to be further endangered by the intense media campaign undertaken by Prime Minister Silvio Berlusconi. Moreover, pre-election polls were constantly evoked during the election campaign, especially by Berlusconi himself, who accused Italian pollsters in general of being biased in favor of the center-left (Stella, 2006) and repeatedly referred to an allegedly more reliable survey he had commissioned to "Americans" and that (again allegedly) documented the center-right's resurgence. In the event, the number of published polls almost doubled in comparison to the 2001 elections, from 52 to 95, a relatively high number for a small country like Italy.

But the main reason polls were more important than in the past has to do with a new voting system introduced by the center-right government just a few months before the election (Law no. 270, December 2005, subsequently described as a *porcata*, a "dirty trick", by the government minister who sponsored it). In order to understand this point, some history must be recalled. Up to the 1992 elections, the Italian Parliament was elected through a highly proportional voting system, in which the number of MPs earned by each party was almost directly determined by its popular vote; and, although there could be (limited) variations in each party's strength from one vote to another, there was no alternative to a coalition government centered upon the Christian Democracy and excluding "extremist" parties such as the Italian Communist Party and the far-right Italian Social Movement. The precise make-up of government coalitions and the government leader were subject to *post*-election negotiations.

The disruption of the Italian party system caused by the "Clean Hands" investigations and other events in the early 1990s led not only to a major re-definition of parties – including the disbanding of the pillars of prior coalition governments, the Christian Democrats and the Socialists, the founding of a new party, Forza Italia, and the legitimation of the fascist-leaning Italian Social Movement (now National Alliance) – but also to new voting rules which were in force for the 1994, 1996 and 2001 general elections. According to that new system, one-fourth of all seats in the Chamber of Deputies (the lower house of Parliament) continued to be allocated according to proportional criteria (and for which single parties continued to compete against each other in a free-for-all), whereas the remaining three-fourths were assigned in single-winner constituencies according to plurality, "first-past-the-post" criteria. This effectively led parties to form pre-election coalitions (in order to identify strong candidates in the plurality constituencies) and designate candidates for chief of government, and introduced an unprecedented, bipolar "center-left vs. center-right" dynamic to Italian politics. The electoral system was nevertheless complicated, and forced voters to cast three ballots for parliamentary elections (one for the

[*] A preliminary version of this text was presented at the Wapor Thematic Seminar on "Quality Criteria in Survey Research VI", held in Cadenabbia, Italy from June 29 to July 1, 2006.

Senate, one for the allocation of Chamber of Deputies "proportional" seats, and one for the constituency-specific single-candidate showdown).

Analyses of voting behavior under the new rules have shown that the center-right coalition performed appreciably better in the proportional voting arena than in the plurality one, i.e., center-right voters were relatively less willing (compared to center-left voters) to vote for a unitary coalition candidate than for their preferred party (D'Alimonte & Scaramozzino, 2002). The desire to reduce the effect of this weakness was probably the major reason the incumbent center-right coalition overhauled the voting system for the upcoming 2006 election. Also, the center-left had committed itself to choosing a unitary candidate through an innovative primary election; since this candidate was Romano Prodi, "a politician without a party", the electoral reform was a means for causing tensions amidst the opposition coalition.

What exactly do the new voting rules say? We will limit the discussion to the Chamber of Deputies (D'Alimonte & Chiaramonte, 2006). Voters cast just one ballot, on which they indicate their preferred *party*. Parties are encouraged (but not obliged) to establish formal multi-party *coalitions* sharing a common platform and leader: the coalition with most votes receives a "majority premium", i.e. is guaranteed 54% of all Chamber seats, and therefore a stable governing majority. Also, only if they belong to such a coalition do (smaller) parties more easily earn parliamentary representation (2% threshold, instead of 4% for "non-coalitioned" parties). In practical terms, each party vies for seats *within* its coalition and earn a number of MPs that is directly proportional to the number of votes it receives at the national level vis-à-vis its coalition. In sum, two distinct dynamics govern the allocation of seats: a general one among coalitions, where the "majority premium" applies; and a specific infra-coalition one, among parties, where quasi-pure proportional allocation applies[1]. Another important innovation concerns the allocation of 12 seats (out of a total of 630) to constituencies of Italian citizens residing abroad, who had never before had any parliamentary representation.

Predictably, only two coalitions were formed: the center-left Union and the center-right House of Freedoms (which together marshaled 99.5% of the popular vote). Obviously, pre-election polls are much more relevant in such a context: there is a straightforward translation of votes into parliamentary seats and thus into a governing majority; there are few local "distortions" in expressions of party preference due to individual candidacies (which are basically of little consequence under current regulations); the competition for votes was "bipolar" to an unprecedented degree (for Italy), and non-coalitioned, "third" parties all but disappeared.

Polls received further attention in the light of the actual election results[2]. The Chamber of Deputies "majority premium" was awarded to the Union coalition by a margin of barely 25,000 votes, i.e., 0.07% of valid votes! In the Senate, the center-right actually received more votes than the center-left, but the introduction of regional-level "majority premiums" and, especially, the center-left's success in the novel "overseas" constituencies led to a tiny majority of seats for the Union[3]. This veritable "deadlock" – as it was described by many commentators – came as a great surprise, for virtually all published pre-election polls had acknowledged a 3-to-4 percentage point lead for the Union; what is more, this expectation was firmly corroborated by three distinct

[1] The center-right and center-left coalitions comprised, respectively, at least 12 and 13 parties, 5 and 8 of which, respectively, earned seats in the Chamber of Deputies.

[2] Voter turn-out, as usual in Italy, was quite high, with 83.6% of resident voters going to the polls. Such a high turn-out rate might seem to render probable voter.

[3] Se D'Alimonte & Chiaramonte (2006) for a comprehenive analysis of the new parliamentary voting system.

exit polls on the afternoon of April 10, mere seconds after voting had ended. As the actual results slowly came to light, pollsters immediately came under fire for their systematically flawed forecasts.

