



Investigative Techniques OECD 2024

UK



USA



POLAND



Investigative Techniques

Definition:

1. measure/action/handling to gather information / evidence
2. measure/action/handling to avoid that investigation is endangered
3. measure/action/handling to recover assets

Investigative Techniques

Kinds of investigative techniques?

.....?

.....?

.....?

.....?

.....?

.....?

Investigative Techniques

Practical Exercise in Groups 15 min:

What kind of investigative techniques, to gather information that are essential to investigations, do you know?

Investigative Techniques

Techniques used covered or open!

Important facts to think about in advance!

- When / in which way we use techniques!
- Why we don't use a single technique?
- Who to inform about the use?
- Who has to approve it?

Investigative Techniques

General to keep in mind before!

- Time
- Costs
- Human resources
- Material needed
- Location
- Support necessary
- Prediction of success – versa facts above

Investigative Techniques

Practical Exercise in Groups 20

min:

- Arrests - Group 1
- Searches - Group 2
- Wiretapping – Group 3
- Surveillance Group 4

focus on aspects as

- pros and cons
- Expected benefits
- Expected challenges
- Resources
- Requirements legal or practical
-

Investigative Techniques

Techniques highlighted!

think about in advance, who, when, how, adv.

– disadvantages

- Arrests
- Searches
- Wiretapping,
- Surveillance,
- Digital techniques?????

Digital Investigative Techniques

What kind of digital data sets are you faced with in your investigation?

Group discussion

Digital Data Sets

Book keeping data

Electronic cash register data

Electronic invoices

Inventory

Banking data

IP addresses

GPS data

etc

Investigative Techniques

Practical Exercise in Groups:

What kind of digital investigative techniques do you know or/and use within your investigations (20 min) ?

Highlight what kind of you use, its benefits, linked problems and all other related aspects!

Investigative Techniques eG:

- **Audits – get knowledge about the business**
- **Surveillance, observation after getting notice of business**
- **Information exchange national/internat.**
- **Inter-agency co-operation police / customs / industry or business areas**
- **Digital techniques**

Digital Techniques:

- **Margin comparison**
- **Gains comparison**
- **Business figures at all**
- **Cost structures compared – eg employees visa turnover**
- **Special different business database-crosschecks of databases**

Other / New Digital Techniques:

- **Visualization of business figures**
- **Technical check tools / for failure detection out of high volume data bases – Monetary Unit Sampling**
- **Summarised Risk Audit (SRP) based on the principle of a
„Time Series Analyses“**

Examples for Other / New Techniques :

Definition MUS – Monetary Unit Sampling:

MUS

Monetary Unit Sampling, also known as probability proportional-to-size (PPS) or dollar unit sampling (DUS), is a statistical sampling method used to determine if the account balances or monetary amounts in a population contain any misstatements. Each individual dollar (i.e. monetary unit) in the population is considered a sampling unit, thus account balances or amounts in the population with a higher value have a proportionately higher chance of being selected.

Examples for Other / New Techniques:

Definition SRP Summarized Risk Audit

SRP = Time Series Analysis

Any metric that is measured over regular time intervals forms a time series. Analysis of time series is commercially important because of industrial need and relevance especially w.r.t forecasting (demand, sales, supply etc).

Examples for Other / New Techniques:

SRP Summarized Risk Audit

Case example

- **Hotel with restaurant**
- **Outside area**
- **Christmas celebrations**
- **New year celebrations**
- **Additional participation on different markets**

Examples for Other / New Techniques:

SRP Summarized Risk Audit

Invoice database out of hotel software

1	Invoices 1.01.2016 bis 31.12.2016)														
2	Invoice Nr	Sender	Receiver	Amount	Payed	Amount	VAT	Tax %	Reduction	Reduction %	Date of Invoice	Payment	Kind of booking	Invoice	Status
3	97893	Blanco GbR		80,00 €	- €	80,00 €	5,23 €	7	0	0	01.01.2016		ZE	RECH	O
4		007 4	Übernachtung	- €	1,00 €	- €	- €	7	Nein		28.12.2015	29.12.2015			
5		007 4	Einzelzimmer	40,00 €	1,00 €	40,00 €	2,62 €	7	Nein		30.12.2015	30.12.2015			
6		007 4	Einzelzimmer	40,00 €	1,00 €	40,00 €	2,62 €	7	Nein		30.12.2015	30.12.2015			
7	97894	Hieble		180,00 €	- €	180,00 €	11,78 €	7	0	0	01.01.2016		ZE	RECH	O
8		004 4	Übernachtung	90,00 €	2,00 €	45,00 €	5,89 €	7	Nein		14.12.2015	16.12.2015			
9		005 4	Übernachtung	90,00 €	2,00 €	45,00 €	5,89 €	7	Nein		14.12.2015	16.12.2015			
10	97895	Cargo Bos Transporten B.V.		1.650,00 €	- €	1.650,00 €	107,94 €	7	0	0	01.01.2016		ZE	RECH	O
11		Verans	Veranstaltung	- €	1,00 €	- €	- €	7	Nein		01.01.2016	02.01.2016			
12		Verans	Wohnung	1.500,00 €	1,00 €	1.500,00 €	98,13 €	7	Nein		01.01.2016	01.01.2016			
13		Verans	zusätzl. Zimm	150,00 €	1,00 €	150,00 €	9,81 €	7	Nein		01.01.2016	01.01.2016			
14	97896	Hilgen e.K.		1.350,00 €	- €	1.350,00 €	88,32 €	7	0	0	01.01.2016		ZE	RECH	O
15		Veran2	Veranstaltung	- €	1,00 €	- €	- €	7	Nein		01.01.2016	02.01.2016			
16		Veran2	Übernachtung	1.350,00 €	30,00 €	45,00 €	88,32 €	7	Nein		01.01.2016	01.01.2016			
17	97897	Janssen Reisen Wittmund Gr		1.170,00 €	- €	1.170,00 €	76,54 €	7	0	0	01.01.2016		ZE	RECH	O
18		Warte1	Warteliste 1	- €	1,00 €	- €	- €	7	Nein		01.01.2016	02.01.2016			
19		Warte1	Übernachtung	1.170,00 €	26,00 €	45,00 €	76,54 €	7	Nein		01.01.2016	01.01.2016			
20	97898	Kuznetsov		80,00 €	- €	80,00 €	6,18 €	8,37	0	0	01.01.2016		ZE	VISA	O
21		008 4	Übernachtung	70,00 €	1,00 €	70,00 €	4,58 €	7	Nein		01.01.2016	02.01.2016			
22		008 4	Frühstück	10,00 €	2,00 €	5,00 €	1,60 €	19	Nein		01.01.2016	02.01.2016			
23	97899	Soijka		95,00 €	- €	95,00 €	7,63 €	8,73	0	0	02.01.2016		ZE	EC-KAR	O
24		003 4	Übernachtung	80,00 €	1,00 €	80,00 €	5,23 €	7	Nein		01.01.2016	02.01.2016			
25		003 4	Frühstück	15,00 €	3,00 €	5,00 €	2,40 €	19	Nein		01.01.2016	02.01.2016			
26	97900	Kleeberger		150,00 €	- €	150,00 €	12,17 €	8,83	0	0	02.01.2016		ZE	VISA	O
27		010 5	Übernachtung	125,00 €	1,00 €	125,00 €	8,18 €	7	Nein		01.01.2016	02.01.2016			
28		010 5	Frühstück	25,00 €	5,00 €	5,00 €	3,99 €	19	Nein		01.01.2016	02.01.2016			
29	97901	Regenbogen-Reisen		4.530,00 €	- €	4.530,00 €	449,03 €	11	0	0	02.01.2016		ZE	RECH	O

Examples for Other / New Techniques:

SRP Summarized Risk Audit

Invoice database out of hotel software

Import in summarized risk audit tool

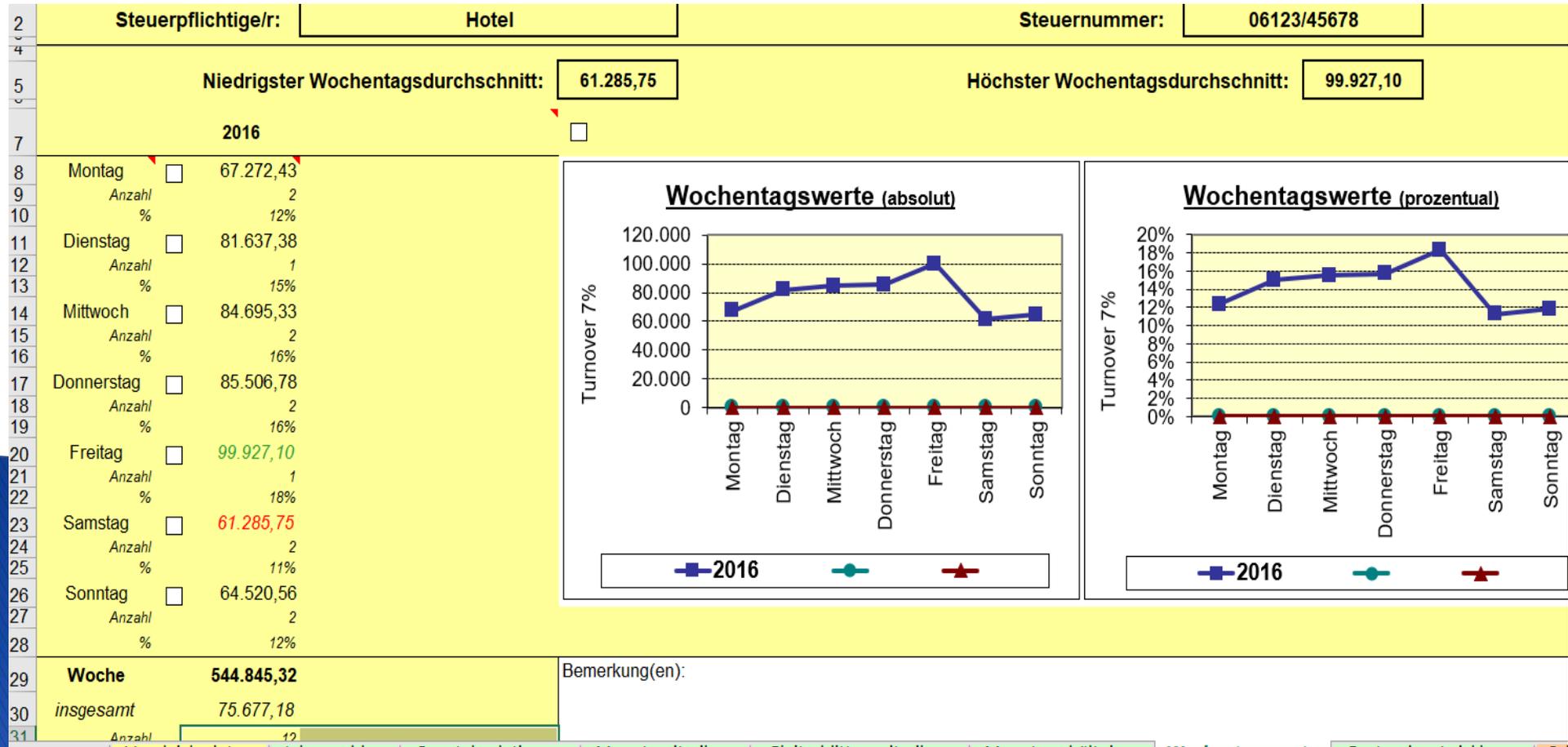
Vergleichsdaten										
1										
2	Steuerpflichtige/r:	Hotel			Beginn Prüfungszeitraum:			01.01.2016		
3	Steuernummer:	06123/45678			Ende Prüfungszeitraum:			31.12.2016		
4	Branche:	Restaurant / Hotel			Abweichendes Wirtschaftsjahr:					
6	Hotel Software 2016				Turnover 7%					
8										
9	Datum	Betrag	Korrektur	Bemerkung	Hotel Software 2016	Datum	Betrag	Korrektur	Bemerkung	Turnover 7%
10	9810	9810			9810	12	12			12
11	01.01.2016	1.261,68			1.261,68	31.01.2016	43.657,01			43.657,01
12	01.01.2016	1.093,46			1.093,46	29.02.2016	55.947,66			55.947,66
13	02.01.2016	65,42			65,42	31.03.2016	78.224,30			78.224,30
14	02.01.2016	74,77			74,77	30.04.2016	69.452,34			69.452,34
15	02.01.2016	116,82			116,82	31.05.2016	81.637,38			81.637,38
16	02.01.2016	0,00			0,00	30.06.2016	92.789,25			92.789,25
17	02.01.2016	175,23			175,23	31.07.2016	85.384,11			85.384,11
18	02.01.2016	175,23			175,23	31.08.2016	101.644,39			101.644,39
19	02.01.2016	175,23			175,23	30.09.2016	99.927,10			99.927,10
20	02.01.2016	175,23			175,23	31.10.2016	78.597,20			78.597,20
21	02.01.2016	175,23			175,23	30.11.2016	67.746,26			67.746,26
22	02.01.2016	161,21			161,21	31.12.2016	53.119,16			53.119,16

Examples for Other / New Techniques:

SRP Summarized Risk Audit

Invoice database out of hotel software

Import in summarized risk audit tool



Examples for Other / New Techniques:
SRP Summarized Risk Audit
Indicators

- **Reduced turnover on weekends**
- **Usually busiest time for hotels in tourist areas**

Restaurant evaluation:

Examples for Other / New techniques:

SRP Summarized Risk Audit

Restaurant Data

Vergleichsdaten										
1										
2	Steuerpflichtige/r:	Hotel Restaurant			Beginn Prüfungszeitraum:			01.01.2014		
3	Steuernummer:				Ende Prüfungszeitraum:			31.12.2016		
4	Branche:	Restaurant			Abweichendes Wirtschaftsjahr:					
6	Goods (#5200 - #5760)				Turnover (#4300, #4400)					
8										
9	Datum	Betrag	Korrektur	Bemerkung	Goods (#5200 - #5760)	Datum	Betrag	Korrektur	Bemerkung	Turnover (#4300, #4400)
10	2074	2074			2074	2225	2225			2225
12	04.01.2014	56,99			56,99	01.01.2014	171,03			171,0
13	09.01.2014	46,08			46,08	02.01.2014	768,99			768,9
14	09.01.2014	74,84			74,84	02.01.2014	145,61			145,6
15	09.01.2014	403,86			403,86	03.01.2014	839,24			839,2
16	09.01.2014	41,55			41,55	03.01.2014	84,86			84,8
17	09.01.2014	184,42			184,42	04.01.2014	1.071,43			1.071,4
18	11.01.2014	11,58			11,58	04.01.2014	138,50			138,5
19	11.01.2014	728,93			728,93	05.01.2014	945,71			945,7
20	11.01.2014	127,26			127,26	05.01.2014	121,12			121,1
21	11.01.2014	8			8,00	06.01.2014	1.210,34			1.210,3
22	11.01.2014	58,63			58,63	06.01.2014	173,08			173,0
23	15.01.2014	63,84			63,84	07.01.2014	599,24			599,2
24	15.01.2014	489			489,00	07.01.2014	85,42			85,4
25	16.01.2014	12,9			12,90	08.01.2014	865,71			865,7
26	16.01.2014	12,98			12,98	08.01.2014	53,93			53,9
27	16.01.2014	7,72			7,72	09.01.2014	731,26			731,2
28	16.01.2014	37,43			37,43	09.01.2014	62,71			62,7

