# Task:

* Your task is to analyze the results of tax compliance experiment.
* Try to describe the behavior of participants (overall and session by session) during the experiment. The main variables of interest are as follows:
* RealIncome - endowment (earnings)
* ConIncome - income declare to tax authority
* Control - if 1=> subject audited by tax authority
* Catch - audit found subject "guilty."
* rpref[1] -rpref[10] - risk aversion check

# Variables

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Treatment | value | 1 | 2 | 3 | 4 |
| meaning | baseline | flat tax rate | progressive tax rate | regressive tax rate |
| value | 5 | 6 | 7 | 8 |
| meaning | flat t.r. + positive news headlines | flat t.r. + negative news headlines | baseline + positive news headlines | baseline + negative news headlines |
| Session | value | 1 or 2 |
| meaning | up to 2 sessions per treatment |
| Subject | value | 1 to 24 |
| meaning | unique identification of an experimental subject in a session |
| Group | value | 1 to 6 |
| meaning | subject in a session were divided into smaller groups who interact together |
| RealIncome | meaning | in treatments 1, 7, 8 | randomly given number  |
|   | other treatments | from a real effort tasks |
| ConIncome | meaning | reported income for taxation |
| Compliance | value | 0 | 1 |
| meaning | RealIncome==ConIncome | RealIncome>ConIncome |
| Control | value | 0 | 1 |
| meaning | not audited | audited |
| Catch | value | 0 | 1 |
| meaning | not found guilty | found guilty  |
| rpref[1-10] | value | 1 to 2 |
| meaning | risk preferences |

# Description of data

Table 1 - Number of Subjects (and their characteristics) per Treatment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Treatment** | **1** | **2** | **3** | **4** | **5** |
| *Subjects* | *44* | *44* | *40* | *32* | *48* |
| male | 19 | 12 | 16 | 12 | 14 |
| Czech | 40 | 39 | 33 | 27 | 45 |
| risk averse | 2 | 6 | 3 | 2 | 4 |
| risk neutral | 41 | 35 | 36 | 30 | 43 |
| risk loving | 1 | 3 | 1 | 0 | 1 |
| **Treatment** | **6** | **7** | **8** | **total** |  |
| *Subjects* | *44* | *44* | *40* | *332* |
| male | 19 | 12 | 16 | 121 |
| Czech | 40 | 39 | 33 | 298 |
| risk averse | 2 | 6 | 3 | 30 |
| risk neutral | 41 | 35 | 36 | 292 |
| risk loving | 1 | 3 | 1 | 10 |

**Mann-Whitney U Test**

Mann-Whitney U test is the alternative test to the [independent sample t-test](http://www.statisticssolutions.com/academic-solutions/membership-resources/member-profile/sample-size-power-analysis/write-up-generator-references/independent-sample-t-test-2/).  It is a non-parametric test that is used to compare two population means that come from the same population, it is also used to test whether two population means are equal or not.  It is used for equal [sample sizes](http://www.statisticssolutions.com/academic-solutions/academic-research-consulting/sample-size-determination/), and is used to test the median of two populations. (see e.g. <http://www.statisticssolutions.com/mann-whitney-u-test/>)

Test of session effect - Compare mean contribution (ConIncome) between two sessions of the same treatment

In STATA: **runksum**

by Treatment, sort : ranksum ConIncome, by(Session)

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-> Treatment = 1

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

 Session | obs rank sum expected

-------------+---------------------------------

 1 | 120 11921 13260

 2 | 100 12389 11050

-------------+---------------------------------

 combined | 220 24310 24310

unadjusted variance 221000.00

adjustment for ties -288.17

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adjusted variance 220711.83

Ho: ConInc~e(Session==1) = ConInc~e(Session==2)

 z = -2.850

 Prob > |z| = 0.0044 **means differ at 99% significance level – Session effect**

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-> Treatment = 2

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

 Session | obs rank sum expected

-------------+---------------------------------

 1 | 120 12902.5 13260

 2 | 100 11407.5 11050

-------------+---------------------------------

 combined | 220 24310 24310

unadjusted variance 221000.00

adjustment for ties -229.51

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adjusted variance 220770.49

Ho: ConInc~e(Session==1) = ConInc~e(Session==2)

 z = -0.761

 Prob > |z| = 0.4467  **means do not differ at 99% significance level – No session effect**

**Chi-square test**

The chi-square test is always testing what scientists call the null hypothesis, which states that there is no significant difference between the expected and observed result.

Usually refers to frequency tables. The test measures (non)existence of differences between cells.

Null hypothesis => no difference.

In our example – to test whether there is a difference between compliance rate (Compliance) among treatments.

STATA:

. tabulate Compliance Treatment, chi2 column

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Compliance | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Total |
| 0 | 122 | 112 | 105 | 109 | 134 | 87 | 117 | 80 | 866 |
| 55.45 | 50.91 | 52.50 | 68.13 | 55.83 | 39.55 | 58.50 | 40.00 | 52.17  |
| 1 | 98 | 108 | 95 | 51 | 106 | 133 | 83 | 120 | 794 |
| 44.55 | 49.09 | 47.50 | 31.87 | 44.17 | 60.45 | 41.50 | 60.00 | 47.83  |
| Total | 220 | 220 | 200 | 160 | 240 | 220 | 200 | 200 | 1,66 |
|   | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00  |

 Pearson chi2(7) = 47.8479 Pr = 0.000

**Differences are significant at 99% level**