According to some analysts, pre-elections polls had perhaps been accurate but, due to the embargo during the final two weeks of the election campaign, they were not able to record important variations in voting intentions caused by Berlusconi's intense campaigning and/or the center-left's unsettling messages concerning possible tax increases. This thesis, however, seems to be contradicted by the almost perfect convergence between pre-election and exit polls. Others maintain that both types of polls were plagued by insincere respondents, unwilling to own up to their center-right inclinations; this thesis finds some support in polls' underestimation of Forza Italia's actual electoral strength. Others still claim that the Italian market for political opinion polls is simply too underdeveloped and prone to price wars to generate high quality standards and the investments they require; and the elimination of single-candidate constituencies by the new election system has only further depressed demand (Meletti, 2006; Sani, 2006a, 2006b).

GAUGING THE INTENTION TO VOTE

The majority of poll accuracy measures[4] compare, with different methods, a measure of intention to vote for a particular candidate or political party with the actual vote coming form the official results. The two data are inherently dissimilar and collected in different ways. The intention to vote is recorded *before* the election, on a sample of voters, with different questions (e.g. "If the general election were held today…") and generally diverse modes of data collection, for example telephone surveys. The official results, on the other hand, are based on the tally of all valid ballots (census), with a unique "questionnaire" (the ballot), and data are collected in a visual mode (paper ballot or electronic voting machines, for example). More specifically, operationalizing voting intentions means using questions that record a *subjective* event; the nature of the judgment is an expectation about this future event (Martin, 1984). There are also two other further complications: survey respondents may decide not to vote, and/or some may be undecided about which candidate or political party to vote for. The official count, on the other hand, is a manifestation of an *objective* behavior, an actual expression of preference.

A problem that arises when doing pre-election polls is how to screen for likely voters, especially when there is a low turnout rate. Pollsters do not want to base their election outcome forecasts on respondents who are not likely to cast a ballot; to screen out such respondents, a series of questions are often asked in order to assess who is more likely to vote (Zukin, 2004). This assessment varies greatly among polling firms, introducing additional difficulties in comparing results from different sources (Daves, 2006). From this brief analysis the reader can see how the two kinds of results (polls and official counts) have a different meaning and how the comparison, done with any formula, should be interpreted with great care.

All the above arguments hold true if some assumptions are satisfied. For data collected with a poll, besides sampling and non-sampling errors, the general assumption is that the respondents express their true vote intention or, in other words, that there is an almost perfect correspondence between intention to vote and actual vote. The second assumption is that even if respondents behave differently than reported in a poll, these differences (due, for example, to

[4] For an exception, see Lau (1994) and the paper written after his contribution. We discuss this measure later in the paper.

bandwagon and underdog effects) would cancel each other out in the final count. On the other hand, the main assumption of official results is that *all* votes are counted *correctly*. Table 1 summarizes the concepts described above.

Table 1. Characteristics of Pre-election Polls and Official Results

Characteristics	Pre-election poll	Official results
Sampling design	Sample of likely voters	Census of all people who actually vote
Questionnaire	Hypothetic question ("If the general election were held today…")	Authentic ballot
Mode of data collection	Interviewer-administered: telephone, face-to-face, self-administered (internet)	Self-administered
Timing of data collection	Before the election, last day determined by country specific laws	Actual voting day(s)
Undecided	Decreasing incidence as election day approaches	No undecided in the ballot, blank and null votes removed from the final count
Coverage error	Dependent on data collection mode	No coverage error
Nonresponse	Assessed by response rate	Blank and null ballots
Screening for likely voters	Depends on question wording and polling firm strategy	Not applicable
Assumptions	Intention = actual vote (irrelevance of last-minute changes); Respondents relate true voting intentions to pollster	Every vote is counted; The count is precise

The difficulty when comparing data drawn from pre-election polls (or "predictions") to the actual vote is on how to ascertain the error and the eventual discrepancies among the two systems. The next section is a brief review of methods for poll accuracy assessment.

POLL ACCURACY MEASURES

The first systematic discussion of ways to measure the difference between predictions and actual results dates back to Frederick Mosteller (1949). He was part of a committee assembled under the auspices of the Social Science Research Council (SSRC) with the goal to review and assess polling methods after polling firms' failure to correctly predict the outcome of the 1948 presidential elections (Perry, 1979). Mosteller laid out eight methods "applicable in measuring errors in election forecast" (p. 55). The first six methods use the difference between predictions and results or the difference between the two main parties; the seventh method uses the chi-square test; the last one uses the predicted versus the observed attribution of electoral votes. The SSRC used method 1 (the difference in percentage points between the leading candidate's share of the total vote from a poll and from the actual vote) to evaluate poll accuracy for the 1948 presidential election.

Crespi (1988) conducted the second major study of accuracy of pre-election polls in the U.S. He evaluated Mosteller's methods 1, 3 and 6 and ended up using method 1, for he didn't find much difference between them. Crespi also pointed out that the SSRC did not discuss how to include the percentage of undecided voters in the final count. Polling firms report results including the percentage of undecided, but since there are no undecided in the official results, it is necessary to allocate them somehow in order to provide comparability across polls. Crespi found that proportional allocation was the method most commonly used by the pollsters he interviewed for his book.

In a review and application of Mosteller's methods to the 1996 election, Mitofsky (1998) addressed the undecided voter problem by proposing four allocation techniques. He concluded that technique 1 (proportional allocation of undecided according to the final results) gave more consistent results when comparing different polls. Mitofsky's major contribution was to elect Mosteller's method 3 (average deviation for each party or candidate) and 5 (the difference in the differences between the leading candidates in the polls and the actual results) as the two best methods to evaluate poll accuracy. Method 3 has the advantage of taking into account third party candidates but the disadvantage of not being comparable across elections with different numbers of meaningful candidates. Method 5 has the advantage of working for both two- and multi-candidate elections. After a debate with Panagakis (1999), Mitofsky (1999) advocated using method 5 for comparability purposes. When the undecided voters are allocated, methods 3 and 5 produce the same results for a two-candidate race. These two measures became popular and have been used in evaluating U.S. elections (National Council of Public Polls (NCPP), 2002; Traugott, 2001, 2005).