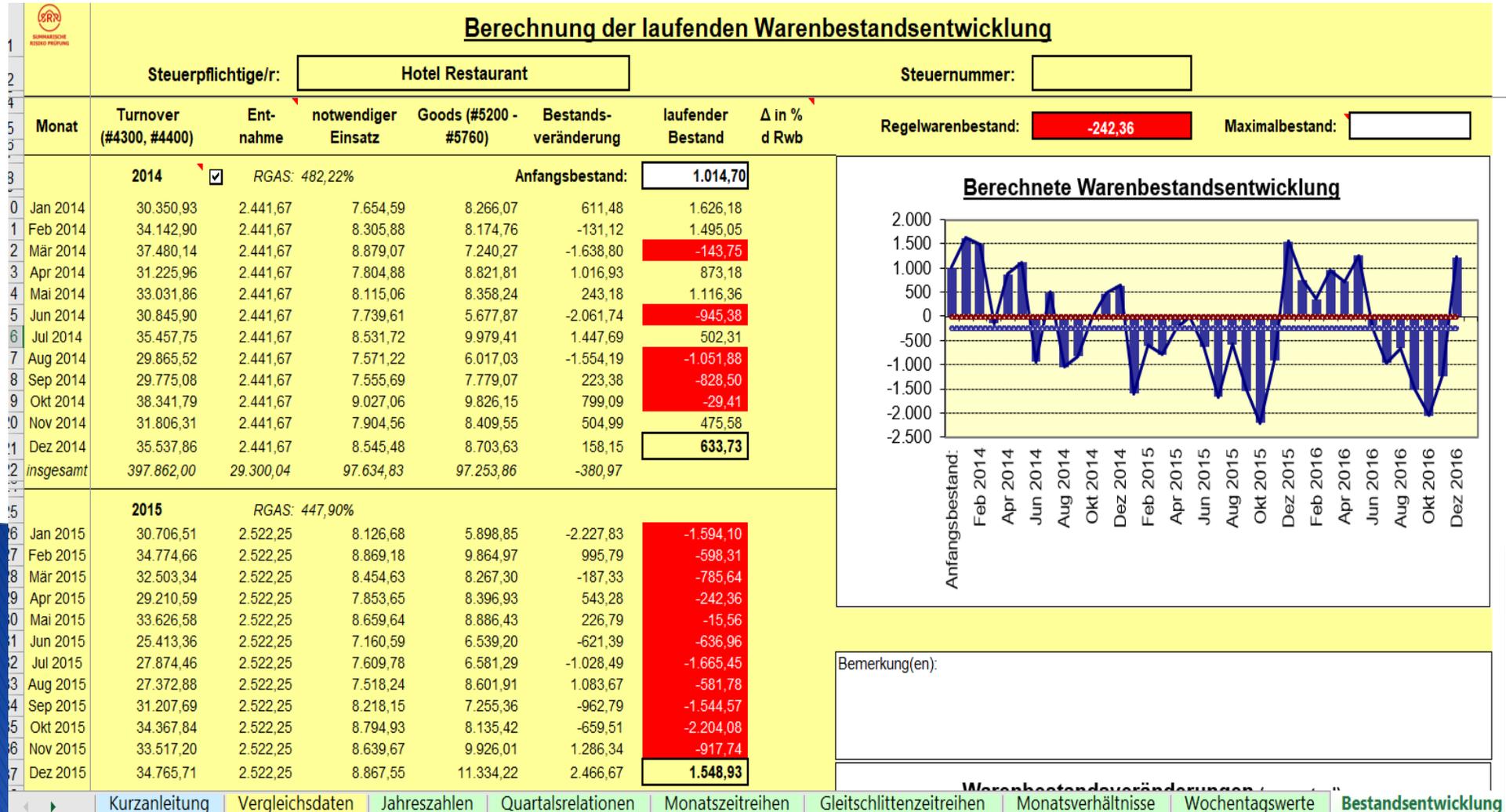
Examples for Other / New techniques:
SRP Summarized Risk Audit
Evaluation based on time series analysis

- **Time series analysis**
- **Average margin comparance**
- **Cutting the pics 16 %**
- **Calculation of available goods**

RESULT:

- **No goods available for turnover ?????**

Examples for Other / New techniques: SRP Summarized Risk Audit Evaluation based on time series analysis



Examples for Other / New Techniques:

SRP Summarized Risk Audit

Estimation of turnover based on time series analysis – more € 285.238,57

Interaktive Schätzungsvorlage			
Steuerpflichtige/r:	Hotel Restaurant		Steuernummer:
	2014	2015	2016
Turnover (#4300, #4400):	397.862,00	375.340,82	388.627,79
Goods (#5200 - #5760):	97.253,86	99.687,89	90.139,25
Bestandsveränderung:	-380,97	915,20	-320,43
Entnahmen:	29.300,04	30.267,00	30.420,00
zusätzliche Entnahmen (ermäßigter USt-Satz):	<input type="checkbox"/>		
zusätzliche Entnahmen (voller USt-Satz):	<input type="checkbox"/>		
weitere Einsatzminderungen:			
Einsatz:	68.334,79	68.505,69	60.039,68
RGAS:	482%	448%	547%
80 %-Quantil RGAS:	<input checked="" type="checkbox"/> 635%	635%	635%
frei geschätzter RGAS:	<input type="checkbox"/>		
80 %-Quantil Einkauf / Einsatz:	<input type="checkbox"/>		
frei geschätzter Einsatz:	<input type="checkbox"/>		
ermittelter Umsatz:	502.260,71	503.516,82	441.291,65
freie Umsatzhinzuschätzung:	<input type="checkbox"/>		
Umsatzschätzung:	502.260,71	503.516,82	441.291,65
Mehrerlös durch Schätzung:	104.398,71	128.176,00	52.663,86
(RGAS nach Schätzung):			
Mehrerlös insgesamt:			285.238,57
festе Aufteilung Mehrerlös:	Anteil ermäßigter Steuersatz:		
Anteil Mehrerlös (ermäßigter USt-Satz):			
freie Aufteilung Mehrerlös:	Anteil ermäßigter Steuersatz:		
Anteil Mehrerlös (ermäßigter USt-Satz):			
Anteil Mehrerlös (voller USt-Satz):			

Examples for Other / New Techniques :

Visualization of data

Visualization is often excel based or other software / a tool to visualize different figures / data sources in relation to each other in various diagrams

