



Alternative Ratio (`es_alt_ratio`)

a.k.a. Relative Risk

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Introduction

The `es_alt_ratio` function (and `es_alt_ratio_arr` in VBA) calculates an effect size known as the Alternative Ratio (sometimes also referred to as Relative Risk). This effect size measure can be used with a one-sample binomial test, Wald, or Score test.

This document contains the details on how to use the functions, and formulas used in them.

1 About the Function

1.1 Input parameters:

- **data**
The data to be used. Note for Python this needs to be a pandas data series.
- *Optional parameters*
 - **codes** (default is none)
Two codes for the two categories to be compared. For example, if the data has a list of scores with “national” and “international”, the codes used can be exactly those: “national”, “international”.
This makes it possible to also use a nominal data set (with more than two categories) and then select the two for this test to be used, and keep it in line with a one-sample binomial, Wald, or score test.
 - **p0** (default is 0.5)
The hypothesized proportion for the first category (as in codes or found in data).
 - **category** (default is none)
The category to use to determine the effect size (the category for which p0 is used)

1.2 Output:

- The **two Alternative Ratios**. Except for the non-array version in VBA (Excel) which will only show the requested Alternative Ratio.
Note
 - if *codes* and *category* are not provided, the first category will be the first data point.
 - If *codes* only are provided, the first category in the *codes* is used
 - If *codes* are not provided, the 2nd category will be all data not matching the first category.
- The array version in VBA (`es_alt_ratio_arr`) requires **two rows** and **two columns**.



1.3 Dependencies

- **Excel**
None.
You can run the **es_alt_ratio_addHelp** macro so that the function will be available with some help in the 'User Defined' category in the functions overview.
- **Python**
The following additional libraries will have to be installed:
 - *pandas*
the data input needs to be a pandas data series, and the output is also a pandas dataframe.
- **R**
No other libraries required.

2 Examples

2.1 Excel

	A	B	C	D	E	F	G	H
1	data		codes					
2	1		1					
3	2		2					
4	2							
5	1							
6	2			0,6	=es_alt_ratio(\$A\$2:\$A\$21)			
7	2			1,3	=es_alt_ratio(\$A\$2:\$A\$21;;;2)			
8	1			0,631579	=es_alt_ratio(\$A\$2:\$A\$21;C2:C3)			
9	1			1,368421	=es_alt_ratio(\$A\$2:\$A\$21;C2:C3;;C3)			
10	2							
11	2			Alt. Ratio	Alt. Ratio Cat. 2			
12	2			0,631579	1,368421			
13	2							
14	2			D11:E12	=es_alt_ratio_arr(A2:A21;C2:C3)			
15	2							
16	1							
17	2							
18	1							
19	2							
20	2							
21	5							
22								



2.2 Python

```
[2]: #example
dataList = ['Female', 'Male', 'Male', 'Female', 'Male', 'Male', 'Female',
            'Female', 'Male', 'Male', 'Male', 'Male', 'Male', 'Male', 'Female',
            'Male', 'Female', 'Male', 'Male', 'Other']
data = pd.Series(dataList)

[3]: es_alt_ratio(data)

[3]:  Ait.Ratio Cat. 1  Ait.Ratio Cat. 2
0          0.6          1.4

[4]: es_alt_ratio(data, category='Male')

[4]:  Ait.Ratio Cat. 1  Ait.Ratio Cat. 2
0          1.3          0.7

[5]: es_alt_ratio(data, codes=['Male', 'Female'])

[5]:  Ait.Ratio Cat. 1  Ait.Ratio Cat. 2
0  1.368421  0.631579
```

2.3 R

```
> data <- c("Female", "Male", "Male", "Female", "Male", "Male",
+         "Female", "Female", "Male", "Male", "Male", "Male", "Male",
+         "Male", "Female", "Male", "Female", "Male", "Male", "Other")
> es_alt_ratio(data)
  ARI AR2
1 0.6 1.4
> es_alt_ratio(data, category="Male")
  ARI AR2
1 1.3 0.7
> es_alt_ratio(data, c("Male", "Female"))
  ARI AR2
1 1.368421 0.6315789
>
```

3 Details of Calculations

a.k.a. Relative Risk

$$AR_i = \frac{p_i}{\pi}$$

With

$$p_i = RF_i = \frac{F_i}{n}$$

$$n = \sum_{i=1}^k F_i$$

Symbols:

π the expected proportion in the population

F_i the (absolute) frequency (count) of category i

n the sample size, i.e. the sum of all frequencies

p_i the proportion of cases in category i

RF_i the relative frequency of category i



4 Source

The **Alternative Ratio** is only mentioned in the documentation of a program called PASS (n.d.), and referred to as Relative Risk by JonB (2015).

References

JonB. (2015, October 14). *Effect size of a binomial test and its relation to other measures of effect size*. StackExchange - Cross Validated. <https://stats.stackexchange.com/q/176856>

NCSS. (n.d.). Tests for one proportion. In *PASS Sample Size Software* (pp. 100-1-100–132). Retrieved November 10, 2018, from https://ncss-wpengine.netdna-ssl.com/wp-content/themes/ncss/pdf/Procedures/PASS/Tests_for_One_Proportion.pdf