Mosteller's methods or slight variations of them have been used widely also in the international context. Jowell and colleagues (1993) estimated the accuracy of the 1992 British elections simply by measuring the difference in percentage points between the overall average of final polls for each party and the actual official results. This is basically Mosteller's method 1. In an analysis of the 1997 British elections Curtice (1997) uses the same measures of Jowell *et al.*, plus he calculates Labour's lead, which is evaluated directly by method 5. Using pre-election polls from 1945 to 1997 and an update up to 2005, Crewe (1997; Crewe, 2005) applies methods 1, 3 and 5 to determine accuracy. According to Crewe (1997, p. 580) "the true test of a poll's accuracy is the mean of the deviation between the average forecast for each party's vote share and actual vote share". This is exactly Mosteller's (1949, p. 55) method 3: "Measure the error by averaging the deviations in percentage points between predicted and observed results for each party (without regard to the sign)"[5]. Results from the 2002 Irish election were compared with pre-election polls by McElroy & Marsh (2003) using method 3. Magalhães (2005) uses method 3 and 5 to evaluate the poll accuracy of pre-election polls in Portugal from 1991 to 2004. Lastly, methods 1 and 3 are used to evaluate the accuracy of the 2002 French presidential election by Burand, Blais & Larochelle (2004).

Another method was introduced by Lau (1994) in the U.S. and applied with some variations to other contexts. His measure is the difference between specific poll results and the mean of all the available polls results in the same period weighted by sample size (except the poll whose accuracy is being judged). The measure does not take into account the actual official results and has the advantage of estimating the accuracy of a poll in a specific point in time. Durand (2002) used a modifies version of Lau's measure based on the the difference between estimates of each poll and estimates from time-series analysis: the daily polls' average is used to

[5] See also Mitofsky's discussion (1998, p. 237).

create a time-series that is then plotted on a chart including 95% margin of error trend lines. Each poll can then be compared to the average of that specific point in time to assess its accuracy (Durand, Blais, & Vachon, 2002; Vachon, Durand, & Blais, 1999). The authors apply the analysis to the elections in Quebec in 1998 and 2000.

To summarize, in the U.S. and international literature, two classes of poll accuracy have been used: Mosteller's methods (1949) and their variations, where the official results are compared to the polls, or Lau's measure (1994) and its variations, where each poll is compared to the weighted average of the other polls taken in the same period. Mosteller methods 1 and 2 and Lau's computation can also assess the direction of bias (i.e., the extent to which a pollster systematically over- or underestimates a party's or candidate's share of votes). Politicians are especially interested in knowing if partisan polls are biased towards them or if, for example, a newspaper of a certain political orientation publishes biased polls. The problem with these two measures is that they do not deal with the sampling error of polls, which is one component of the difference between poll estimates and actual results. Another problem is the allocation of undecided voters. If the latter are not allocated to a candidate, method 1 will overstate the error. Furthermore the computed error cannot be comparable for polls that report the percentage of undecided voters and those that use their own methods of allocation. Method 2 eliminates undecided voters from computation because it re-percentages the two major parties' or candidates' shares of the vote so that they add to 100 (Mitofsky, 1998).

THE NEW MEASURE OF PREDICTIVE ACCURACY: "A"

In order to address the problems of Mosteller's methods and obtain a new measure unaffected by the size of the undecided voter category and that also takes into account the sampling error, Martin, Traugott & Kennedy (2005)[6] recently proposed a new measure of poll accuracy called *A*. The measure is computed as the natural logarithm of the odds ratio of the outcome in a poll and the outcome of the election: $A = \log \frac{r/d}{R/D}$ where *r* and *d* are the number or the percentage of poll respondents who favor the Republican and the Democratic candidate, respectively. *R* and *D* are the actual number of votes, or percentage of people who voted Democratic or Republican in that election. The reason for using the logarithm to the base *e* is to create a measure that is symmetric around 0 and to simplify the calculation of the variance. A significantly positive value of *A* indicates a pro-Republican bias, while a significantly negative value of *A* indicates a pro-Democratic bias in the poll(s). *A* is zero when the odds ratio is one: this reflects perfect agreement between a poll and the election result. The formula takes into account the sampling error of the polls, and via the calculation of the variance indicates if the results of a poll are significantly biased with a 95 percent confidence interval, for example. Note that the formula ignores undecided voters, implicitly assuming their proportional distribution among parties.

[6] The full description of the derivation and formula for *A* and its variance calculation is reported in Martin, Traugott, and Kennedy (2005, p. 350-353).

DATA: DESCRIPTION OF ANALYZED ITALIAN POLLS

The polls analyzed in this paper are drawn from the archive that can be consulted at an official website administered by the Italian Presidency of the Council of Ministers: www.sondaggipoliticoelettorali.it. Law no. 28 (passed at the beginning of the year 2000) – popularly known as the "*par condicio* law" – regulates political communication and, in particular, equal access to media during election campaigns. Part of the law deals with public dissemination of survey findings concerning voters' political leanings and voting intentions. The law specifically forbids the publishing of polls in the two-week period preceding an election, regardless of when the poll was conducted (polls can be conducted in this two-week period, but their results cannot be rendered public). In any case, poll findings can be published (i.e., distributed via mass media) only if accompanied by information concerning the following aspects: who conducted the poll, who sponsored the poll, sampling criteria, data collection and processing methods, sample size, reference population, question texts, percentage of subjects who answered each question, date(s) in which the poll was carried out. This information must also be forwarded to the above-mentioned site, where it can be freely consulted[7].

It is worth noting that publication of political and electoral polls are regulated in a partially different manner than that of the findings of other types of sample surveys. Publication of "non-political" poll results must also be accompanied by methodological information and the deposit of a corresponding document at the public website of the Autorità per le Garanzie nelle Comunicazioni (www.agcom.it; see the Authority's deliberation no. 237/03/CSP of 11 November 2003 for the entire text of relevant norms). Inexplicably, the information that must be rendered public for non-political polls is appreciably more comprehensive and strict than than for political polls. For example, publication of "non-political" poll findings entails the description of the territorial extension of the sample, the total number of non-respondents and substitutions, the procedures employed for checking response consistency, the "sample representativeness in terms of margins of error at a 95% confidence level" and the ensuing "interpretative limits" – elements that are *not* required for political polls, to which the law has conferred an exceptional, and expressly *less* demanding, status.