Examples for Other / New Techniques : Visualization of data – Bookkeeping Data

JAH	BELD	KTOF	KTOBESCHR	GKTOF	GKTOBESCHR	BUCHTEXT	BELNR	SOL_F	STSA	STBETR	STI	BUF	USTIDNF	HABI	SOL	SO_HA	VERME	MF	BELEGL	KTOA	HA_S
2	2014	#####	4130	Gesetzlich soziale Aufwendungen	1753	Voraus.Beitragsschuld.Sozialver.		-0,20	0,00	0,00		3533		0,20	0,00	0,20		-1	2_AUSG		0,
3	2014	#####	8300	Erlöse 7% Ust.	1000	Kasse		-242,06	7,00	-16,34	USt	11		242,06	0,00	242,06		-1	LEINN		242,
4	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		-115,37	19,00	-22,03	USt	4		115,37	0,00	115,37		-1	LEINN		115,
5	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		-207,38	19,00	-33,52	USt	7		207,38	0,00	207,38		-1	LEINN		207,
6	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		-1153,45	19,00	-213,15	USt	12		1153,45	0,00	1153,45		-1	LEINN		1153,
7	2014	#####	4360	Versicherungen	1200	Sparkasse Breisach #6004212	Assona Handyversicherung	24,00	0,00	0,00		320		0,00	24,00	24,00		-1	2_AUSG		-24,
8	2014	#####	4520	Kfz - Versicherungen	1200	Sparkasse Breisach #6004212	Allianz KFZ Versicherung FR-MG 1916	301,17	0,00	0,00		316		0,00	301,17	301,17		-1	2_AUSG		-301,
9	2014	#####	4810	Mietleasing (bewegliche Wirtschafts	4360	Mieten für Einrichtungen (bewegl. W		227,31	0,00	0,00		1718		0,00	227,31	227,31		-1	2_AUSG		-227,
10	2014	#####	4360	Mieten für Einrichtungen (bewegl. W	1200	Sparkasse Breisach #6004212	Hoffmann Leasing 01/14	227,31	19,00	43,19	VSt	313		0,00	227,31	227,31		-1	2_AUSG		-227,
11	2014	#####	4360	Mieten für Einrichtungen (bewegl. W	4810	Mietleasing (bewegliche Wirtschafts	umb	-227,31	0,00	0,00	VSt	1718		227,31	0,00	227,31		-1	2_AUSG		227,
12	2014	#####	8300	Erlöse 7% Ust.	1000	Kasse		-119,16	7,00	-8,34	USt	19		119,16	0,00	119,16		-1	LEINN		119,
13	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		-25,23	19,00	-4,81	USt	13		25,23	0,00	25,23		-1	LEINN		25,
14	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		-657,06	19,00	-124,84	USt	15		657,06	0,00	657,06		-1	LEINN		657,
15	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		#####	19,00	-318,30	USt	20		1678,40	0,00	1678,40		-1	LEINN		1678,
16	2014	#####	3736	Erhaltene Skonti 19% Vorsteuer	1611	Verb. aus LuL. o. Kontokorrent	Badischer Winzerkeller Skonto	-1,30	19,00	-0,36	VSt	2969		1,30	0,00	1,30		-1	2_AUSG		-1,
17	2014	#####	4971	Kosten des Geldverkehrs Telecash	1200	Sparkasse Breisach #6004212	B & S Gebühren	95,41	19,00	18,13	VSt	346		0,00	95,41	95,41		-1	2_AUSG		-95,
18	2014	#####	8300	Erlöse 7% Ust.	1000	Kasse		-182,39	7,00	-12,81	USt	26		182,39	0,00	182,39		-1	LEINN		182,
19	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		#####	19,00	-193,12	USt	21		1047,38	0,00	1047,38		-1	LEINN		1047,
20	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		-1917,56	19,00	-364,34	USt	27		1917,56	0,00	1917,56		-1	LEINN		1917,
21	2014	#####	8300	Erlöse 7% Ust.	1000	Kasse		-162,39	7,00	-11,41	USt	34		162,39	0,00	162,39		-1	LEINN		162,
22	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		-648,24	19,00	-123,16	USt	28		648,24	0,00	648,24		-1	LEINN		648,
23	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		-113,78	19,00	-21,62	USt	32		113,78	0,00	113,78		-1	LEINN		113,
24	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		#####	19,00	-366,64	USt	35		1923,66	0,00	1923,66		-1	LEINN		1923,
25	2014	#####	4302	Interimskonto Vorsteuervergütung	1000	Kasse	Intermarche 5,5 % TVA	75,37	0,00	0,00	VSt	43		0,00	75,37	75,37		-1	2_AUSG		-75,
26	2014	#####	4302	Interimskonto Vorsteuervergütung	1000	Kasse	Intermarche 20,00 % TVA	44,43	0,00	0,00	VSt	50		0,00	44,43	44,43		-1	2_AUSG		-44,
27	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		-395,04	19,00	-75,06	USt	36		395,04	0,00	395,04		-1	LEINN		395,
28	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		-485,29	19,00	-92,21	USt	40		485,29	0,00	485,29		-1	LEINN		485,
29	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		-240,67	19,00	-45,73	USt	45		240,67	0,00	240,67		-1	LEINN		240,
30	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		-750,84	19,00	-142,66	USt	46		750,84	0,00	750,84		-1	LEINN		750,
31	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		#####	19,00	-536,22	USt	48		2822,18	0,00	2822,18		-1	LEINN		2822,
32	2014	#####	8300	Erlöse 7% Ust.	1000	Kasse		-510,75	7,00	-35,75	USt	60		510,75	0,00	510,75		-1	LEINN		510,
33	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		-113,35	19,00	-21,65	USt	51		113,35	0,00	113,35		-1	LEINN		113,
34	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		-308,24	19,00	-58,56	USt	55		308,24	0,00	308,24		-1	LEINN		308,
35	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		#####	19,00	-478,40	USt	61		2517,90	0,00	2517,90		-1	LEINN		2517,
36	2014	#####	3300	Wareneingang 7% Vst.	1200	Sparkasse Breisach #6004212	Neukauf	16,36	7,00	1,14	VSt	355		0,00	16,36	16,36		-1	2_AUSG		-16,
37	2014	#####	3300	Wareneingang 7% Vst.	1200	Sparkasse Breisach #6004212	Aldi	139,31	7,00	9,75	VSt	356		0,00	139,31	139,31		-1	2_AUSG		-139,
38	2014	#####	4210	Miete Digel	1200	Sparkasse Breisach #6004212	012014	#####	19,00	660,63	VSt	352		0,00	#####	3476,39		-1	2_AUSG		#####
39	2014	#####	4240	Gas, Strom, Wasser	1200	Sparkasse Breisach #6004212	Stadt Breisach Abwasser	165,00	0,00	0,00	VSt	353		0,00	165,00	165,00		-1	2_AUSG		-165,
40	2014	#####	4240	Gas, Strom, Wasser	1200	Sparkasse Breisach #6004212	Stadt Breisach Wasser	32,71	7,00	2,29	VSt	354		0,00	32,71	32,71		-1	2_AUSG		-32,
41	2014	#####	4320	Telefon	1200	Sparkasse Breisach #6004212	Telkom 012014	54,89	19,00	10,43	VSt	359		0,00	54,89	54,89		-1	2_AUSG		-54,
42	2014	#####	4370	Nebenkosten des Geldverkehrs	1200	Sparkasse Breisach #6004212	Darlehenspreis #6001227369	2,30	19,00	0,44	VSt	362		0,00	2,30	2,30		-1	2_AUSG		-2,
43	2014	#####	4370	Nebenkosten des Geldverkehrs	1200	Sparkasse Breisach #6004212	Darlehenspreis #6001227369	2,30	19,00	0,44	VSt	363		0,00	2,30	2,30		-1	2_AUSG		-2,
44	2014	#####	4370	Nebenkosten des Geldverkehrs	1200	Sparkasse Breisach #6004212	Darlehenspreis #6001227369	2,30	19,00	0,44	VSt	364		0,00	2,30	2,30		-1	2_AUSG		-2,
45	2014	#####	4370	Nebenkosten des Geldverkehrs	1200	Sparkasse Breisach #6004212	Darlehenspreis #6001227369	2,30	19,00	0,44	VSt	365		0,00	2,30	2,30		-1	2_AUSG		-2,
46	2014	#####	4370	Nebenkosten des Geldverkehrs	1200	Sparkasse Breisach #6004212	Darlehenspreis #6001227369	2,30	19,00	0,44	VSt	366		0,00	2,30	2,30		-1	2_AUSG		-2,
47	2014	#####	8300	Erlöse 7% Ust.	1000	Kasse		-100,56	7,00	-7,04	USt	70		100,56	0,00	100,56		-1	LEINN		100,
48	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		-434,12	19,00	-82,48	USt	62		434,12	0,00	434,12		-1	LEINN		434,
49	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		-81,01	19,00	-15,39	USt	67		81,01	0,00	81,01		-1	LEINN		81,
50	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		-350,00	19,00	-180,50	USt	71		350,00	0,00	350,00		-1	LEINN		350,
51	2014	#####	3300	Wareneingang 7% Vst.	1200	Sparkasse Breisach #6004212	Union SB	1563,08	7,00	103,84	VSt	368		0,00	#####	1563,08		-1	2_AUSG		###
52	2014	#####	3400	Wareneingang 19% Vorsteuer	1000	Kasse	Rewe	150,36	19,00	28,68	VSt	73		0,00	150,36	150,36		-1	2_AUSG		-150,
53	2014	#####	3400	Wareneingang 19% Vorsteuer	1200	Sparkasse Breisach #6004212	Union SB	-33,50	19,00	-6,37	VSt	367		33,50	0,00	33,50		-1	2_AUSG		33,
54	2014	#####	3400	Wareneingang 19% Vorsteuer	1200	Sparkasse Breisach #6004212	Union SB	105,31	19,00	20,12	VSt	370		0,00	105,31	105,31		-1	2_AUSG		-105,
55	2014	#####	4250	Reinigung	1200	Sparkasse Breisach #6004212	Union SB	36,86	19,00	7,00	VSt	363		0,00	36,86	36,86		-1	2_AUSG		-36,
56	2014	#####	4285	Dekoration	1200	Sparkasse Breisach #6004212	Union SB Servietten	79,31	19,00	15,18	VSt	371		0,00	79,31	79,31		-1	2_AUSG		-79,
57	2014	#####	4380	Beiträge	1200	Sparkasse Breisach #6004212	Dehogs 01-06/14	327,12	0,00	0,00	VSt	374		0,00	327,12	327,12		-1	2_AUSG		-327,
58	2014	#####	8300	Erlöse 7% Ust.	1000	Kasse		-184,21	7,00	-12,89	USt	80		184,21	0,00	184,21		-1	LEINN		184,
59	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		-399,08	19,00	-75,82	USt	74		399,08	0,00	399,08		-1	LEINN		399,
60	2014	#####	8400	Erlöse 19% Ust.	1000	Kasse		-27,31	19,00	-5,19	USt	78		27,31	0,00	27,31		-1	LEINN		27,

Examples for Other / New Techniques :

Visualization of data – problems?

