

# Matrix Balancing Scenarios

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## Introduction

Everybody knows that Nature development increases Entropy, but not all of us are aware that in Economy we see the same [1] [2] [3] [4]. We will show how to use Entropy for data analysis in economical systems. Analysis of data requires the presentation of the data for human observation in the 2-dimensional tables by row and column categories as in example by Areas and Industries, Regions and Products, Types and Companies, Grants and Institutions, etc. and the sums by row categories and sums by column categories. Balancing the given matrix to given sums by rows and sums by columns using the number of iterations that described as proportional matrix rows adjustments to required sums and then proportional columns adjustments to required sums (RAS algorithm) [5], resulted in matrix that maximized the entropy function of “usefulness”, and this process get us the final balancing coefficients to multiply rows of starting matrix and to multiply columns of starting matrix to receive the values of balancing matrix. Balancing matrix algorithm shows what most probable evolution of starting matrix will be for the given restrictions for sums by rows and sums by columns, and the balance is maximizing the entropy function [3][6]. Balancing matrix shows the values for cells that supposed to be reached as macro economical point of balance for target sums of rows and sums of columns. This algorithm can be used to predict the natural way of macroeconomics development for future planning, and in reverse to analysis of current situation and why it has not reached the balancing point. It calculates the balancing coefficients as well that represent the comparison weights for the row categories and the comparison weights for the column ones. There are eleven scenarios of the balancing mechanism supported by <http://OUReports.com> . Scenarios of balancing matrix to the sums by rows and sums by columns or by multiple data columns differ by the way of getting the starting matrix from the original data and by the way of getting the target sums by rows and sums by columns. Scenarios 1a, 1b, 2a, 2b, 2c, 3a, 3b, 3c, 4a, 4b, 4c presented in the Table of Scenarios below. Each scenario requests some of parameters for getting initial matrix and target sums:

Prg - the group field for matrix row categories

Pcg - the group field for matrix column categories

Fld1 – the data field

Agf1 – the aggregation function for field1 values

Msr - manually entered sums by rows

Msc - manually entered sums by columns

Fld2 – the data field

Agf2 – the aggregation function for field2 values

Sfld2 – the starting value of field2

Tfld2 – the target value of field2

Mcs - multiple data columns

AgMc – the aggregation function for multiple matrix columns values

## Table of Scenarios

Iterations and balancing	Matrix structure (rows, columns, items):		
<p><b>Balancing of sums by rows and sums by columns or by sums of multiple columns:</b></p>	<p>Rows defined by values in group row field. Columns defined by values in group column field. <i>Starting matrix item is the <b>aggregated field1 value</b> for row/column group.</i></p>	<p>Rows defined by values in group row field. Columns selected from the list of data columns. <i>Starting matrix item is the <b>value</b> of the row/column item.</i></p>	<p>Multidimensional balancing. Columns selected from the list of data columns to balance by. <i>Starting matrix item is the <b>aggregated field1 value</b> for values in selected columns.</i></p>
<p>Balance to sums by rows and sums by columns or sums by multiple columns entered manually.</p>	<p><a href="#">Scenario 1a</a> Params: Prg, Pcg, Fld1, Agf1, Msr, Msc</p>	<p><a href="#">Scenario 1b</a> Params: Prg, Mcs, Msr, Msc</p>	<p><a href="#">Scenario 4c</a> Multidimensional Params: Mcs, Fld1, Agf1</p>
<p>Balance to sums by rows and sums by columns or sums by multiple columns of the target matrix. <i>Target matrix item is <b>aggregated field2 value</b> for row/column or multi columns group.</i></p>	<p><a href="#">Scenario 2a</a> Params: Prg, Pcg, Fld1, Agf1, Fld2, Agf2</p>		<p><a href="#">Scenario 4a</a> Multidimensional Params: Mcs, Fld1, Agf1, Fld2, Agf2</p>
<p>Multiple 2a scenarios to get balancing coefficients for each selected field from the list of columns. Balance to sums by rows and sums by columns for target matrices. <i>Target matrix item is <b>aggregated selected field value</b> for row/column group.</i></p>	<p><a href="#">Scenario 3a</a> Params: Prg, Pcg, Fld1, Agf1, Mcs, AgMc</p>		
<p><i>Field2 starting and target values</i> used as condition on data to get starting and target matrices. Balance to sums by rows and sums by columns or sums by multiple columns for target matrix.</p>	<p><a href="#">Scenario 2b</a> Params: Prg, Pcg, Fld1, Agf1, Fld2, Sfld2, Tfld2</p>	<p><a href="#">Scenario 3b</a> Params: Prg, Mcs, Fld2, Sfld2, Tfld2</p>	<p><a href="#">Scenario 4b</a> Multidimensional Params: Mcs, Fld1, Agf1, Fld2, Sfld2, Tfld2</p>
<p>Multiple scenarios of the scenarios (2b or 3b) to get balancing coefficients (2c or 3c). All values between starting and target values of field2.</p>	<p><a href="#">Scenario 2c</a> Params: Prg, Pcg, Fld1, Agf1, Fld2, Sfld2, Tfld2</p>	<p><a href="#">Scenario 3c</a> Params: Prg, Mcs, Fld2, Sfld2, Tfld2</p>	



1a: Starting Matrix of aggregated field1 values to balance by manually entered sums by rows and sums by columns.