The above-mentioned political and electoral poll archive contains every document ever deposited since October 2000: up to the site closure due to the April 9-10 parliamentary elections, the site hosted 1,046 documents. This data set has obvious advantages and drawbacks: it should contain standardized information about all "political and electoral" surveys the findings of which have been rendered public, but the level of standardization is not always satisfactory and, of course, unpublished surveys are not included. There are, however, no alternatives, i.e. no initiatives for the pooling and public availability of Italian election polls[8].

In the period from the beginning of 2006 to the pre-election embargo period, the site contains individual documents referring to 95 different national pre-election surveys (this figure does not include polls concerning subnational areas or specific voter categories); 20 of these had separate questions for the Senate and the Chamber of Deputies; 2 addressed only the Senate

[7] Applying a restrictive interpretation of the law, the site administrators render the *entire* website inaccessible during the two weeks preceding *any* official election and, moreover, are at times slow to reactivate it after an election. For example, the site was effectively shut down on May 14, 2006 and remained so until June 27, due to administrative elections in a limited number of municipalities, provinces, and regions (May 28-29, June 4-5, June 11-12) and a national referendum (25-26 June).

[8] An important exception is the Italian National Election Studies program (Itanes), coordinated by the Istituto Carlo Cattaneo research foundation: www.itanes.org; www.cattaneo.org/itanes.html.

election. *None* of the surveys polled voters residing abroad, who actually played a crucial role in the election outcome. In this paper we discuss 73 of these surveys, i.e., the ones pertaining to the Chamber of Deputies, and only insofar as they do so.

The 73 pre-election polls were conducted by a total of 16 different polling agencies (including one website, which, strictly speaking, is not a pollster). Only 7 of the agencies (responsible for 36 polls, i.e. approximately one-half of the total) are members of ASSIRM (Associazione tra Istituti di Ricerche di Mercato, Sondaggi di Opinione, Ricerca Sociale), Italy's major association for market, social and opinion research professionals. Five polls were expressly commissioned by political parties. Practically all of the polls were carried out with Cati methods; 5 were web-based; one used a Capi system.

Other information concerning data collection points to both a high degree of variation (which provides opportunities for analysis: see below) and shoddy reporting procedures. Total sample sizes varied from a minimum of 502 to a maximum of 13,200 units; 50 polls report a sample size of exactly 1,000 units; only 9 reach the 2,000 threshold. For 60 polls fieldwork lasted only 1 or 2 days. The oldest poll considered was completed 112 days before the election; the most recent, 18 days.

Information concerning sampling techniques is more difficult to evaluate. In thirteen polls the stated sampling strategy speaks only of "random" sampling; in 26 cases reference is made to both "random" and "stratification" criteria. Another 27 mention only "stratification". The remaining 7 polls mention other criteria as well. In no survey is the sampling technique illustrated in a satisfactory way. The same can be said for case-weighting: in at least 26 surveys, however, one may infer that such a strategy was used.

The surveys almost always report findings referred exclusively to voters who expressed a distinct preference. The pollsters' documentation to quite deficient as regards the incidence of undecided voters, resolute non-voters and "don't knows". Only 17 polls provide distinct data for each of these the categories (and thus only for these polls is it possible to calculate specific N's for the findings); an additional 25 provide data for at least one category (but not for all); 31 documents contain no relevant information whatsoever, thus omitting to suggest that their total N's are not the actual empirical basis for the reported poll findings.

Nine of the polls were based on a very simple question, inviting the respondent to simply state whether they would vote for the "center-right" or the "center-left" coalition. In the other polls, more appropriately, voters' intentions were recorded at the single party level, and the coalition results were determined by adding up all the pertinent party figures. Among these 64 more detailed polls, however, another interesting distinction can be drawn. In most (46), the response categories included the Olive Tree (*Ulivo*), a unitary list formed exclusively for the Chamber of Deputies ballot by Margherita and Democrats of the Left; in 18 polls, however, response categories listed Margherita and Democrats of the Left as two separate parties. Since many post-election analyses underscore the success of the unitary list vis-à-vis its components' performance at the Senate, it would be interesting to ascertain which response-category format entailed more accurate results.

In addition to the information contained in the public archive, the authors also classified each poll in terms of ideological orientation on the basis of the pollster's identity, the media outlet publishing the poll, the poll's sponsor, or a combination thereof. Of course, this classification is inevitably colored by the authors' understanding and perception of the Italian political and media systems, but we are fairly certain that the classification accurately reflects the reality of these systems. In all, 35 polls were deemed to have an affiliation with the centre-left,

20 with the center-right, and 18 no affiliation. This classification will be used to ascertain whether "left-wing", "right-wing" or neutral surveys proved more accurate than others.

The official results used for gauging pre-election poll accuracy in the following section are reported in Table 2[9].

Table 2. Main Results of 2006 Italian Chamber of Deputies Election*

	No. of Votes	%
Total Votes	38,230,064	
Voter turn-out		83.6
Coalitions		
– Center-left	19,036,986	49.8
– Center-right	18,995,697	49.7
Major Parties (>10%)		
– Olive Tree	11,928,362	31.2
– Forza Italia	9,045,384	23.7
– National Alliance	4,706,654	12.3

* Not including voters residing abroad.

FINDINGS

We start by first reporting the results of each poll plotted on a timeline according to their publication date, from January 5 to March 24, 2006 (see Figure 1).

[9] The results refer to all votes cast for the Chamber of Deputies, excluding the constituencies of voters residing abroad and including the small Valle d'Aosta region inhabited by a linguistic minority, which voted with different rules and for partially different parties, that nevertheless were easy to identify in coalition terms. The difference between the two coalitions is gretaer than the 25,000 votes previously mentioned, in that the figures in Table 2 include Valle d'Aosta, where results have no impact on the awarding of the majority premium.

