



Limpert Instituut

JASP for Audit

Open source software voor statistical auditing

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Uitgangspunten

- Vraag naar efficiëntie
 - Ondanks de groeiende mogelijkheden voor integrale controles worden steekproeven in de praktijk nog steeds vaak gebruikt.
- Vraag naar transparantie
 - Terugkoppeling bevindingen naar de klant.
 - Het gebruik van open-source software voor transparante audit trails.



Onderzoek

“A proposal to innovate audit methodology”

Twee pijlers:

- Efficiëntie en transparantie in de audit verhogen d.m.v. Bayesiaanse statistiek.
- Het gratis en gemakkelijk beschikbaar stellen van statistische technieken d.m.v. open source software.



Software

Een auditor heeft verschillende opties:

- Audit software pakketten (IDEA, Galvanize)
 - Gebruiksvriendelijk
 - Closed-source met betaalde licenties
- Programmeertalen (R, Python)
 - Open-source en gratis
 - Steile leercurve



Bron: https://auditware.co.uk/wp-content/uploads/IDEA_Colour.png



Bron: https://commons.wikimedia.org/wiki/File:R_logo.svg



Software

- Er was tot voorkort (vrijwel) geen open-source software beschikbaar voor auditors om steekproeven uit te voeren.
- Twee software pakketten:
 - R package [jfa](#)
 - [JASP for Audit](#)



JASP

JASP is een open-source statistiek platform.

- **Gratis:** Te downloaden via www.jasp-stats.org
- **Transparant:** Source code op [GitHub](https://github.com)
- **Gebruiksvriendelijk:** Point-and-click interface
- **Krachtig:** R onder de motorkap



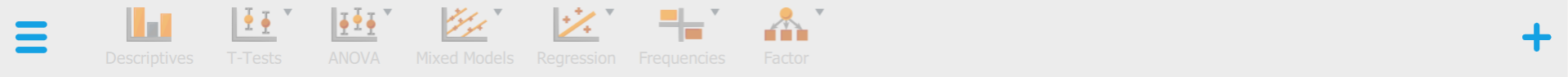
Bron:
https://en.wikipedia.org/wiki/File:JASP_logo.svg



Scenario

Een auditor is betrokken bij de audit van een meubelgigant.

- Auditor krijgt lijst met facturen van klant.
- Controleert of elke factuur te koppelen is aan verkooporder.
- Factuur is “fout” als verkooporder niet te vinden is in de systemen van de klant.



JASP

JASP 0.14.1

Welcome to JASP

A Fresh Way to Do Statistics: Free, Friendly, and Flexible

- **Free:** JASP is an open-source project with structural support from the University of Amsterdam.
- **Friendly:** JASP has an intuitive interface that was designed with the user in mind.
- **Flexible:** JASP offers standard analysis procedures in both their classical and Bayesian manifestations.

So open a data file and take JASP for a spin!

Please keep in mind that this is a preview release and a number of features are still missing.

If JASP doesn't do all you want today, then check back tomorrow: JASP is being developed at break-neck speed!



Navigation bar with icons for: Descriptives, T-Tests, ANOVA, Mixed Models, Regression, Frequencies, Factor. Includes a menu icon on the left and a plus icon on the right.

	FactuurNr	Afnemer	Prijs	
1	1	CompanyX	683.38	
2	2	ClearViewCareers	780.34	
3	3	BuildingX	440.1	
4	4	CompanyY	503.54	
5	5	ClearViewCareers	590.22	
6	6	BuildingY	552.58	
7	7	Mevr. Jansen	624.75	
8	8	Hoison High School	545	
9	9	BuildThat	480.32	
10	10	BuildingX	532.18	
11	11	BuildThat	312.14	
12	12	FoodAndDrinks	389.97	
13	13	BuildingX	579.84	
14	14	Hoison High School	447.46	
15	15	CompanyX	421.33	
16	16	DS cleaning	370.49	
17	17	BuildingX	296.31	
18	18	BuildingY	480.88	
19	19	FoodAndDrinks	556.28	
20	20	Mevr. Jansen	462.75	



Descriptives T-Tests ANOVA Mixed Models Regression Frequencies Factor

Descriptive Statistics

FactuurNr
Afnemer

Variables
Prijs

Split

Frequency tables (nominal and ordinal variables)

Plots

Statistics

Results

Descriptive Statistics

Descriptive Statistics

Prijs	
Valid	5000
Missing	0
Mean	499.089
Std. Deviation	101.012
Minimum	146.350
Maximum	852.240



Voorbeeld

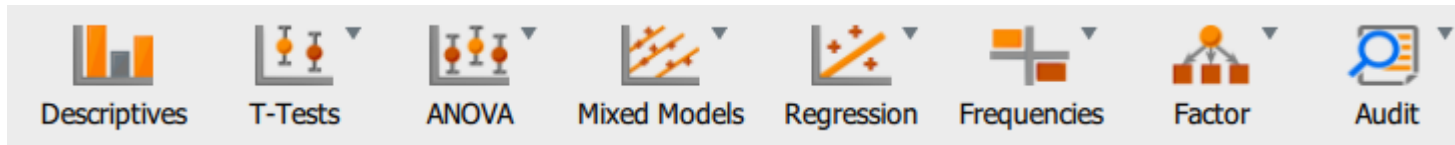
De auditor controleert de lijst met facturen met het doel om deze goed te keuren:

- 3% uitvoeringsmaterialiteit
- 5% risico op onterecht goedkeuren
- 0 toegestane fouten in de steekproef



JASP for Audit

JASP for Audit is een module in JASP ontwikkeld voor statistisch auditen.