Scenario Parameters: Prg, Pcg, Fld1, Agf1, Msr, Msc - both group fields (for rows and columns), the field1, aggregation function for field1, and manually entered sums by rows and by columns.

Starting matrix cell defined by value of the row group field and value of the column group field, and value in the cell defined by field1 values aggregated for all records where row field value and column field value are defined by this cell.

Sample: data has field "Area" and field "Industry", field1 has values of grant applications in dollars, the aggregation function is "Sum". Macro economical desirable values for Areas and Industries entered. Balancing matrix cell shows amount for each Area and Industry that is the macro economical point of balance satisfying macro economical requirements for Areas and Industries.

See more details in [1a Scenario](#) for the report "Sample Sales Records by year".

1b: Starting Matrix of rows and selected columns to balance by manually entered sums by rows and sums by columns.

Parameters: Prg, Mcs, Msc, Msr - the group field for rows, multiple matrix columns, and manually entered sums by rows and by columns.

Starting matrix cell defined by value of the row group field value and the column name, and value in the cell defined by value of the column in the row.

Sample: data has field "Area" and separate fields for each Industry, cell has values of grant applications in dollars for Area and Industry. Macro economical desirable values for Areas and Industries entered. Balancing matrix cell shows amount for each Area and Industry that is the macro economical point of balance satisfying macro economical requirements for Areas and Industries.

See more details in [1b Scenario](#) for the report "Sample Sales Records by year".

2a: Starting Matrix of the aggregated field1 to balance for sums of rows and columns of the Target Matrix of the aggregated field2.

Parameters: Prg, Pcg, Fld1, Agf1, Fld2, Agf2 - both group fields for rows and columns, field1, aggregation function for field1, field2, aggregation function for field2.

Starting and target matrix cell defined by value of the row group field and value of the column group field. The value in the cell of starting matrix defined by field1 values aggregated for all records where row field value and column field value are defined by this cell. The value in the cell of target matrix defined by field2 values aggregated for all records where row field value and column field value are defined by this cell.

Sample: data has field “Area” and field “Industry”, field1 has values of Gross Domestic Product in dollars in 2010, the aggregation function is “Sum”, field2 has values of Gross Domestic Product in dollars in 2020, the aggregation function is “Sum”. Desirable sums for Areas and Industries calculated based on target matrix. Balancing matrix cell shows amount for each Area and Industry that is the macro economical point of balance satisfying macro economical requirements for Areas and Industries based on 2020. Comparison of starting, target, and especially to the balancing matrix gives to analytics the information where process developed out of natural economical point of balance.

See more details in [2a Scenario](#) for the report “Sample Sales Records by year”.

2b: The starting value of field2 to get the Starting matrix of field1 values and target value of field2 to get the Target matrix of field1 values. Balance starting matrix to sums of rows and columns of the target matrix.

Parameters: Prg, Pcg, Fld1, Agf1, Fld2, Sfld2, Tfld2 - both group fields for rows and columns, field1, aggregation function for field1, and field2 with starting and target values.

Sample: data has field “Area” and field “Industry”, field1 has values of Gross Domestic Product in dollars, the aggregation function is “Sum”, field2 has years from 2010 to 2020. Starting field2 value 2010 used as restriction to get the aggregated field1 values for starting matrix and target value 2020 of field2 used to get the aggregated field1 values for target matrix. Desirable sums for Areas and Industries calculated based on target matrix. Balancing matrix cell shows amount for each Area and Industry that is the macro economical point of balance satisfying macro economical requirements for Areas and Industries based on 2020. Comparison of starting, target, and especially to the balancing matrix gives to analytics the information where process developed out of natural economical point of balance.

See more details in [2b Scenario](#) for the report “Sample Sales Records by year”.

2c: Get balancing coefficients for Starting Matrix of field1 for all iterations between starting and target values of the field2. Multiple 2b scenarios.

Parameters: Prg, Pcg, Fld1, Agf1, Fld2, Sfld2, Tfld2 - both group fields for rows and columns, field1, aggregation function for field1, and field2 with starting and target values.

Sample: data has field “Area” and field “Industry”, field1 has values of Gross Domestic Product in dollars, the aggregation function is “Sum”, field2 has years from 2010 to 2020. Starting field2 value 2010 used as restriction to get the aggregated field1 values for starting matrix. The scenario 2b repeated for each value of the field2 up to 2020 which used to get the aggregated field1 values for each target matrix. Desirable sums for Areas and Industries calculated based on target matrix. Balancing matrix cell shows amount for each Area and Industry that is the macro economical point of balance satisfying macro economical requirements for Areas and Industries based on sums of rows and sums of columns in target matrix. Balancing coefficients shows weights of Areas and Industries in each iteration by year. The link in the starting matrix cell opens the chart of balancing matrix values by years.