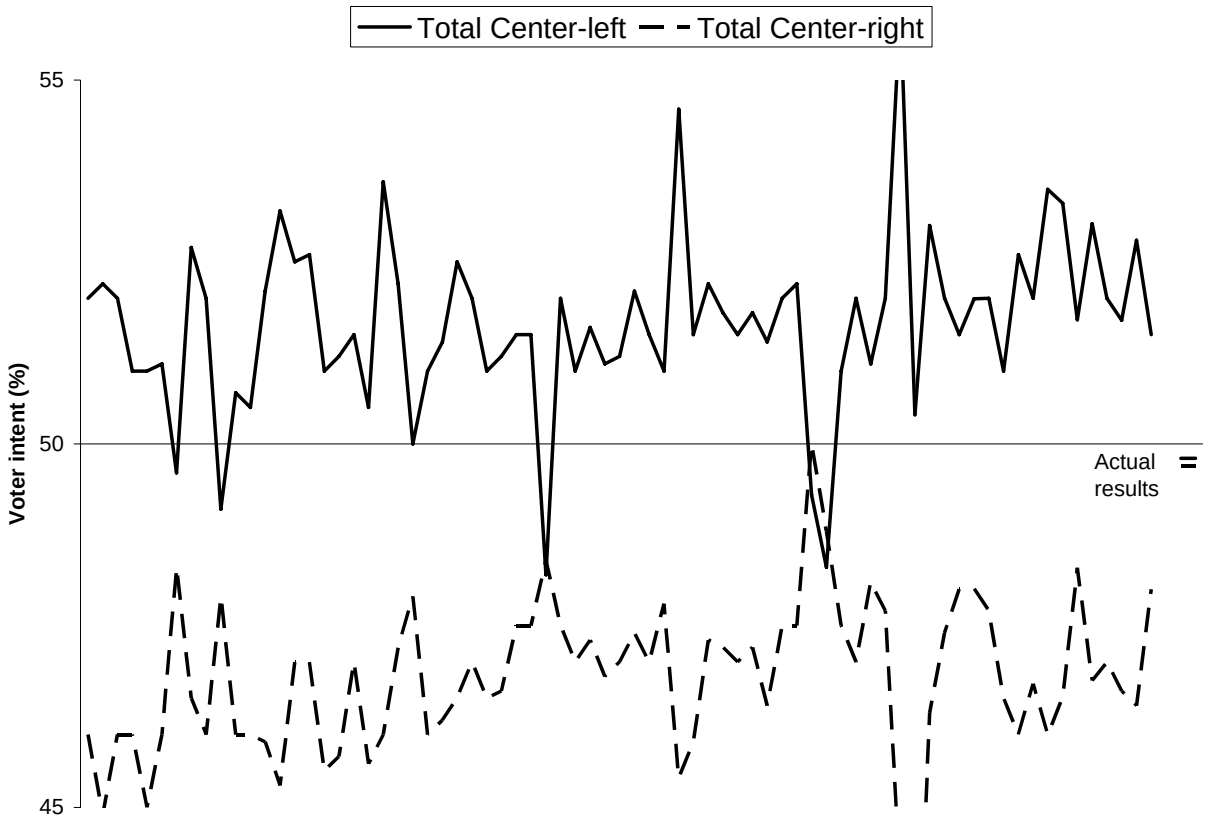

Figure 1. Time-series for Polls Published from January 2006 to 15 Days before the Elections

The distribution shows a high variability of the estimates depending on the different polling firms and methods. We also notice there are not many changes as election day approaches, whereas a convergence towards the 50% line should have occurred. From the trend it is evident how almost each polling firm overestimated the vote of the center-left. This will be even more clear when we examine the values of *A*.

Taking advantage of the fact that the two coalitions collected 99.5% of all votes, we use the formula *A* as in the American context, taking the coalition as a single party. This will make it possible to evaluate each poll since, as previously stated, some polls just ask about the *coalition*, while others ask for which *party* respondents intend to vote. Table 3 shows all 73 polls ordered by publication date with the corresponding values of *A* and Mosteller's measures 3 and 5.

For the computation *A* was adapted to the Italian context as follows:

$A = \log \frac{center\text{-}right / center\text{-}left}{CENTER\text{-}RIGHT / CENTER\text{-}LEFT}$, where the lower case indicates pre-election poll findings and the upper case corresponds to the official vote. A significantly negative value of *A* indicates a poll that is biased in a center-left direction, i.e., the distribution was leaning too much towards the center-right compared to the election outcome; the opposite applies for significantly positive values of *A*. The "effective sample size" column reports the final N per poll, excluding undecided voters, "don't knows", and non-voters. The column labeled "imputed?", when it contains a Y, means that the effective sample size was estimated when information about the number of undecided voters, "don't knows", and non-voters was not reported by the polling

agency. In order to compute these numbers, two averages of the sums of reported undecided voters, DKs and non-voters were computed: one for polls published before March 1st and one for polls published from March 1st. These values were respectively 31.7% and 27.2%.

Table 3. Predictive Accuracy: *A*, Mosteller 3 and 5 for the 2006 Italian National Election

