

Power Analysis Using the Oddjob Airways Example

Before proceeding with any analyses, it is important to check whether we have a sufficient large sample size that will provide a certain degree of precision in our subsequent estimations. To do so, it is necessary to determine the margin of error and the probability with which this is achieved. In agreement with Oddjob Airways management, we decide that the error for estimating the sample size should not exceed the 0.05 level with 0.80 probability. As input for the power analysis we first ought to summarize the mean of the dependent variable *overall price satisfaction* by *gender*. Remember, this can be established either through the menu bar ► Statistics ► Summaries, tables, and tests ► Means, where you select the variable *overall satisfaction* on the **Model** tab and the grouping variable *gender* on the **if/in/over** tab. Alternatively, the same can be obtained directly through the syntax command: `mean overall_sat, over(gender)`. The summary statistics indicate a mean overall price satisfaction scores of 4.5 for women and 4.24 for men. Next, we can proceed to Stata's power analysis module that is obtained by clicking ► Statistics ► Power and Sample size analysis. This opens up a window similar to that displayed on Fig. 6.7. Subsequently, we select ► Sample ► Independent samples ► Test comparing two independent means.

Once the relevant test is specified, another window opens up similar to that displayed in Fig. 6.8. Now, we can enter the significance level of **0.05** together with the probability of **0.8** under **Error probabilities**.