See more details in [2c Scenario](#) for the report “Sample Sales Records by year”.

3a: Get balancing coefficients for Starting Matrix of aggregated values of field1 and multiple Target Matrices of aggregated selected fields values. Multiple 2a scenarios.

Parameters: Prg, Pcg, Fld1, Agf1, Mcs, AgMc - both group fields for rows and columns, field1, aggregation function for field1, and multiple matrix columns, aggregation function for selected matrix columns.

Starting matrix of aggregated field1 values, and target matrices of each aggregated selected field values for the same groups.

Sample: data has field "Area" and field "Industry", field1 has values of Gross Domestic Product in dollars, the aggregation function is "Sum" for year 2010 (used for calculating the starting matrix), and separate fields have values of Gross Domestic Product in dollars for each year up to 2020 (used for calculating each target matrix for each year with aggregation function "Sum"). The scenario 2a repeated for each value of the fields up to 2020 which used to get the values for each target matrix. Desirable sums for Areas and Industries calculated based on target matrix. Balancing matrix cell shows amount for each Area and Industry that is the macro economical point of balance satisfying macro economical requirements for Areas and Industries based on sums of rows and sums of columns in target matrix. Balancing coefficients shows weights of Areas and Industries in each iteration by year. The link in the starting matrix cell opens the chart of balancing matrix values by years.

See more details in [3a Scenario](#) for the report "Sample Sales Records by year".

3b: Starting Matrix rows and selected multiple columns to balance from starting to target values of the field2.

Parameters: Prg, Mcs, Fld2, Sfld2, Tfld2 - group field for rows, selected multiple fields for columns of the matrix, and field2 with starting and target values.

Sample: data has field "Area" and separate fields for each Industry, field2 has years from 2010 to 2020, each cell has values of Gross Domestic Product in dollars for Area and Industry in the particular year. Starting field2 value 2010 used as restriction to get the values for starting matrix and target value 2020 of field2 used to get the values for target matrix. Desirable sums for Areas and Industries calculated based on target matrix. Balancing matrix cell shows amount for each Area and Industry that is the macro economical point of balance satisfying macro economical requirements for Areas and Industries based on 2020. Comparison of starting, target, and especially to the balancing matrix gives to analytics the information where process developed out of natural economical point of balance.

See more details in [3b Scenario](#) for the report "Sample Sales Records by year".

3c: Get balancing coefficients for Starting Matrix rows and selected multiple columns for all iterations between starting and target of the field2 values. Multiple 3b scenarios.

Parameters: Prg, Mcs, Fld2, Sfld2, Tfld2 - group field for rows, selected multiple fields for columns of the matrix, and field2 with starting and target values.

Sample: data has field “Area” and separate fields for each Industry, field2 has years from 2010 to 2020, each cell has values of Gross Domestic Product in dollars for Area and Industry in the particular year. Starting field2 value 2010 used as restriction to get the values for starting matrix and each value of the field2 up to 2020 used to get the values for each target matrix. The scenario 3b repeated for each value of the field2 up to 2020 which used to get the values for each target matrix. Desirable sums for Areas and Industries calculated based on each target matrix. Balancing matrix cell shows amount for each Area and Industry that is the macro economical point of balance satisfying macro economical requirements for Areas and Industries based on sums of rows and sums of columns in target matrix. Balancing coefficients shows weights of Areas and Industries in each iteration by year. The link in the starting matrix cell opens the chart of balancing matrix values by years.

See more details in [3c Scenario](#) for the report “Sample Sales Records by year”.

Sample reports can be open from <http://OUReports.com> by clicking the button “Try It! Play in our Sandbox” or the button “Try It! Play with our Analytics”.

## Multidimensional balancing

4a: Starting Matrix of the aggregated field1 to balance for sums by multiple selected columns of the Target Matrix of the aggregated field2.

Parameters: Mcs, Fld1, Agf1, Fld2, Agf2 - group fields for selected columns, field1, aggregation function for field1, field2, aggregation function for field2.

Starting and target matrix cell defined by value of each selected field. The value in the cell of starting matrix defined by field1 values aggregated for all records where values of the selected are defined by this cell. The value in the cell of target matrix defined by field2 values aggregated for all records where values of the selected are defined by this cell.

Sample: data has selected fields “OrderYear”, “Region”, “ItemType”, “SalesChannel”, “OrderPriority”, field1 has values of TotalCost in dollars, the aggregation function is “Sum”, field2 has values TotalProfit in, the aggregation function is “Sum”. Desirable sums for each of selected fields calculated based on target matrix. Balancing matrix cell shows amount for each of selected fields that is the macro economical point of balance satisfying macro economical requirements for selected fields. Comparison of starting, target, and especially to the balancing matrix gives to analytics the information where process developed out of natural economical point of balance.