Date	Institute	Effective N	Imputed?	Mode	*A*	Signif. biased?	Mosteller 3	Mosteller 5
5 Jan 06	Istituto Piepoli	321		Cati	–0.121	No	2.47	5.90
9 Jan 06	Swg	9504		Cati	–0.149	Yes	3.20	7.20
12 Jan 06	IPR Marketing	755		Cati	–0.121	No	2.47	5.90
13 Jan 06	TNS Abacus	683	Y	Cati	–0.101	No	2.47	4.90
17 Jan 06	ISPO Limited	1093	Y	Cati	–0.123	No	3.13	5.90
18 Jan 06	Ekma Ricerche	575		Cati	–0.103	No	2.47	5.00
18 Jan 06	Euromedia Research	541		Cati	–0.025	No	1.07	1.20
18 Jan 06	IPSOS Public Affairs	718		Cati	–0.123	No	2.13	6.10
19 Jan 06	IPR Marketing	755		Cati	–0.121	No	2.47	5.90
20 Jan 06	Swg	683	Y	Cati	–0.023	No	1.67	1.10
20 Jan 06	Swg	683	Y	Cati	–0.095	No	2.47	4.60
20 Jan 06	TNS Abacus	683	Y	Cati	–0.091	No	2.47	4.40
22 Jan 06	Eurisko	1030	Y	Cati	–0.125	No	2.53	6.10
26 Jan 06	Ekma Ricerche	683	Y	Cati	–0.159	Yes	2.93	7.80
26 Jan 06	IPR Marketing	765		Cati	–0.109	No	1.80	5.40
26 Jan 06	Ekma Ricerche	555		Cati	–0.111	No	1.87	5.50
26 Jan 06	TNS Abacus	683	Y	Cati	–0.112	No	2.80	5.40
27 Jan 06	Swg	683	Y	Cati	–0.112	No	2.67	5.40
30 Jan 06	ISPO Limited	930		Cati	–0.089	No	1.80	4.40
30 Jan 06	Coesis Research	1366	Y	Cati	–0.100	No	2.73	4.80
31 Jan 06	Ekma Ricerche	615		Cati	–0.151	No	2.53	7.50
1 Feb 06	IPR Marketing	770		Cati	–0.099	No	1.67	4.90
1 Feb 06	Euromedia Research	583		Cati	–0.041	No	1.20	2.00
2 Feb 06	TNS Abacus	683	Y	Cati	–0.101	No	2.47	4.90
2 Feb 06	TNS Abacus	683	Y	Cati	–0.090	No	2.13	4.40
7 Feb 06	Swg	683	Y	Cati	–0.105	No	2.33	5.10
7 Feb 06	Ekma Ricerche	570		Cati	–0.119	No	2.13	5.90
8 Feb 06	IPR Marketing	770		Cati	–0.099	No	1.80	4.90
13 Feb 06	Swg	683	Y	Cati	–0.092	No	2.07	4.50
14 Feb 06	ISPO Limited	1057		Cati	–0.079	No	1.47	3.90
14 Feb 06	Ekma Ricerche	615		Cati	–0.079	No	1.47	3.90
16 Feb 06	Penn, Schoen & Berland	1311		Cati	+0.006	No	1.93	0.30
16 Feb 06	IPR Marketing	810		Cati	–0.089	No	1.47	4.40
16 Feb 06	TNS Abacus	683	Y	Cati	–0.080	No	1.80	3.90
17 Feb 06	Swg	683	Y	Cati	–0.085	No	1.60	4.20
18 Feb 06	Eurisko	1062	Y	Cati	–0.086	No	1.93	4.20
21 Feb 06	Ekma Ricerche	705		Cati	–0.084	No	1.80	4.10
22 Feb 06	IPR Marketing	830		Cati	–0.093	No	1.53	4.60
23 Feb 06	TNS Abacus	683	Y	Cati	–0.089	No	1.80	4.40
24 Feb 06	Swg	683	Y	Cati	–0.063	No	1.27	3.10
24 Feb 06	Makno & Consulting	2937		Web	–0.183	Yes	3.20	9.10
28 Feb 06	Lorien Consulting	683	Y	Cati	–0.113	No	2.53	5.50

Table 3. Predictive Accuracy: *A*, Mosteller 3 and 5 for the 2006 Italian National Election (cont.)

Date	Institute	Effective N	Imputed?	Mode	*A*	Signif. biased?	Mosteller 3	Mosteller 5
1 Mar 06	Ekma Ricerche	630		Cati	–0.091	No	1.67	4.50
2 Mar 06	TNS Abacus	728	Y	Cati	–0.089	No	1.80	4.40
3 Mar 06	IPR Marketing	850		Cati	–0.097	No	1.60	4.80
3 Mar 06	Swg	728	Y	Cati	–0.091	No	1.67	4.50
4 Mar 06	Eurisko	1093		Cati	–0.100	No	2.20	4.90
7 Mar 06	Ekma Ricerche	686		Cati	–0.089	No	1.47	4.40
8 Mar 06	Ipr	850		Cati	–0.092	No	1.60	4.60
9 Mar 06	Euromedia Research	590		Cati	+0.016	No	0.33	0.80
9 Mar 06	Penn, Schoen & Berland	887	Y	Cati	+0.012	No	1.60	0.60
10 Mar 06	TNS Abacus	570		Cati	–0.069	No	1.47	3.40
10 Mar 06	Swg	728	Y	Cati	–0.099	No	1.80	4.90
10 Mar 06	Lorien Consulting	728	Y	Cati	–0.058	No	1.07	2.90
13 Mar 06	Ipr	860		Cati	–0.084	No	1.47	4.20
13 Mar 06	Simera Simulation Intelligence	760		Cati	–0.239	Yes	4.13	11.90
13 Mar 06	Ipr	873		Cati	–0.084	No	1.47	4.20
14 Mar 06	Tql	569		Cati	–0.192	Yes	5.43	8.80
14 Mar 06	Ekma Ricerche	728	Y	Cati	–0.133	No	2.27	6.60
14 Mar 06	Brunikmedia	2211		Web	–0.091	Yes	1.53	4.51
16 Mar 06	TNS Infratest	728	Y	Cati	–0.068	No	1.13	3.40
16 Mar 06	Makno & Consulting	5634		Web	–0.078	Yes	1.46	3.89
17 Mar 06	Gfk Eurisko	1060		Capi	–0.090	No	2.13	4.40
20 Mar 06	Swg	728	Y	Cati	–0.132	No	2.47	6.50
20 Mar 06	Eurisko	1179		Cati	–0.105	No	2.00	5.20
21 Mar 06	Ekma Ricerche	688		Cati	–0.149	No	2.47	7.40
22 Mar 06	Brunikmedia	2193		Web	–0.134	Yes	2.34	6.69
23 Mar 06	Makno & Consulting	2567		Web	–0.066	No	1.27	3.31
23 Mar 06	Brunikmedia	2182		Web	–0.124	Yes	2.15	6.18
23 Mar 06	Ipr	900		Cati	–0.099	No	1.80	4.90
24 Mar 06	Gfk Eurisko	1089		Cati	–0.102	No	2.07	5.00
24 Mar 06	Swg	728	Y	Cati	–0.127	No	2.20	6.30
24 Mar 06	TNS Abacus	728	Y	Cati	–0.068	No	1.13	3.40
			Mean values		–0.0978		2.04	4.85