- **420.000 data sets?**
- **How to explore?**
- **Where to start?**
- **Searching?**
- **What kind of parameters?**
- **Where are the indicators?**

Examples for Other / New Techniques :

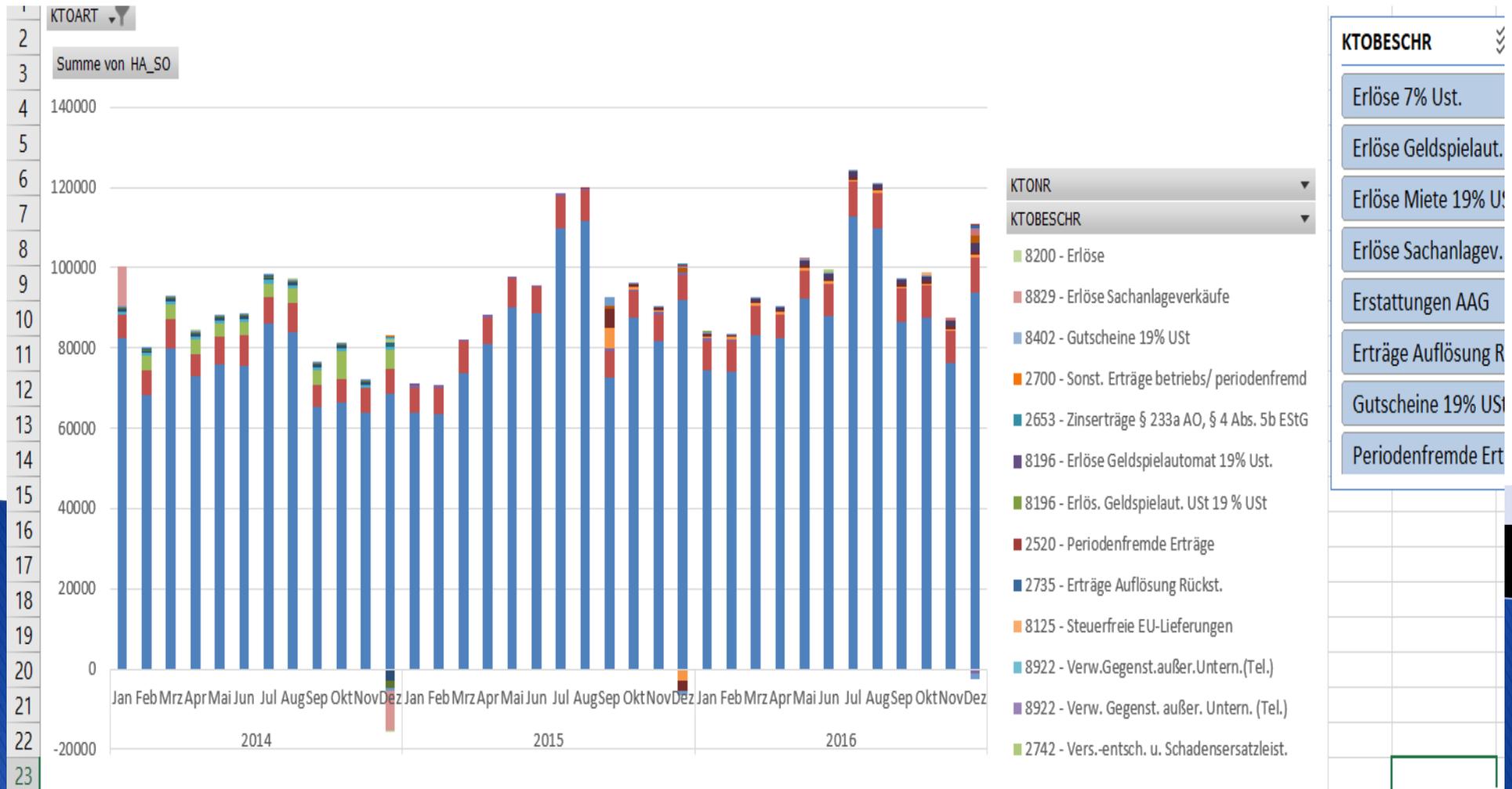
Visualization of data – example

- **Restaurant**
- **Outside area**
- **Christmas celebration**
- **New year celebrations**
- **Additional participation on different markets**
- **No remarkable changes in business (same size, ... employees, ... suppliers....)**

Examples for Other / New Techniques :

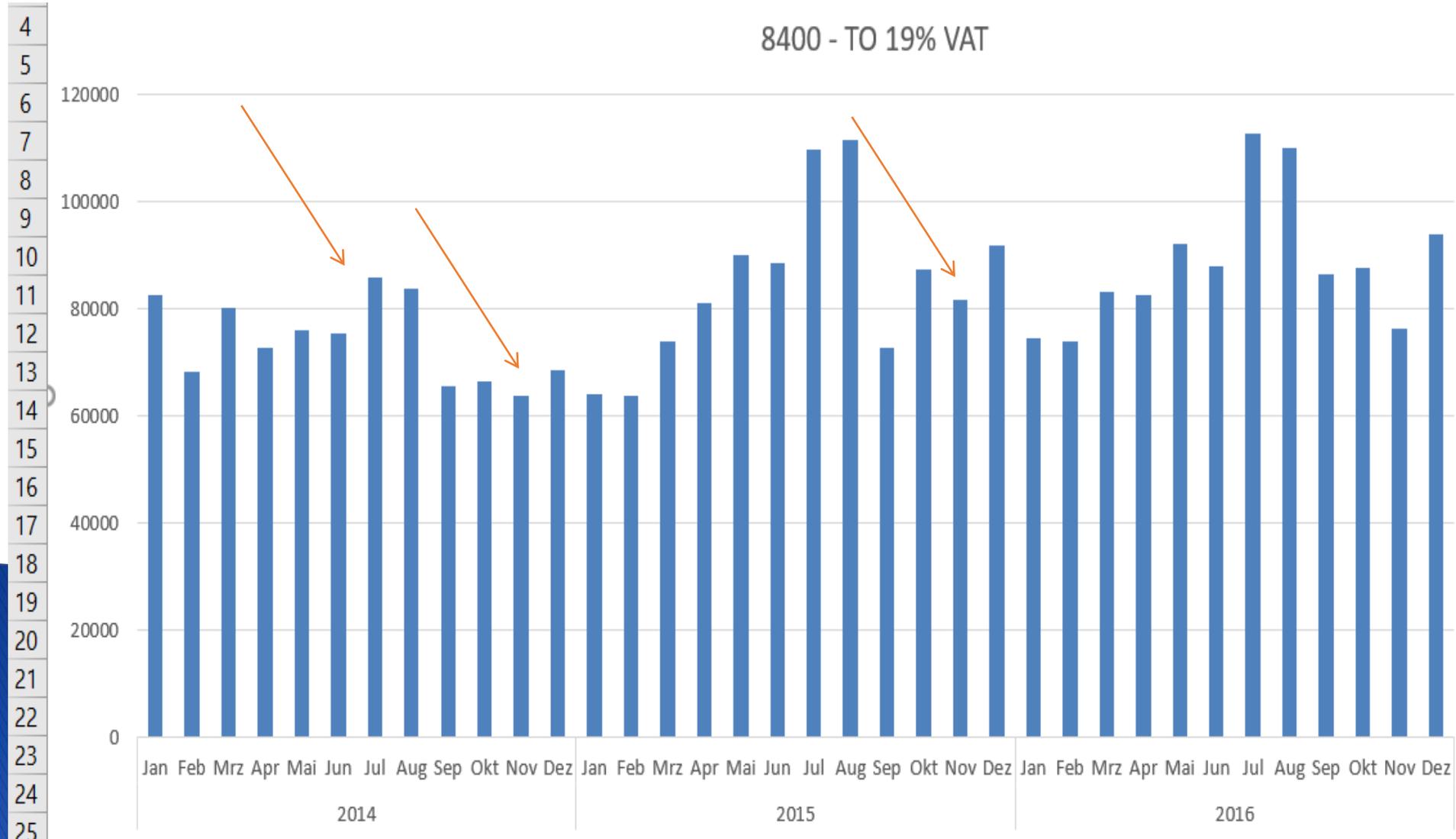
Visualization of data

Edited data – visualized



Examples for Other / New Techniques :

Visualization of data – account selection



Examples for Other / New Techniques :

Visualization of data – example

Indicators for problems

- **Summertime**
 - reduced turnover compared with other years
- **Christmastime**
 - reduced turnover – usually the busiest time of a year for restaurants

Examples for Other / New Techniques :

Visualization

- Any expenditures
- Turnover
- Any other account like input VAT – output VAT
- Almost everything could be visualized
-

Benford`s Law

Benford`s Law

This “Law” is focused on the “relative rate” of figures at the beginning of numbers

Benford's Law

Naturally there are more small things than big things !!