See more details in [4a Scenario](#) for the report “Sample Sales Records by year”.

4b: The starting value of field2 to get the Starting matrix of field1 values and target value of field2 to get the Target matrix of field1 values. Balance starting matrix to sums of multiple selected fields for the target matrix.

Parameters: Mcs, Fld1, Agf1, Fld2, Sfld2, Tfld2 - group fields for multiple selected columns, field1, aggregation function for field1, and field2 with starting and target values.

Sample: data has selected fields "OrderYear", "Region", "ItemType", "OrderPriority", field1 has values of TotalCost in dollars, the aggregation function is "Sum", field2 has values of SalesChannel. Starting field2 value "Offline" used as restriction to get the aggregated field1 values for starting matrix and target value of field2 "Online" used to get the aggregated field1 values for target matrix. Desirable sums for each of selected fields calculated based on target matrix sums for each selected fields. Balancing matrix cell shows amount for each of selected fields that is the macro economical point of balance satisfying macro economical requirements for selected fields. Comparison of starting, target, and especially to the balancing matrix gives to analytics the information where process developed out of natural economical point of balance.

See more details in [4b Scenario](#) for the report "Sample Sales Records by year".

4c: Starting Matrix of aggregated field1 values to balance by manually entered sums by multiple selected columns.

Scenario Parameters: Mcs, Fld1, Agf1 – multiple selected fields, the field1, aggregation function for field1, and manually entered sums by selected fields.

Starting matrix cell defined by values of the selected fields, and value in the cell defined by field1 values aggregated for all records where values of the selected fields are defined by this cell.

Sample: data has field "Area" and field "Industry", field1 has values of grant applications in dollars, the aggregation function is "Sum". Macro economical desirable values for Years, Areas, and Industries entered. Balancing matrix cell shows amount for each Area and Industry that is the macro economical point of balance satisfying macro economical requirements for Years, Areas, and Industries (3-dimensional balancing).

See more details in [4c Scenario](#) for the report "Sample Sales Records by year".

# Report: "Sample Sales Records by year" in the Analytics from http://OUReports.com Data:

Records returned: 100

OrderYear	Region	Country	Item Type	Sales Channel	Order Priority	Name	Order Date	Order ID	Ship Date	Units Sold	Unit Price	Unit Cost	Total Revenue	Total Cost	Total Profit	Index
2010	Australia and Oceania	Turvalu	Baby Food	Offline	H		5/28/2010	869166000/6/27/2010	8925	255.28	159.42	2533650	1562240	961410	1	
2012	Central America and the Caribbean	Grenada	Cereal	Online	C		9/22/2012	963981000/9/19/2012	2964	205.7	117.11	578763	328376	248406	2	
2014	Europe	Russia	Office Supplies	Offline	L		5/2/2014	341417000/5/8/2014	1779	651.21	524.96	1158500	933904	224599	3	
2014	Sub-Saharan Africa	Sao Tome and Principe	Fruits	Online	C		6/20/2014	514322000/7/6/2014	8162	9.33	6.92	75691.7	56665.8	19525.8	4	
2015	Australia and Oceania	Solomon Islands	Baby Food	Online	C		4/2/2015	547996000/2/21/2015	2974	255.28	159.42	756203	474115	285088	6	
2011	Sub-Saharan Africa	Angola	Household	Offline	M		4/23/2011	135425000/4/27/2011	4187	668.27	502.54	2798050	2104140	693912	7	
2012	Sub-Saharan Africa	Burkina Faso	Vegetables	Online	H		7/17/2012	871544000/7/27/2012	8082	154.06	90.93	1245110	734896	510217	8	
2015	Sub-Saharan Africa	Republic of the Congo	Personal Care	Offline	M		7/14/2015	770462000/6/25/2015	6070	81.73	56.67	498101	343907	152114	9	
2014	Sub-Saharan Africa	Senegal	Cereal	Online	H		4/18/2014	619607000/5/30/2014	6593	205.7	117.11	1356180	772106	584074	10	
2011	Asia	Kyrgyzstan	Vegetables	Offline	H		6/24/2011	814712000/7/12/2011	124	154.06	90.93	19103.4	11275.3	7828	12	
2014	Sub-Saharan Africa	Cape Verde	Clothes	Offline	H		6/2/2014	939826000/6/19/2014	4168	109.28	35.84	454479	149391	306090	12	
2017	Asia	Bangladesh	Clothes	Online	L		1/13/2017	187311000/1/31/2017	8263	109.28	35.84	902961	296146	606835	13	
2017	Central America and the Caribbean	Honduras	Household	Offline	H		2/8/2017	522840000/2/13/2017	8974	668.27	502.54	5997060	4509790	1487260	14	
2014	Asia	Mongolia	Personal Care	Offline	C		2/19/2014	832401000/2/23/2014	4901	81.73	56.67	400559	277740	122819	15	
2012	Europe	Bulgaria	Clothes	Offline	M		4/23/2012	972292000/6/3/2012	1673	109.28	35.84	182825	89960.3	122865	16	
2016	Asia	Sri Lanka	Cosmetics	Offline	M		1/19/2016	419124000/1/28/2016	6952	437.2	263.33	3039410	1838670	1200740	17	
2015	Sub-Saharan Africa	Cameroon	Beverages	Offline	C		4/1/2015	519821000/4/18/2015	5430	47.45	31.79	257654	172620	86033.8	18	
2010	Asia	Turkmenistan	Household	Offline	L		12/30/2010	441619000/1/20/2011	3830	668.27	502.54	2559470	1924730	634746	19	
2012	Australia and Oceania	East Timor	Meat	Online	L		7/31/2012	322088000/9/11/2012	5988	421.89	364.09	2492530	2154590	337938	20	
2014	Europe	Norway	Baby Food	Online	L		5/14/2014	619028000/6/28/2014	7450	255.28	159.42	1901540	1187680	714157	21	
2015	Europe	Portugal	Baby Food	Offline	H		7/31/2015	860674000/9/3/2015	1273	255.28	159.42	324971	202942	122030	22	
2016	Central America and the Caribbean	Honduras	Snacks	Offline	L		6/30/2016	795491000/7/26/2016	2225	152.58	97.44	339490	216004	122886	23	
2014	Australia and Oceania	New Zealand	Fruits	Online	H		9/8/2014	142278000/10/4/2014	2187	9.33	6.92	20404.7	15134	5270.67	24	
2016	Europe	Moldova	Personal Care	Online	L		5/7/2016	740148000/5/10/2016	5070	81.73	56.67	414371	287317	127054	25	
2017	Europe	France	Cosmetics	Offline	H		5/22/2017	898523000/6/5/2017	1815	437.2	263.33	793518	477944	315574	26	
2014	Australia and Oceania	Kiribati	Fruits	Offline	M		10/13/2014	347140000/11/10/2014	6398	9.33	6.92	50363.3	37364.2	13009.2	27	
2010	Sub-Saharan Africa	Mal	Fruits	Online	L		6/7/2010	680480000/5/20/2010	8622	9.33	6.92	54319.3	40288.2	14031	28	
2014	Europe	Norway	Beverages	Offline	C		7/18/2014	435609000/7/30/2014	5124	47.45	31.79	243134	162992	80241.8	29	
2012	Sub-Saharan Africa	The Gambia	Household	Offline	L		5/26/2012	886495000/6/9/2012	2370	668.27	502.54	1583800	1191920	392780	30	

