Statistical Dead Heat and the Mass Media

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With the worldwide proliferation of political polling, especially in the United States, the mass media has coined the term ' statistical dead heat' . The intended meaning is to call the race a tie if the two candidates have percentages that fall within the sampling error. For example, if we have a sample size of 600 the sampling error is +/- 4 percentage points. Therefore, if candidate A has 45% of the vote and candidate B has 41%, the media is calling it even. I say this is not so. In fact, it is my contention the media makes four errors when they use the term ' statistical dead heat' . There certainly can be a tie if each candidate has the same percentage, i.e. 45% to 45%. In any other case the candidate with the higher vote is more likely to be ahead, even if the difference is only one percentage point.

ERROR 1 – Let' s start with the extreme case: A has 45% and B 41%, this is within the sampling error margin for a sample of 600. Using the recognized statistical calculation called ' power of the test' (Berenson, 1996), the probability that B is tied with or ahead of A is 2%. Hence, there is a 98% probability A is in the lead. Now, test the least extreme situation. Even though A is ahead 45% to 41% assume the tie occurs at 43%. The ' power of the test' still shows A is the likely winner, although the probability drops to 84%. A third scenario would be to have the poll show only a one point spread, 45% to 44%. Even then the ' power of the test' produces a probability of 69% that A is the leader. In short, you would rather be ahead in the poll, no matter the margin, then behind.

ERROR 2 – The media misuses its own interpretation of ' statistical dead heat.' Using the above example, they are calling it a dead heat if A and B are within four points of each other. It should really be within eight points since if B goes up by four points, then A will come down by four. Using this logic, a spread of 39 to 47 should be called a dead heat.

ERROR 3 – The media ignores the fact that sampling error works in both directions. Using the above example where A is ahead 45% to 41%, there is exactly the same probability that A is beating B by 49% to 37% as there is of B beating A by 45% to 41%. In others words, the probability that A is four points lower is the same that A is four points higher. The probability that they are tied at 43% is the same as A having 47% and B having 39%.

ERROR 4 – In the above example, there is a 14% undecided vote. [100-45-41 =14] For the race to be a dead heat the undecided vote would have to be diametrically opposed to the committed vote, not just different, but the opposite. Using a sample of 600 if A has 45% that is 270 votes, B at 41% would have 246 votes. That means there are 84 undecided voters in the poll. For there to be a tie A and B would each need 300 votes. That means B would need 54 out of the uncommitted 84 votes or 64%. Empirically, we know that is extremely unlikely since B is only getting 41% of the committed vote. In fact, the undecided vote is more likely to mirror the committed vote than to be the opposite.

While I have pointed out that the media misunderstands and misuses sampling error I must place the blame on ourselves, the professional pollster. While our footnote regarding sampling error, ' the sampling error is +/- X points' , is accurate, it is incomplete. The footnote should say, ' We are 95%

confident that the sample mean is within +/- X points of the population mean on the closest possible question in the poll, i.e. 50/50. On other questions the sampling error is less. In other words, we are more accurate than we claim to be. We err on the conservative side. For instance, if A and B are tied at 50% the sampling error is +/- 4 points for a sample size of 600. However, if A was beating B by 90% to 10% the sampling error is only 2.4 points. This should not be a startling conclusion. It clearly is easier to pick a winner in a 90/10 spread then a 51/49 spread.

What does the above mean and why do polls work so well. It all stems form the 'central limit theorem' (Black, 1994). Basically the theorem says that if we were to take thousands of samples from a population the sample means would be normally distributed about the population mean and 95% of the sample means would be within +/- 1.96 standard deviations of the true population mean. We would never do thousands of samples. But it does mean if we take one sample there is a 95% probability it will be near the true mean of the population. Hence, the 95% confidence statement.

One other item that the public and many in the media do not understand is that population size does not impact sampling error. Only sample size affects the sampling error. For a sample of 600 the sampling error is +/- 4 points whether I poll a city, state or country. Obviously, the larger the population the more problem I have getting coverage. In other words, does my sample represent the population. We have other methods to deal with coverage error.

REFERENCES

Berenson, M.L. and Levine, D.M. (1996). Basic Business Statistics. Prentice Hall, New Jersey.

Black, K. (1994). Business Statistics. West, Minneapolis.

RESUME

Quatre erreurs sont commises quand les médias, commentant sur un sondage, nous disent que les candidats sont à 'égalite statistique.' Ces erreurs ne tiennent pas compte (1) de la forme d'une courbe normale; (2) du dégré d'erreur de l'échantillonage; (3) du fait que l' erreur d'échantillonage opère dans les deux sens; (4) de l'attribution des votes indéterminés. Sauf dans le cas ou les deux candidats font une parfaite égalité dans l'échantillon, celui qui a l'avantage dans l'échantillon est probablement celui qui a aussi l'avantage dans l'électorat.