The quasi-totality of polls overestimated the victory of the center-left coalition (70 out of 73: negative sign of *A*). Nine polls were significantly biased, but the reader has to keep in mind that for many polls we had to use an imputed percentage of undecided, DKs and non-voters. Mosteller 3 ranges from a minimum of 0.33 to a maximum of 5.43, with a mean of 2.04 and a modal value of 1.8. Mosteller 5 ranges form a minimum of 0.30 to a maximum of 11.90, with a mean of 4.85 and a modal value of 4.4. For both measures, a value close to 0 indicates no bias. The advantage of reporting Mosteller's methods 3 and 5 is that they share the same measurement unit, for they are percentages. For the computation in method 3 we used the two coalitions and a third operand that is the sum of all the other minor parties that did not belong to any of the two coalitions. The measure is associated with *A* but varies more dramatically. For example a value of A of 0.016 (Euromedia Research, March 9th) corresponds to 0.33 of Mosteller's 3, while a

value of 0.012 (Penn, Schoen & Berland, March 9th) corresponds to a value of 1.6. Interpretation of Mosteller's 5 (the difference between two differences) is generally more complex, as the author realized himself (1949, p. 57). In the Italian case it is easier to interpret since the difference between the two coalitions' official results was 0.1%. As a result, Mosteller 5 is very close to the absolute value of the differences of the center-left minus the center-right poll results.

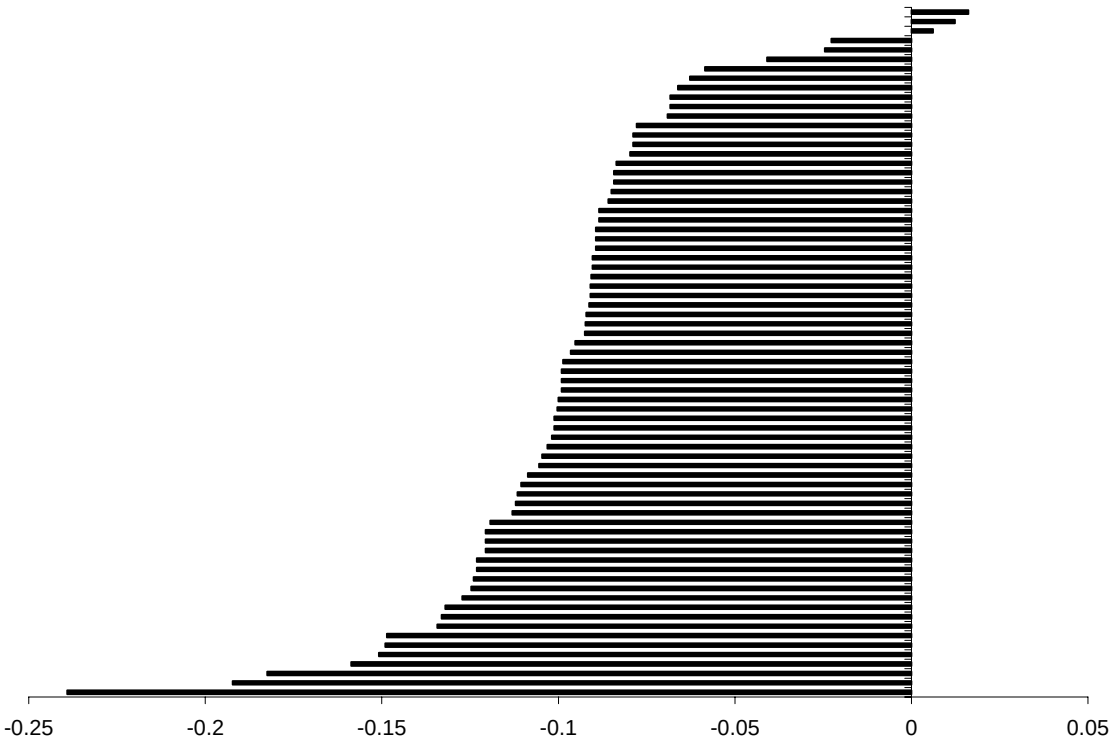

Figure 2. Ordered Distribution of *A*

Figure 2 plots *A* from its negative highest value to its positive highest value. The figure makes even clearer the bias of almost every poll in estimating vote for the center-left coalition: its range varies from –0.239 to +0.016. Only three polls have a value close to 0, signifying agreement between polls and elections outcome. Two of them are the highly debated polls commissioned by Berlusconi to an American firm, Penn, Schoen & Berland (PSB), that subcontracted data collection by telephone to three different polling companies in Italy. From the published information we cannot clearly understand how polling was actually performed and how the poll results were obtained. The question wording and the field period is very similar to that of other polling firms. In the first poll, published on February 16, the sample size is greater than usual: 1,920 respondents. The second poll, published March on 9, involves 1,218 voters. PSB reports that they used a proprietary sampling design, and it also seems that likely voters were screened, but we do not have access to the full questionnaire to properly assess this conjecture[10]. Moreover, PSB does not report percentages of undecided voters and DKs, so we

[10] Forza Italia's recourse to PSB was hotly contested by the center-left and by other pollsters as a "fake". Some pointed to the firm's alleged unethical conduct in a 2004 exit poll in Venezuela. The left-leaning daily newspaper

had to use an imputed value to compute *A*. The other pollster that produced findings closest to the actual election results is Euromedia Research, and this poll was also commissioned by Berlusconi's Forza Italia. The sample size is the usual 1,000 units, and everything else is very similar to other polls. Euromedia Research did however report the percentage of undecided, DKs and non-voters. Even if one considers Euromedia's other two polls, reporting a slight advantage for the center-left, its overall mean *A* was a respectable –0.016. All other pollster's have a mean *A* higher than –0.85. Belonging to ASSIRM had a negligible effect on accuracy: polls by the professional assocation's members present a mean value of *A* of –0.097, versus –0.099 for polls by non-members.