## 1a Scenario:

Parameters with manually entered target proportional values:

Sample Sales Records by year - Advanced Analytics - Matrix Balancing

Select Scenario: 1a: Starting Matrix of aggregated field1 values to balance by manually entered sums by rows and sums by columns

100 Precision: 1 Partial rows/columns: 0.0 adjust by start matrix

1a: Starting Matrix of aggregated field1 values to balance by manually entered sums by rows and sums by columns

Enter:

Matrix rows by: ItemType columns by: Region

Matrix items by field1: TotalProfit aggregation function: Sum

Enter sums by rows: 11,22,33,44,11,22,33,44,55,66,77,88

Enter sums by columns: 11,22,33,44,55,66,77

(1a) Balancing matrix of field1 for given above sums by rows and by columns

Arrays of sums by rows and columns should have the same dimensions as Matrix (12,7).

Starting Matrix of Sum of TotalProfit	Export to Excel	=>	Target Matrix	Export to Excel
Balancing coefficients	Export to Excel		Balancing Matrix	Export to Excel

Starting, Target sums adjusted to starting overall total, and Balancing Matrix:



Advanced Analytics | Google Charts

oureports.net/OUReports/AdvancedAnalytics.aspx

Small Business Ban... CHASE Bank - Credit... Login TRVACACHE SQL MySQL - MySQL 8... Google Calendar... Online User Report... Help Desk at Run... Google Earth Settings - Passwords HTML Tutorial Analytics | Realtime... Help Desk Other bookmarks

Balancing for sum of rows and columns of the starting matrix for sum values of field: TotalProfit: **Balanced, precision: 0.93344, steps: 241**