- Klassieke en Bayesiaanse steekproeven
- Workflow met begeleidende tekst
- Automatisch rapport met interpretatie resultaten
- Gebaseerd op het R pakket [jfa](#)
- Gratis [handleiding](#)



Workflow

JASP for Audit biedt het steekproefproces in vier fases aan:



- **Planning:** Berekenen van een steekproefgrootte
- **Selection:** Trekken van de steekproef
- **Execution:** Annoteren van de steekproef
- **Evaluation:** Evalueren van de steekproef



Workflow

JASP for Audit begeleidt de auditor door de vier fases van het steekproefproces:

- Point-and-click interface voor elke fase
- Begeleidende tekst met interpretatie van de statistische resultaten
- Automatisch de juiste keuzes afhankelijk van de audit vraag en keuzes in vorige fases



Fase 1: Planning

Descriptives
 T-Tests
 ANOVA
 Mixed Models
 Regression
 Frequencies
 Factor
 Audit

Sampling Workflow

1. Planning

Sampling Objectives Audit Risk Explanatory Text

Test against a performance materiality Confidence % Enable

Relative %

Absolute

Obtain a required minimum precision

Variable Definitions

Afnemer Transaction ID's

Prijns FactuurNr

Critical

SelectionResult

AuditResult

Ist Position (optional)

- A. Critical Transactions
- B. Risk Assessments
- C. Advanced Options
- D. Tables and Plots

Sampling Workflow

Procedure

The objective of this sampling procedure is to determine with a confidence of **95%** whether the **percentage** of misstatement in the population is lower than the performance materiality of **3%**.

Audit Risk Model

Prior to the sampling procedure, the inherent risk was determined to be **High (100%)**. The internal control risk was determined to be **High (100%)**. According to the Audit Risk Model, the required detection risk to maintain an audit risk of **5%** should be **5%**.

The translation of High, Medium and Low to probabilities is done using default values. To learn more about the choice of these values and how to adjust these, see the help file of this analysis.

Audit risk (5%) = Inherent risk (High = 100%) x Control risk (High = 100%) x Detection risk (5%)

Planning

The most likely error in the sample is expected to be **0%**. The sample size that is required for a performance materiality of **3%**, assuming the sample contains **0** full errors, is **99**. This sample size is based on the **binomial** distribution, the *a priori* assessments of inherent risk (**High**) and control risk (**High**) from the Audit Risk Model, and the expected errors.

Consequently, if this sample is evaluated and the sum of (proportional) errors in the audited transactions is lower than (or equal to) **0**, the maximum misstatement is determined to be below the performance materiality.

Table 1. Planning Summary

Performance materiality	Inherent risk	Control risk	Detection risk	Expected errors	Required sample size
3%	100%	100%	5%	0.000	99

Note. The required sample size is based on the **binomial** distribution ($p = 0.03$)





Fase 2: Selectie

Descriptives
 T-Tests
 ANOVA
 Mixed Models
 Regression
 Frequencies
 Factor
 Audit

Sampling Workflow

1. Planning

2. Selection

Add custom variables to sample

FactuurNr
 Afnemer
 Prijs
 Critical
 SelectionResult
 AuditResult

Ranking Variable (optional)

Additional Variables (optional)

A. Selection Methodology

Randomly organize transactions before selection

Sampling Units

Monetary unit sampling
 Record sampling

Selection Method

Random sampling
 Cell sampling
 Fixed interval sampling

Starting point 1

B. Tables

3. Execution

risk was determined to be **High (100%)**. According to the Audit Risk Model, the required detection risk to maintain an audit risk of 5% should be 5%.

The translation of High, Medium and Low to probabilities is done using default values. To learn more about the choice of these values and how to adjust these, see the help file of this analysis.

Audit risk (5%) = Inherent risk (High = 100%) x Control risk (High = 100%) x Detection risk (5%)

Planning

The most likely error in the sample is expected to be 0%. The sample size that is required for a performance materiality of 3%, assuming the sample contains 0 full errors, is 99. This sample size is based on the **binomial** distribution, the *a priori* assessments of inherent risk (**High**) and control risk (**High**) from the Audit Risk Model, and the expected errors.

Consequently, if this sample is evaluated and the sum of (proportional) errors in the audited transactions is lower than (or equal to) 0, the maximum misstatement is determined to be below the performance materiality.

Table 1. Planning Summary

Performance materiality	Inherent risk	Control risk	Detection risk	Expected errors	Required sample size
3%	100%	100%	5%	0.000	99

Note. The required sample size is based on the **binomial** distribution ($p = 0.03$)

Selection

From the population of 5000 non-randomized transactions, 99 sampling units (records) are selected from the record variable (*FactuurNr*) using a **fixed interval record sampling** method.