In the whole world there exist
more sand as pebbles
more pebbles as stones
more stones as rocks
more rocks as mountains
more mountains as mountain-ranges

Benford's Law

Frank Benford

Physiker, USA

**Benford's Hypothese:
1920**

**There exist more numbers with a small figure
than with a high figure (at the beginning)**

Benford`s Law

Benford did more than 20.000 single checks to proof his thesis!:

- Results of the American Baseballleagues
- air pressure figures
- weight of atoms
- Invoices of energy on Solomon Islands
- articles of Reader`s Digest
- numbers of inhabitants of countries, cities ...
- bookkeeping of enterprises

....

Result:

**The „1“ was always the leading figure
the „9“ always the last one**

Benford's Law

The spread-rates for the “first figure” were

Figure	Rate
1	30,10 %
2	17,60 %
3	12,49 %
4	9,69 %
5	7,91 %
6	6,69 %
7	5,79 %
8	5,11 %
9	4,57 %

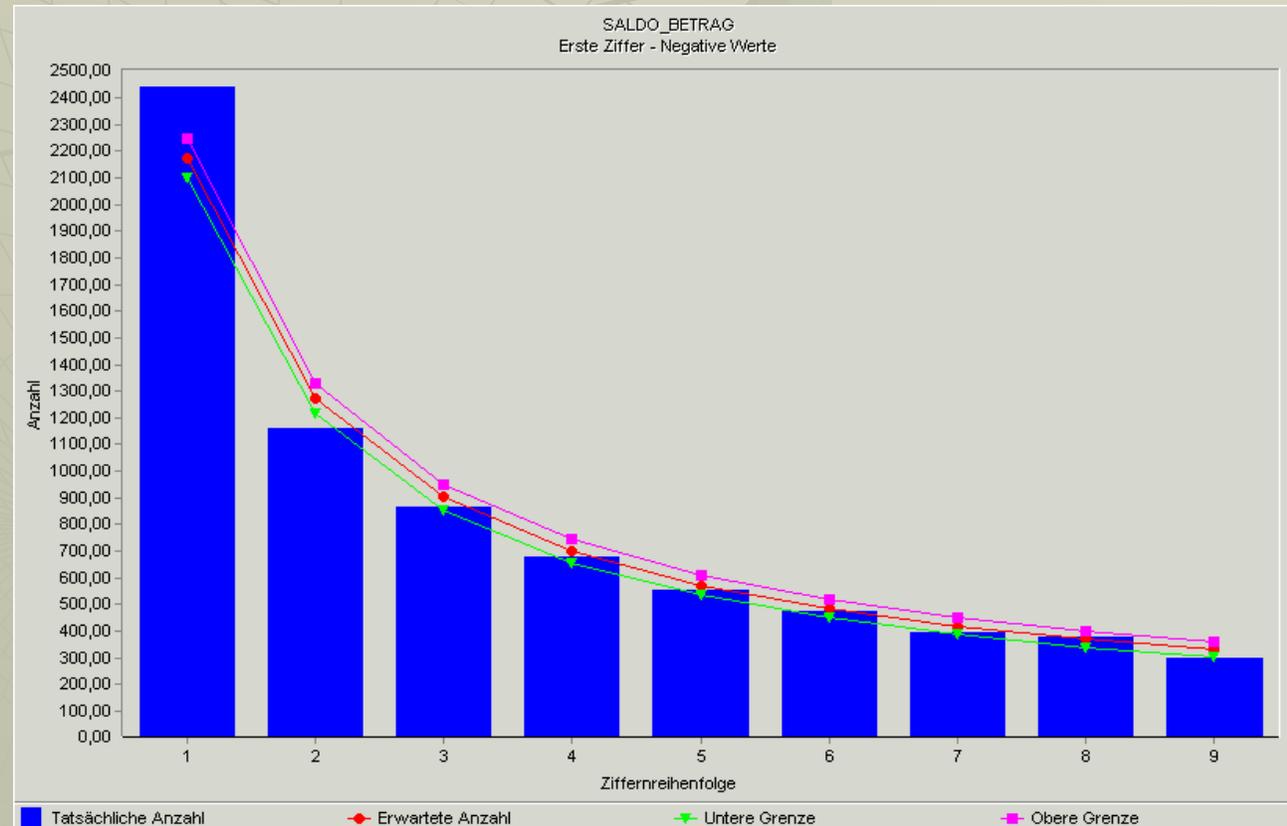
Benford's Law

Benford's Law:

every 3. number
starts with a „1“

Benford's Law

Grafik: 1. Rate-Test

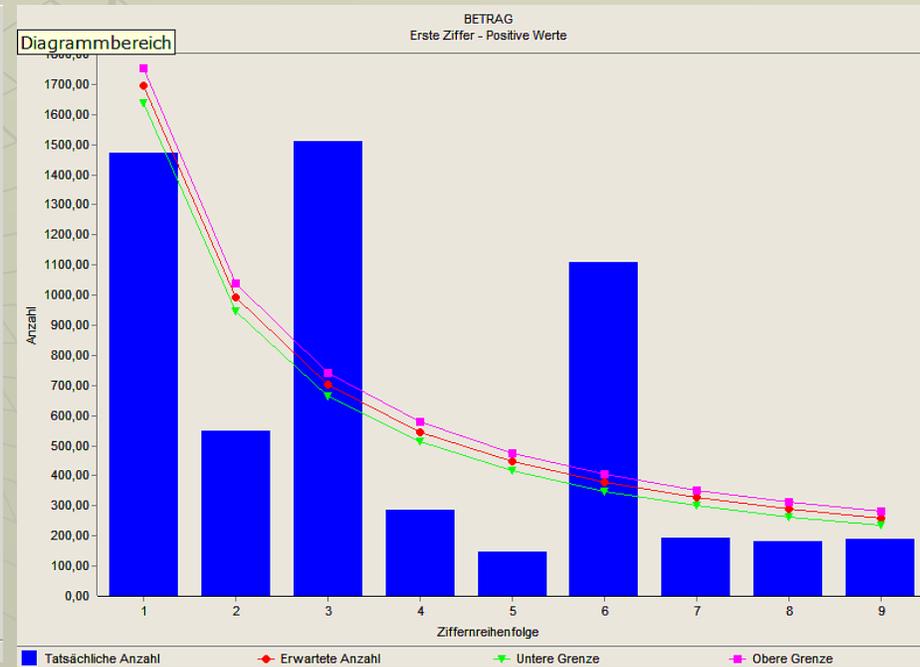
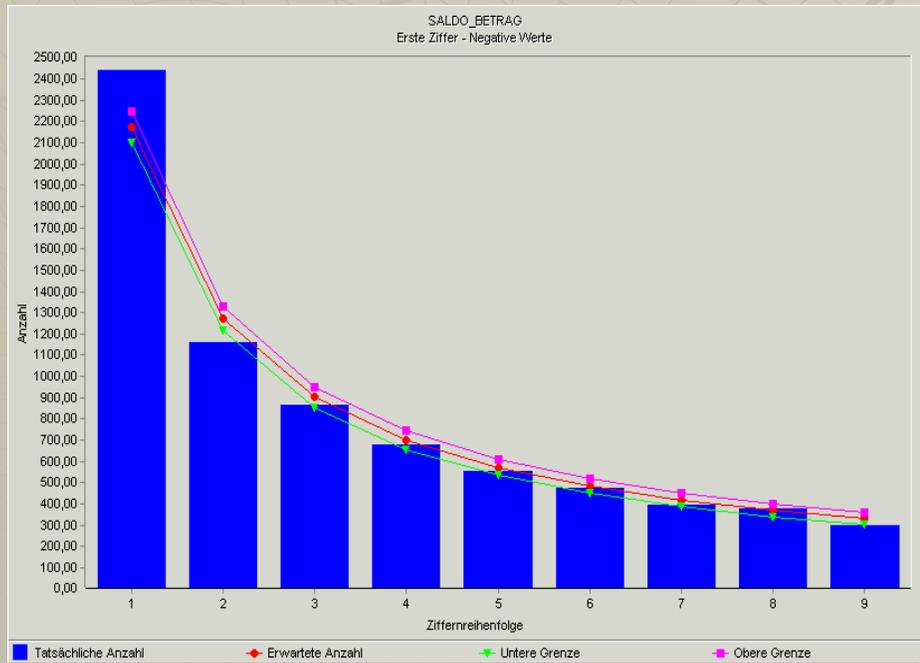


Benford's Law

Grafik: 1. Rate-Test

normal

noticeable



Benford`s Law

Is Benford`s law always right ?