Starting Matrix of Sum of TotalProfit											Target Matrix of proportional to requested sums by rows and columns of TotalProfit												
Item Type	Sum of Sum of TotalProfit by Item Type	Asia	Australia and Oceania	Central America and the Caribbean	Europe	Middle East and North Africa	North America	Sub-Saharan Africa				Item Type	Sum of Sum of TotalProfit by Item Type	Asia	Australia and Oceania	Central America and the Caribbean	Europe	Middle East and North Africa	North America	Sub-Saharan Africa			
Baby Food	388644	0	0	0	2117260	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Beverages	889947.52	0	293507	127723	153217.41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cereal	229243.03	0	88418.4	244405	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clothes	533332.75	0	1042334	727423	403773	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cosmetics	14556046	0	320780	167850	296448	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fruits	126495.26	0	16103.5	16279.87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Household	147266.88	0	300216	0	1487080	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Meat	610610	0	0	337938	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Office Supplies	592980	0	1475397	369155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Personal Care	1220521.79	0	32819	0	60610	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Snacks	751944	0	0	0	122506	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vegetables	165819.33	0	243428.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total: 44168190.36	Sum of Sum of TotalProfit by Region:	7300336.63	3485661.27	2846906	11082939.87	5761191.39	1457946	12183209.2				Sum of Sum of TotalProfit by Region:	1577435.37	3154870.74	4732306.11	6309741.48	7887176.85	9464612.22	11042047.5				

Balancing coefficients														Balancing Matrix of Sum of TotalProfit							
Steps	k1	k2	k3	k4	k5	k6	k7	k8	k9	k10	k11	k12	h1	h2	h3	h4	h5	h6	h7	Precision	
1	0.247052	1.6245	1.25653	0.73389	0.06596	1.53719	0.3886	0.28996	0.80965	4.71978	0.53849	6.06834	0.29085	0.77479	1.41821	1.47511	4.20536	0.00894	0.47484	34028964	95509
2	1.040481	1.3387	0.8546	0.68927	0.59431	1.517	0.71017	1.5613	1.10236	0.5481	1.59213	2.23539	0.81564	0.78307	0.92841	1.18911	2.54249	1.71129	0.69121	12386804	83441
3	0.944181	0.9803	0.9522	0.89442	0.85776	1.0782	0.74021	1.2718	0.9751	0.837	1.24637	1.3912	0.8765	0.82444	0.94759	1.05935	1.06761	1.4226	0.81211	142297	1365
4	0.96621	0.6745	0.96671	0.97240	0.95291	1.02742	0.99007	0.74759	1.14433	1.20192	0.90953	0.86178	0.94805	1.02162	1.01088	1.32049	0.87351	0.50393	30362		
5	0.99631	0.6347	1.01946	1.06477	0.99391	1.03455	0.89041	1.5551	1.00717	0.78731	1.09823	1.12683	0.93036	0.89074	0.95386	0.99870	0.80709	2.9545	0.90848	399429	95035
6	1.00884	0.4816	1.02913	1.02021	1.01347	1.03809	0.82944	1.11593	1.01635	0.81413	1.07308	1.0897	0.94341	0.91232	0.95426	0.80759	0.97581	2.2111	0.92923	3427478	1445
7	1.01621	0.4162	1.0336	1.02781	1.02367	1.03935	0.84457	1.0999	1.02486	0.833	1.05005	1.06894	0.91840	0.92165	0.96360	0.90660	0.97333	1.9491	0.94237	307039	68336
8	1.02228	0.3841	1.0354	1.03157	1.02881	1.03931	0.86177	1.0723	1.02837	0.84759	1.04854	1.05633	0.95710	0.93969	0.9666	0.97670	0.96784	1.7599	0.95105	282267	31236
9	1.02811	0.3265	1.0376	1.03321	1.03136	1.03853	0.86527	1.06015	1.03009	0.85858	1.04226	1.04819	0.96149	0.94011	0.96077	0.97460	0.96961	1.61719	0.967	263693	60913
10	1.02711	0.3147	1.03836	1.03349	1.03231	1.0374	0.87266	1.0516	1.03074	0.87221	1.03789	1.04266	0.96430	0.95429	0.97035	0.97389	0.96897	1.5081	0.9612	240052	2372
11	1.02791	0.3106	1.03468	1.03321	1.03241	1.03491	0.87481	1.04549	1.03078	0.87416	1.03407	1.03876	0.96644	0.95886	0.97152	0.97120	0.96744	1.4472	0.96402	35415	54864
12	1.02711	0.3142	1.03363	1.03261	1.03207	1.03482	0.88361	1.04103	1.03049	0.8758	1.03279	1.03591	0.96822	0.96220	0.9724	0.97301	0.96814	1.3511	0.96642	225170	12037
13	1.02814	0.3039	1.03265	1.03188	1.0315	1.03358	0.88742	1.03772	1.03002	0.88447	1.03117	1.03377	0.96953	0.96489	0.97308	0.97311	0.96892	1.2939	0.96828	168621	6214
14	1.02793	0.2992	1.03169	1.03082	1.03024	1.03244	0.89803	1.03521	1.02949	0.88035	1.02993	1.03212	0.9706	0.9669	0.97361	0.97331	0.96972	1.2465	0.96942	209791	40359
15	1.02784	0.2878	1.03079	1.03031	1.03012	1.0314	0.89321	1.03338	1.02894	0.89121	1.02897	1.03083	0.97145	0.96849	0.97405	0.97357	0.97041	1.2069	0.97072	2036479	80719
16	1.02721	0.2815	1.02997	1.02951	1.02945	1.03048	0.89618	1.03176	1.02841	0.89439	1.02822	1.02979	0.97210	0.96970	0.9744	0.97385	0.97191	1.1734	0.9716	1987969	70915
17	1.02699	0.276	1.02924	1.02893	1.02882	1.02966	0.89828	1.03055	1.0279	0.89675	1.02758	1.02894	0.97279	0.97078	0.9747	0.97413	0.97184	1.1451	0.97232	1944831	43255
18	1.02667	0.2713	1.02858	1.02833	1.02825	1.02894	0.9001	1.02967	1.02746	0.89878	1.02767	1.02823	0.9713	0.971629	0.97466	0.9744	0.97421	1.1208	0.97291	1807791	30271
19	1.02636	0.2673	1.02801	1.0278	1.02773	1.02831	0.90166	1.02876	1.02703	0.90052	1.02664	1.02764	0.97374	0.97320	0.97570	0.97465	0.97293	1.11	0.97342	1875839	44148