Table 2. Selection Summary



Selected sampling units	Selected transactions	% of total observations	Interval
99	99	1.98%	50.51

Note. Sampling unit 1 is selected from each interval.



Fase 3: Executie

How would you like to evaluate your transactions?

Soll values  Correct / Incorrect 

Column name selection result:

Column name audit result:

Annotate your selected transactions with a 0 (correct) or a 1 (incorrect).

▼ A. Data Entry

Row #	FactuurNr	In_steekproef	Fout
1	1	1	0
51	51	1	0
102	102	1	0
152	152	1	0
203	203	1	0
253	253	1	0
304	304	1	1
354	354	1	0
405	405	1	0



Fase 4: Evaluatie

☰
📊 Descriptives
📉 T-Tests
📉 ANOVA
📈 Mixed Models
📈 Regression
📊 Frequencies
👤 Factor
🔍 Audit
+

Sampling Workflow

- ▶ 1. Planning
- ▶ 2. Selection
- ▶ 3. Execution
- ▼ **4. Evaluation**
 - 👤 Afnemer
 - 👤 Prijs
 - 👤 Critical
 - 👤 In_steekproef

Audit Result

👤 Fout

▶ A. Advanced Options

▶ B. Tables and Plots

Download Report

Evaluation

The selection consisted of **99** sampling units, of which a total of **1** were misstated. The information from this sample combined with the prior information results in a most likely error in the population of **1.01%** and an 95% upper bound of **4.702%**.

The cumulative knowledge states that there is a 95% probability that, when one would repeatedly sample from this population, the upper bound on the misstatement in the population is lower than **4.702%** with a precision of **3.692%**.

Table 3. Evaluation Summary

Performance materiality	Sample size	Errors	Total tainting	Most likely error	95% Upper bound
3%	99	1	1.01%	1.01%	4.702%

Note. The upper bound is calculated according to the **binomial** distribution.

Evaluation of Sampling Objectives

Performance materiality	3%
Maximum error	4.7%
Most likely error	1.01%



Bayes'

JASP for Audit maakt het voor de auditor gemakkelijk om een Bayesiaanse steekproef uit te voeren.

- Bayesiaanse statistiek kan bestaande informatie incorporeren in de statistische analyse via de prior verdeling.
- Voorbeeld: het uitbreiden van een steekproef als nog niet goedgekeurd kan worden.



Bayesian Sampling Workflow

1. Planning

Sampling Objectives

- Test against a performance materiality
 - Relative 3 %
 - Absolute
- Obtain a required minimum precision

Audit Risk: Confidence 95.00 %

Explanatory Text: Enable

Variable Definitions

- Afnermer
- Prijs
- Critical
- SelectionResult
- AuditResult

Transaction ID's: FactuurNr

Ist Position (optional):

A. Critical Transactions

B. Efficiency Techniques

C. Prior Information

Prior information: Earlier sample

Expected Errors in Sample

- Relative 0.00 %
- Absolute
- All possible

Number of earlier seen transactions: 99

Number of earlier seen errors: 1

Planning

The most likely error in the sample is expected to be 0%. The sample size that is required for a performance materiality of 3%, assuming the sample contains 0 full errors, is 57. This sample size is based on the **beta** distribution, the *a priori* assumption that an earlier sample of 99 transactions containing 1 errors is seen, and the expected errors.

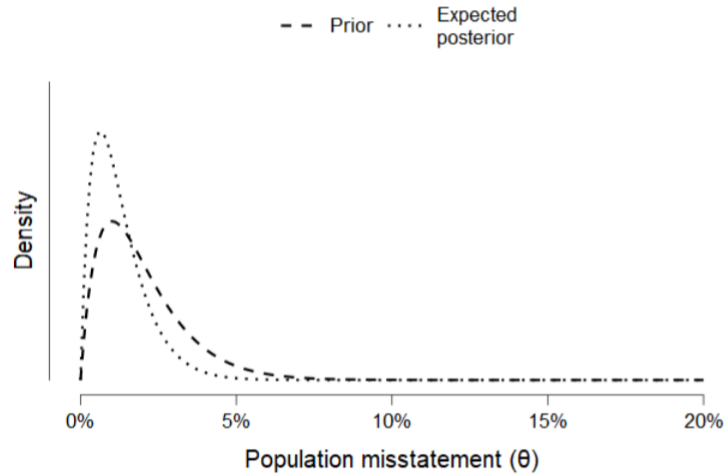
Consequently, if this sample is evaluated and the sum of (proportional) errors in the audited transactions is lower than (or equal to) 0, the maximum misstatement is determined to be below the performance materiality.

Table 1. Planning Summary

Performance materiality	Audit risk	Expected errors	Required sample size
3%	5%	0.000	57

Note: The required sample size is based on the **beta** distribution ($\alpha = 2, \beta = 99$).

Implied Prior Distribution





Afsluiting

JASP is te downloaden via www.jasp-stats.org

Versie 0.15.0 binnenkort beschikbaar