**law of maths
or
freak of nature**

Example Cars

Benford`s Law

Benford`s Law is always right for naturally formed figures / databases

Figures, following the nature-laws as:

Numbers of inhabitants

Length of all rivers of the world

Size / amount of water in all seas/lakes/oceans

Stock-courses

Booking numbers

Turnover

Trading prices

Benford's Law

Relevanz of Units

Benford's Law is universal

Change of Units doesn't influence the rate!

**Km – Miles – Morgen – Zoll – Inch – Acr
EUR - BAT- \$ - Yen**

Benford's Law

The Benford check is an own automatic tool within the analyse-programs IDEA/ACL (and others)

After import of databases you can run the check automatic by allocating the source – “a thing of seconds”

BUT BENFORD-CHECK IS NOT THE PROOF OF THE FRAUD IT'S THE ENTRY FOR FURTHER CHECKS

Benford`s Law

Benford`s Law

Examples

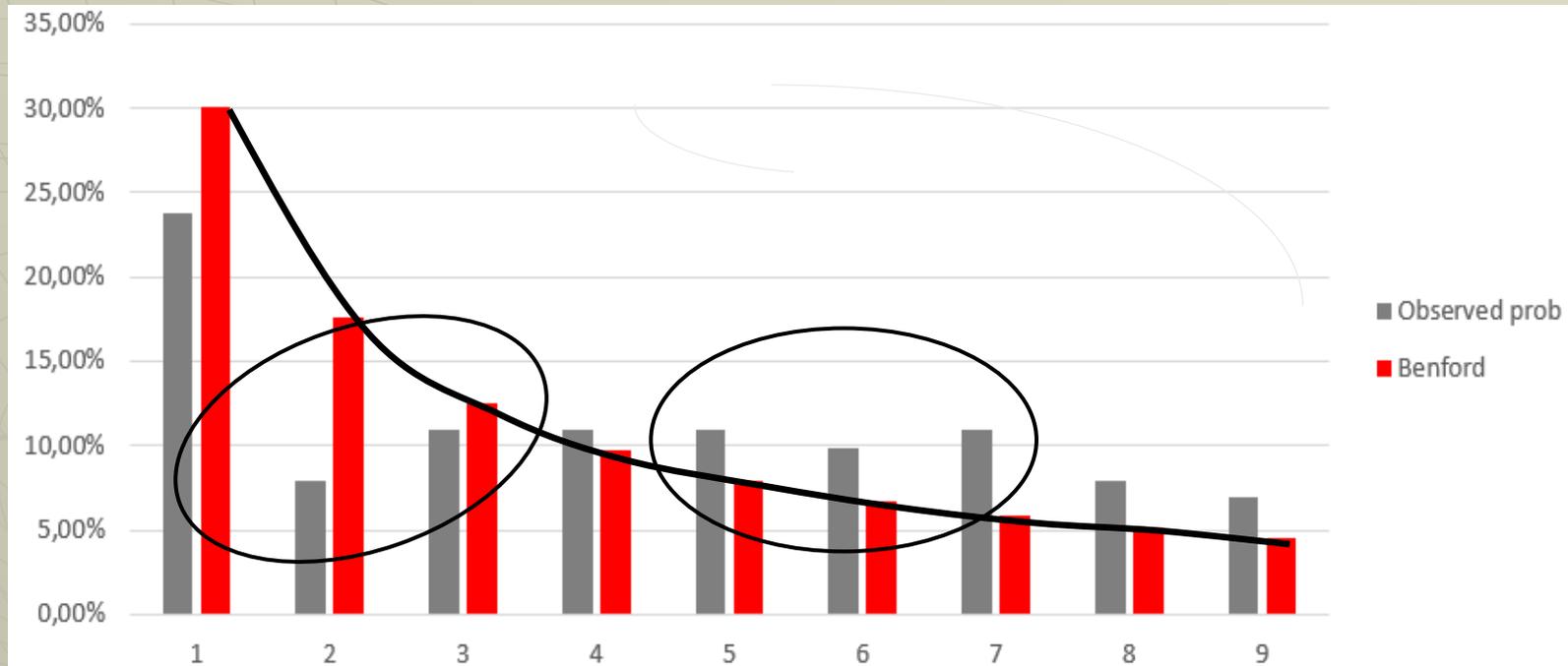
Wai San Loh

1	0	0	1	6	4	9	0
1	2	3	4	4	6	9	0
1	1	8	8	9	6	4	0
1	0	0	8	9	1	8	8
2	2	2	2	8	9	8	6
3	3	3	3	7	3	1	1
4	4	4	4	1	1	3	7
5	5	5	5	1	1	7	3
6	6	6	6	3	7	1	1
7	7	7	7	1	3	0	1
8	8	8	8	3	1	0	1
9	9	9	9	1	1	0	3
5	5	2	6	1	4	1	7
1	6	8	8	1	7	1	4
1	0	2	6	1	1	7	4
6	2	1	0	1	1	4	7
2	8	7	9	3	4	1	4
9	4	5	9	3	4	4	1
9	8	1	3	1	3	4	4
9	0	2	2	3	1	1	4
1	2	6	1	5	6	7	8
8	3	5	9	8	7	6	5
7	8	1	7	7	8	5	6
6	6	9	3	8	7	5	6
5	5	2	9	5	7	0	3
6	3	5	1	3	7	0	5
3	8	6	6	7	5	3	0
7	7	3	1	3	0	7	5
5	9	8	0	4	6	1	7
8	4	7	7	1	7	4	6
9	8	0	1	6	4	1	7
5	7	0	0	6	4	7	1
7	5	0	0	7	4	1	6
4	8	1	2	7	4	6	1
6	0	9	0	1	6	1	4
2	7	5	7	1	1	6	4
1	1	2	2	1	1	4	6
2	2	3	3	4	6	1	4
4	4	5	5	4	6	1	6
7	7	8	8	4	6	1	7
8	8	9	9	4	6	1	8
2	2	1	1	4	6	1	9
3	3	2	2	5	0	0	1
5	5	4	4	5	0	0	2
6	6	5	5	5	0	1	0
7	7	6	6	6	0	1	0
8	8	9	9	2	0	1	9
4	7	1	0	2	0	2	2
1	2	7	6	2	0	2	0
3	8	7	3	1	9	9	1
				1	8	8	1



1	1001	51	6490	101	1881
2	1234	52	4690		
3	1188	53	9640		
4	1008	54	9188		
5	2222	55	8986		
6	3333	56	7311		
7	4444	57	1137		
8	5555	58	1173		
9	6666	59	3711		
10	7777	60	1301		
11	8888	61	3101		
12	9999	62	1103		
13	5526	63	1417		
14	1688	64	1714		
15	1026	65	1174		
16	6210	66	1147		
17	2879	67	3414		
18	9459	68	3441		
19	9813	69	1344		
20	9022	70	3114		
21	1261	71	5678		
22	8359	72	8765		
23	7817	73	7856		
24	6693	74	8756		
25	5529	75	5703		
26	6351	76	3705		
27	3866	77	7530		
28	7731	78	3075		
29	5980	79	4617		
30	8477	80	1746		
31	9801	81	6417		
32	5700	82	6471		
33	7500	83	7416		
34	4812	84	7461		
35	6090	85	1614		
36	2757	86	1164		
37	1122	87	1146		
38	2233	88	4614		
39	4455	89	4616		
40	7788	90	4617		
41	8899	91	4618		
42	2211	92	4619		
43	3322	93	5001		
44	5544	94	5002		
45	6655	95	5010		
46	7766	96	6010		
47	8899	97	2019		
48	4710	98	2022		
49	1276	99	2020		
50	3873	100	1991		