## 1b Scenario:

## Parameters and Starting Matrix with manually entered target proportional values:

Advanced Analytics | Advanced Analytics

oureports.net/OUReports/AdvancedAnalytics.aspx

Small Business Ban... CHASE Bank - Credit... Login TRVACACHE SQL MySQL - MySQL 8... Google Calendar... Online User Report... Help Desk at Run... Google Earth Settings - Passwords HTML Tutorial Analytics | Realtime... Help Desk Other bookmarks

Sample Sales Records by year - Advanced Analytics - Matrix Balancing

Select Scenario: 1b: Starting Matrix of rows by matrix group field and selected multiple columns to balance by manually entered sums by rows and sums by columns | Steps: 100 | Precision: 1 | Partial rows/columns: 0.0 | adjust by start matrix

To: Starting Matrix of rows by group field for rows and selected columns from the multiple fields to balance by manually entered sums by rows and sums by columns

Enter: Matrix rows by: Item Type

Enter sums by rows: 11.22,33.44,11.22,33.44,55.66,77.88

Enter sums by columns: 11.22,33.44,55.66

Multiple fields: select all fields unselect all fields

Units Sold UnitPrice UnitCost TotalRevenue TotalCost TotalProfit

(1b) Balancing matrix of rows and multiple columns for given above sums by rows and by columns

Balancing for sum of rows and columns of the starting matrix of rows and multiple selected columns: **Balanced, precision: 0.42503, steps: 8**

Starting Matrix											Target Matrix						
Item Type	Sum of row Item Type	Units Sold	UnitPrice	UnitCost	TotalRevenue	TotalCost	TotalProfit	Item Type	Sum by Item Type	Units Sold	UnitPrice	UnitCost	TotalRevenue	TotalCost	TotalProfit		
Baby Food	284417.7	5559	255.28	159.42	141910	86216	532886	Baby Food	672645.3	8237.42	88243.84	72844.82	138721.44	159082.63	244715.75		
Cereal	3578053.81	8656	205.7	117.11	1780540	1013700	766835	Cereal	1345290.61	23748.7	84184.15	88109.56	29376.17	300442.28	581429.75		
Office Supplies	263388.17	2021	651.21	524.96	1316100	100590	251151	Office Supplies	2017935.91	8450.86	30969.95	601959.34	323742.57	479241.4	294652.28		
Fruits	123225.45	8267	9.33	6.92	58471.1	43367.6	15103.8	Fruits	2695981.83	3171.97	8284.14	6528.13	14673.22	202589.21	170027.66		
Household	717970.81	5367	668.27	502.54	3586600	269730	89473	Household	672645.3	10422.9	23471.39	41888.3	53336.79	60337.41	36034.42		
Vegetables	459287.99	1485	154.06	90.93	228779	136311	93748	Vegetables	1345290.61	24077.8	32656.9	18948.08	200456.32	356034.72			
Personal Care	94879.4	3187	81.73	56.67	471337	32618	144521	Personal Care	2017935.91	1123.54	140422.9	23471.39	41888.3	53336.79	60337.41		
Clothes	195114.32	888	109.28	35.84	97040.6	31825.9	65214.7	Clothes	2695981.83	4646.16	62673.76	39273.25	183862.24	96378.97			
Cosmetics	692510.53	7910	437.2	263.33	3485250	200290	1375310	Cosmetics	1363226.52	12329.04	42968.24	585616.2	521757.87	351928.65			
Beverages	782928.24	8156	47.45	31.79	367002	259278	127723	Beverages	403381.83	18948.08	200456.32	356034.72					
Meat	492795.98	4187	421.89	364.68	2011150	173400	27872	Meat	470857.13								
Snacks	1258913.02	8085	152.58	97.44	632889	358042	225247	Snacks	5381162.44								
Total: 30941684.02	Sum by columns:	60928	3193.98	2251.64	15437658.7	10673767.547638842		Total: 30941684.02	Sum by columns:	1473413.52	2946827.05	4420024.57	5893654.1	7367067.62	8840481.15		

