Odds Ratio

Odds Ratio Example 1

- Suppose that in a sample of 100 men, 90 drank wine in the previous week, while in a sample of 100 women only 20 drank wine in the same period.
- The odds of a man drinking wine are 90 to 10, or 9:1, while the odds of a woman drinking wine are only 20 to 80, or 1:4 = 0.25:1.
- The odds ratio is thus 9/0.25, or 36, showing that men are much more likely to drink wine than women. The detailed calculation is:

$$\frac{0.9/0.1}{0.2/0.8} = \frac{0.9 \times 0.8}{0.1 \times 0.2} = \frac{0.72}{0.02} = 36.$$

  This example also shows how odds ratios are sometimes sensitive in stating relative positions: in this sample men are 90/20 = 4.5 times more likely to have drunk wine than women, but have 36 times the odds.
- The logarithm of the odds ratio, the difference of the logits of the probabilities, tempers this effect, and also makes the measure symmetric with respect to the ordering of groups.
- For example, using natural logarithms, an odds ratio of 36/1 maps to 3.584, and an odds ratio of 1/36 maps to -3.584.

Odds Ratio Example 2

These data are taken from the ***British Election Study 2005*** pre-campaign and post-election panel data. We will consider the propensity to vote (sometimes called "turnout") as the dependent variable, which has 2 categories. 0=did not turn out to vote, 1 turned out to vote.

gender of respondent * vote2005 Crosstabulation

			vote2005		
			didn't vote	voted	Total
gender of respondent	male	Count	491	1346	1837
		% within gender of respondent	26.7%	73.3%	100.0%
		% within vote2005	45.5%	43.8%	44.2%
	female	Count	587	1729	2316
		% within gender of respondent	25.3%	74.7%	100.0%
		% within vote2005	54.5%	56.2%	55.8%
Total		Count	1078	3075	4153
		% within gender of respondent	26.0%	74.0%	100.0%
		% within vote2005	100.0%	100.0%	100.0%

Figure 1: General Election 2005

- The odds of a male turning out to vote are:

$$1346/491 = 2.741$$

- The odds of female turning out to vote are

$$1729/587 = 2.945$$

- The Odds ratio (female: male) are

$$(1729/587)/(1346/491) = 1.074$$