As one might surmise from Figure 1, there is no significant association between the value of *A* and the number of days separating data collection from election day ($r = –0.04$). Nor is there any appreciable link – much to our discontent – between *A*, on the one hand, and, on the other, duration of fieldwork, type of data collection, recourse to case-weighting, sample size, thoroughness of reporting on incidence of undecided voters, or sampling technique. There is a slight difference tied to the type of question used: in polls using the simple "center-right versus center-left" item, the mean *A* value was –0.115, whereas polls employing a more detailed, specific-party response scheme produced an overall mean *A* of –0.095 (among the polls using such schemes, the ones separately listing Margherita and Democrats of the Left proved to be only slightly more accurate than those using the more appropriate Olive Tree category). Also, a small difference was noted in regard to the pollsters', media outlets' and/or sposnors' political leanings: "center-right" polls produced a mean *A* of –0.854, versus –0.985 for "center-left" polls. "Neutral" polls, however, defy expectations, in that they were even more inaccurate: mean $A = –0.110$, and with a majority of analyzed polls expressing statistically significant bias.

DISCUSSION

The results from the above analysis lead to the obvious conclusion that Italian pre-election polls were not able to effectively predict the winning coalition. It is however true that even an ideal

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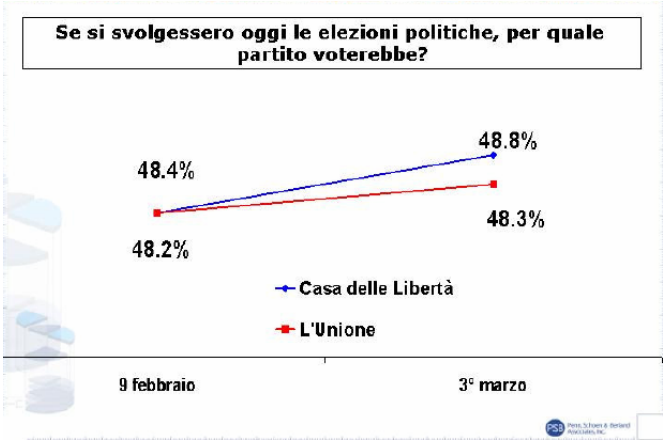
"L'Unità" published an article allegedly documenting the fact that PSB's first poll was in fact a push poll: see Marra (2006), Roscani (2006), and Pagnoncelli (2006). In any case, the PSB polls were undoubtedly used as a tool for political communication. The official document delivered to the government website pertaining to the second PSB-Forza Italia poll (www.sondaggipoliticoelettorali.it: poll dated 8 March 2006) contains the following figure, which represents an alleged change in voter intentions in a manifestly distorted manner.



poll with 100% response rate and no other non-sampling error could not have reliably predicted a winning coalition when the actual margin was a mere 0.1% (we do not take into account the vote of Italians abroad).

Secondly, and very important, the polls we were able to obtain were mandated to stop their publication 15 days before election day. Italy is one of the countries with one of the longest embargo periods prior to the election (Spangenberg, 2003). See also Smith (2004) for a similar discussion. Since the closeness of the poll to election day has been demonstrated to be a good predictor of accuracy (Crespi, 1988; DeSart & Holbrok, 2003; Lau, 1994) Italian published polls could not have captured late changes in the electorate (provided there *was* one), including the final choices made by the undecided electorate.

A third reason of why the polls overestimated the center-left's share of votes could be due to rising coverage error in telephone polls. This is due the increasing number of Italian households that are reachable only if calling a mobile phone (mobile phone households). No polling firm attempted (or made it clear that it attempted) to call mobile phones. There is no official data for the percentage of households with mobile phones alone or without a phone for 2006. Based on previous data from the National Institute of Statistics estimating at 13.1% and 3.8% the incidence of Italian households equipped only with mobile phones or without a phone in 2002 and from other commercial sources reporting data for 2004[11], we estimate a total coverage error of at least 20-22% during the pre-election poll period. Moreover, if case-weighting was based mainly on demographics traits[12], it could not have been sufficient in correcting the coverage error. In the last U.S. presidential election, weighting by age was able to compensate for the coverage error due to mobile phone households, but the latter accounted for only 7% of the electorate (Keeter, 2006).

A fourth reason for the discrepancy between official results and pre-election polls could be the failure of the majority of institutes to screen for likely voters. Although the Italian parliamentary election had a high turnout rate (83.6%, which nevertheless indicates a further decline – of almost 2 percentage points – in resident voters' participation), it is possible that non screening for likely voters could have introduced some bias. Italian pre-election polls usually do not devote much consideration to this problem, the effect of which can be particularly damaging in non-parliamentary elections, when turn-out rates are lower – sometimes very much lower – than 80%.

The fifth reason the center-left coalition's overestimation may have to do with the assumption that the intention to vote is equal to the actual vote (see Table 1): some respondents may have been reluctant to express their intention to vote for the center-right coalition and deliberately misrepresented their behavior at the polls.

How do we explain the fact that the partisan polls for Forza Italia were the most accurate? We do not have much information regarding the method in order to do so. A possible explanation is that, as Martin, Traugott and Kennedy (2005) demonstrated, partisan polls are biased in the direction of the party who commissioned the poll. For this reason the bias in favor of the center-right of the partisan polls could have counterbalanced all the other problems that we mentioned before, thus rendering the estimates closer to the actual results. (It must also be kept in mind that the polls conducted by PSB, the only pollster to explicitly mention likely voter screening in its methodological note, were the most accurate.)

[11] See Ipsos-Inra (2004).

[12] As previously mentioned, information about case-weighting is scarce and vague. It seems that if any weighting was performed, it was done mostly on the basis of census-based demographic data.

Italian pollsters should also seriously consider that role played by voters residing abroad. All commentators and politicians seriously underestimated their impact on the final outcome, especially as regards the Senate race. Polling abroad presents many difficulties and is obviously quite costly, and so may be unsustainable; but, then, at the very least, pollsters should reduce the cognitive claims tied to their "merely" national polls.

To conclude, the new measure of poll accuracy was easy to adapt and apply to to the Italian context, where the two coalitions can be treated as actors in a two-party system. Nevertheless, published results still lack the necessary methodological information required to properly judge poll quality. This is a problem of legislation, since the criteria the publication of which is rendered compulsory by Law no. 28 of 2000 are all too vague and lenient. We invite other scholars to use the new measure of predictive accuracy in other contexts to test its performance. In the specific Italian case we consider it relatively less important to statistically test *A* in search of significant bias. Other non-sampling errors such as coverage, nonresponse, likely voters, and other factors such as freedom to report polls before election day seem to contribute more to the overall bias than mere sampling error.

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