Benford's Law



Results

Testing goodness of fit to Benford's law

Null hypothesis: data is described by Benford's law

I am more than 95% sure there is something wrong

Benford's Law

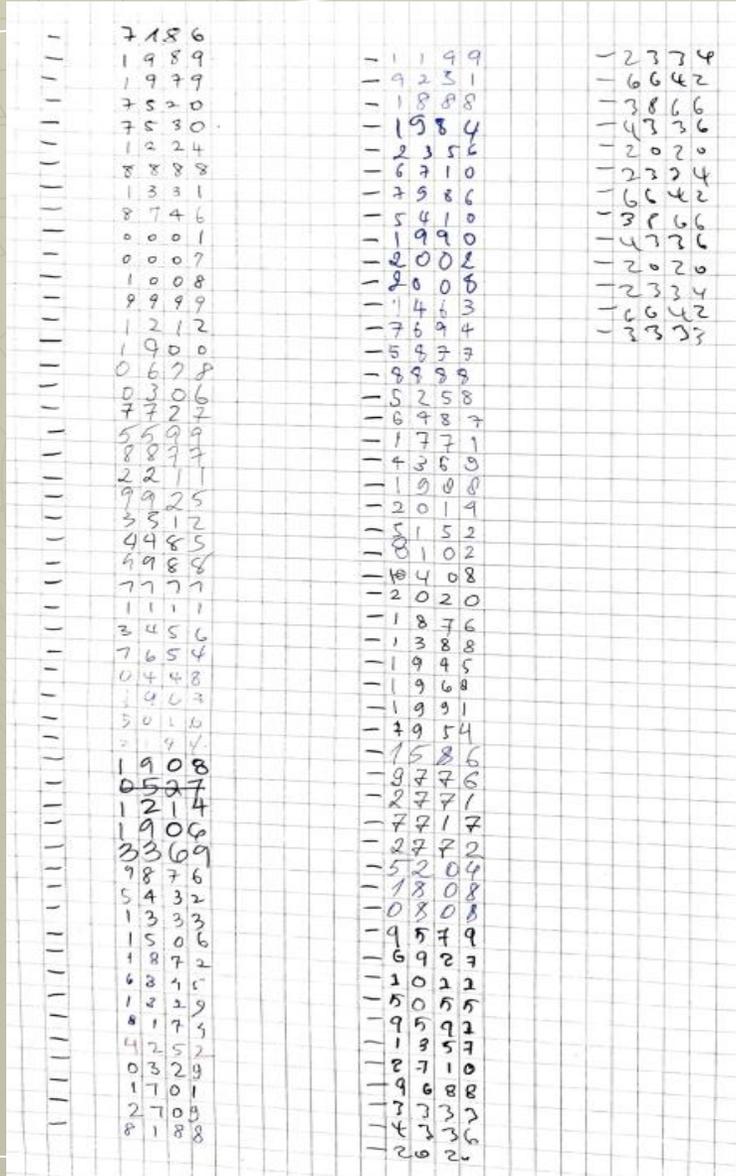
Benford's Law

Number	Count	Observed prob.	Benford	Chi square values
1	24	23,76%	30,10%	1,3488868
2	8	7,92%	17,61%	5,3837113
3	11	10,89%	12,49%	0,2076704
4	11	10,89%	9,69%	0,1500993
5	11	10,89%	7,92%	1,1274012
6	10	9,90%	6,69%	1,5509684
7	11	10,89%	5,80%	4,5155688
8	8	7,92%	5,12%	1,5541295
9	7	6,93%	4,58%	1,2241097
Number of Data Points		101		
ChiSquare Value		17,063		
Critical Thresholds for ChiSquare Tests (8 degrees of freedom)				
95 percent		15,5073		
99 percent		20,0902		

Group

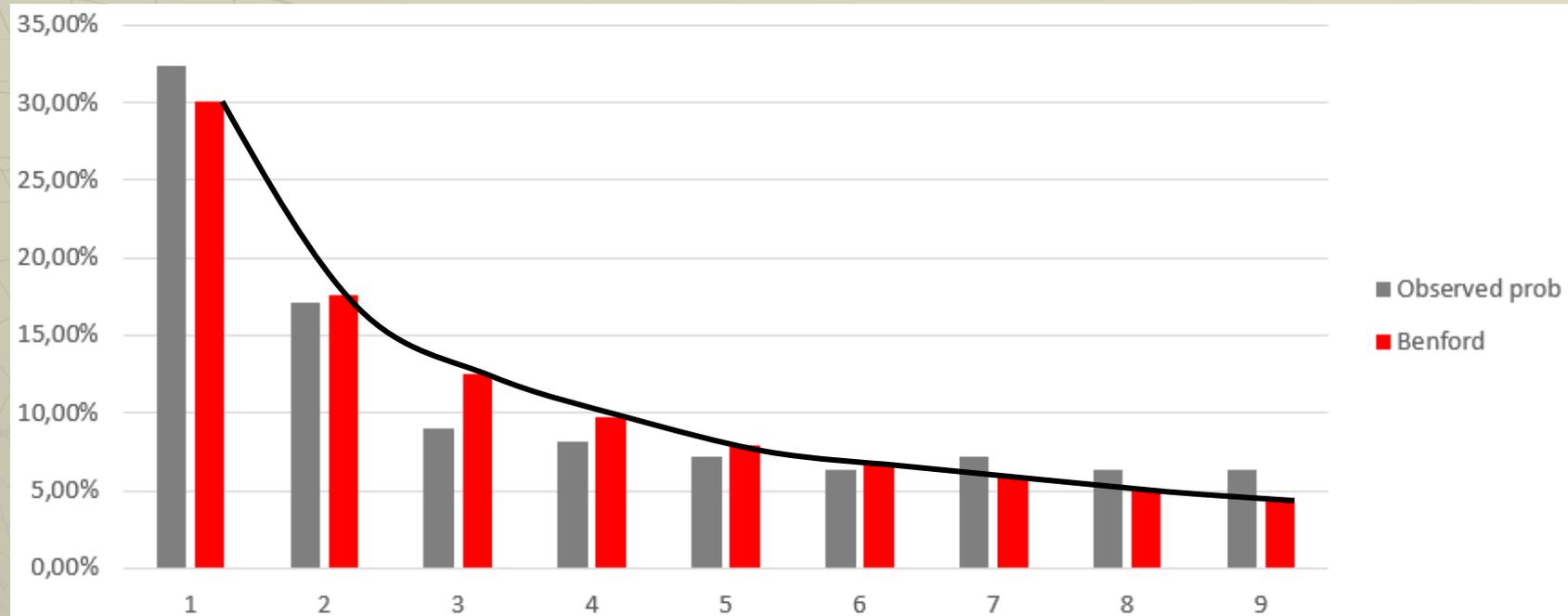


Benford's Law



1	7186	50	8188	99	4336
2	1989	51	1199	100	2020
3	1979	52	9231	101	2334
4	7520	53	1888	102	6642
5	7530	54	1984	103	3866
6	1224	55	2356	104	4336
7	8888	56	6710	105	2020
8	1331	57	7986	106	2334
9	8746	58	5410	107	6642
10	1001	59	1990	108	3866
11	2007	60	2002	109	4336
12	1008	61	2008	110	2020
13	9999	62	1463	111	2334
14	1212	63	7694	112	6642
15	1900	64	5877	113	3333
16	678	65	8888		
17	306	66	5258		
18	7727	67	6787		
19	5599	68	1771		
20	8877	69	4369		
21	2211	70	1900		
22	9925	71	2019		
23	3312	72	5152		
24	4485	73	8102		
25	4988	74	1408		
26	1111	75	2020		
27	1111	76	1876		
28	3456	77	1388		
29	1654	78	1945		
30	448	79	1968		
31	1963	80	1991		
32	5016	81	7954		
33	2194	82	1586		
34	1908	83	9776		
35	1214	84	2771		
36	1906	85	7717		
37	3369	86	2772		
38	9876	87	5204		
39	5432	88	1808		
40	1333	89	808		
41	1503	90	9579		
42	1872	91	6927		
43	6345	92	1022		
44	1329	93	5055		
45	8179	94	9597		
46	4252	95	1357		
47	329	96	2710		
48	1701	97	9866		
49	2709	98	3333		

Benford's Law



Results

Testing goodness of fit to Benford's law

Null hypothesis: data is described by Benford's law

Cannot reject Null Hypothesis I am not 95% sure there is something wrong

Cannot reject Null Hypothesis I am not 99% sure there is something wrong

Benford's Law

Number	Count	Observed prob	Benford	Chi square values
1	36	32,43%	30,10%	0,2000846
2	19	17,12%	17,61%	0,0152592
Vertikal (Wert) Achse	10	9,01%	12,49%	1,0789410
4	9	8,11%	9,69%	0,2869839
5	8	7,21%	7,92%	0,0708498
6	7	6,31%	6,69%	0,0250087
7	8	7,21%	5,80%	0,3794620
8	7	6,31%	5,12%	0,3078356
9	7	6,31%	4,58%	0,7264952
Number of Data Points	111			
ChiSquare Value	3,091			
Critical Thresholds for ChiSquare Tests (8 degrees of freedom)				
95 percent	15,5073			
99 percent	20,0902			