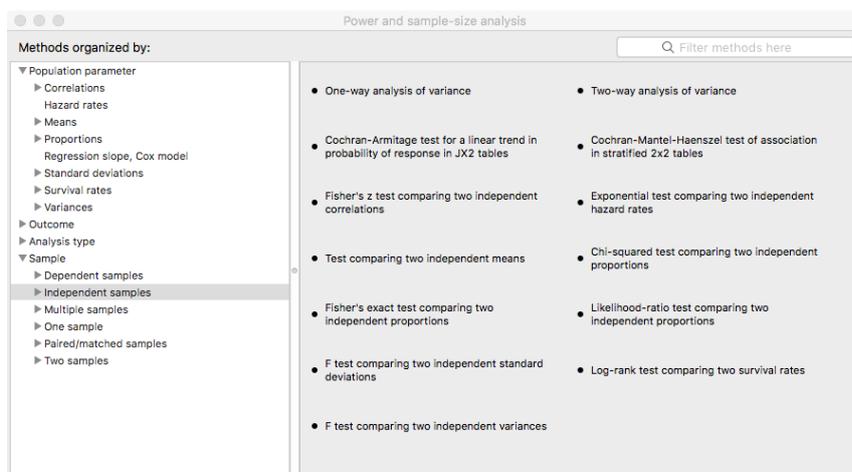


Fig. 6.7 Power and sample-size analysis

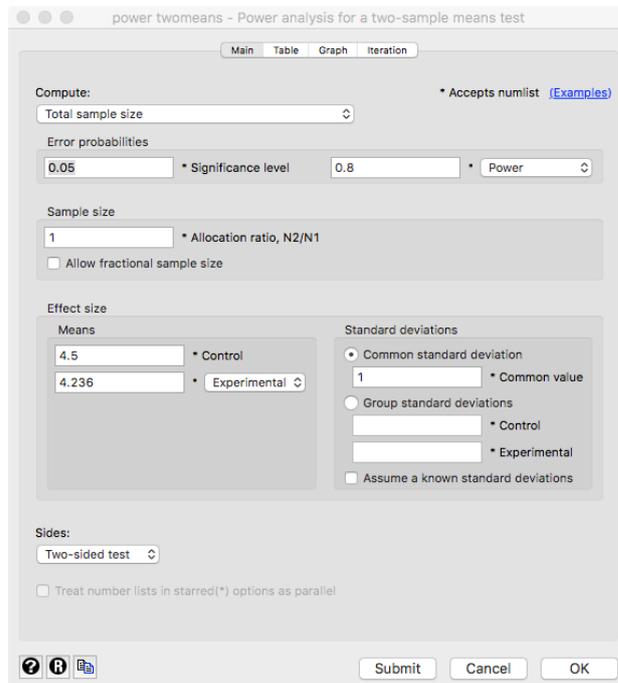


Fig. 6.8 Power analysis for a two-sample means test

Next we enter the mean of *overall price satisfaction* for females (**4.5** serving as control group) and males (**4.236**); specify a **two-tailed** test in the bottom of the box, and then click on **OK**. Results from the power analysis in Table 6.5 indicate that we require a total sample size of 454 men and women to successfully achieve an independent sample *t*-test at 5% level (alpha 0.05). Stata accurately displays the mean of men's and women's *overall price satisfaction* indicated by **m1= 4.5** (for women) and **m2= 4.236** (for men), a mean difference **delta** of **-0.264** and a standard deviation, **sd** of **1**.

Table 6.5 Output from the power analysis

```
power twomeans 4.5 4.236, table
```

```
Performing iteration ...
```

```
Estimated sample sizes for a two-sample means test
t test assuming sd1 = sd2 = sd
Ho: m2 = m1 versus Ha: m2 != m1
```

| alpha | power | N | N1 | N2 | delta | m1 | m2 | sd |
|-------|-------|-----|-----|-----|-------|-----|-------|----|
| .05 | .8 | 454 | 227 | 227 | -.264 | 4.5 | 4.236 | 1 |

Additionally, using the **graph** option in the **Graph** tab, we can plot the estimated power over the increasing number of observations. Stata's corresponding syntax to this option is:

```
power twomeans 4.5 4.236, n(100(10)500) graph
```

Note that the `n()` option specifies the minimum and maximum of the range of the sample sizes with an increment of 10. The resulting plot is shown in Fig. 6.9.

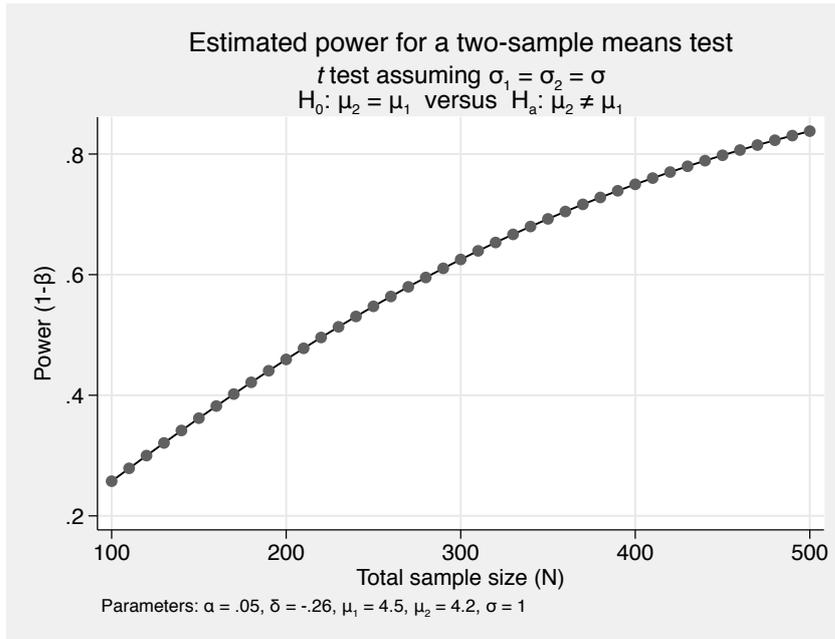


Fig. 6.9 Power analysis graph

The analysis shows that the power increases with an increasing sample size. Fortunately, the sample size of *Oddjob Airways*, includes 280 women and 785 men that together make for a total of 1065 observations. This means that we have a sufficient sample size to conduct further analyses with a high degree of precision.