Balancing coefficients														Balancing Matrix								
Steps	k1	k2	k3	k4	k5	k6	k7	k8	k9	k10	k11	k12	h1	h2	h3	h4	h5	h6	h7	Precision		
1	0.2365	0.376830	0.76571	21.834620	0.939992	9.29802	1.273213	7.89777	48.6666	1.69381	1.68994	3.0179	0.13189	6.34	0.7215	1.636	8.3110	3.0440	720351	72685	2862566	80996
2	1.119771	1.46680	0.78630																			

# Target values adjusted to grand total of starting matrix, and Balancing Coefficients and balancing Matrix:

Advanced Analytics | oureports.net/OURports/AdvancedAnalytics.aspx

Enter sums by columns: 11,22,33,44,55,66

Multiple fields:  select all fields  unselect all fields  
 UnitsSold UnitPrice UnitCost TotalRevenue TotalCost TotalProfit

(1b) Balancing matrix of rows and multiple columns for given above sums by rows and by columns

Balancing for sum of rows and columns of the starting matrix of rows and multiple selected columns:  
 Balanced, precision: 0.42503, steps: 8

Starting Matrix								Target Matrix								
Item Type	Sum of row	Item Type	Units Sold	UnitPrice	UnitCost	TotalRevenue	TotalCost	TotalProfit	Item Type	Sum by Item Type	Units Sold	UnitPrice	UnitCost	TotalRevenue	TotalCost	TotalProfit
Baby Food	2844175.7	2550	20520	189.42	1491908	968276	522886		Baby Food	672645.3						
Cereal	3578053.81	8656	205.7	117.11	1780540	1013700	766835		Cereal	1345290.61						
Office Supplies	2633388.17	2021	651.21	524.96	1316100	1000940	256151		Office Supplies	2017935.91						
Fruits	123225.45	8287	9.33	6.92	58471.1	43307.6	15103.8		Fruits	2690581.22						
Household	7178740.81	5367	668.27	502.54	3856600	2697130	885473		Household	672645.3						
Vegetables	458287.99	1485	154.06	90.93	228779	135031	93748		Vegetables	1345290.61						
Personal Care	948579.4	5767	81.73	56.67	471337	326816	144521		Personal Care	2017935.91						
Clothes	185114.32	369	109.20	35.84	97048.6	31825.9	58144.3		Clothes	2690581.22						
Cosmetics	6925110.53	7910	437.2	263.33	3485250	2032540	1375310		Cosmetics	3363226.52						
Beverages	782239.24	8156	47.45	31.79	387002	259279	127723		Beverages	4035871.83						
Meat	4027855.58	4767	421.89	364.69	2811158	1738400	276762		Meat	4708517.13						
Snacks	1258913.02	4686	152.58	97.44	623289	398940	226349		Snacks	5381162.44						
<b>Total:</b>	<b>30941684.02</b>	<b>Sum by columns:</b>	<b>60928</b>	<b>3193.98</b>	<b>2251.64</b>	<b>15437658.7</b>	<b>10673767.5</b>	<b>4763884.2</b>	<b>Total:</b>	<b>Sum by columns:</b>	<b>1473413.52</b>	<b>2946827.05</b>	<b>4420240.57</b>	<b>5893654.1</b>	<b>7367067.62</b>	<b>8840481.15</b>

Balancing coefficients																	Balancing Matrix															
Steps	k1	k2	k3	k4	k5	k6	k7	k8	k9	k10	k11	k12	k13	k14	k5	k6	Precision	Item Type	Sum of row	Units Sold	UnitPrice	UnitCost	TotalRevenue	TotalCost	TotalProfit							
1	0.2365	0.376830	0.76571	21.834620	0.93692	9.298082	1.273213	7.89770	0.485665	1.59381	1.68994	3.81179	6.10376	6.34872	15.1636	8.3110	0.384040	7.20351	1.72885	2462566	88096											
2	1.11077	1.146950	0.879830	0.9109	1.170130	7.62011	1.21450	6.3706	1.161861	1.37151	1.08361	1.0456	1.03109	1.11851	1.05001	0.965690	0.946391	0.06669	1.253523	90611												
3	1.052081	1.008750	0.878	0.9845	1.008	0.8002	1.006260	0.96959	1.00917	1.00863	1.00832	1.00062	0.9994	1.00695	1.00339	0.997540	0.996961	0.000370	1.0971	33058												
4	1.000291	1.000570	0.98959	1.00052	1.000340	0.98665	1.000380	0.98608	1.000551	1.000641	0.00280	0.99999	0.99962	1.00047	1.00027	0.999880	0.999830	0.999995	1.040	0.6764												
5	1.000011	1.000030	0.99991	1.00012	1.000010	0.9999	1.000020	0.99987	1.000031	1.000051	0.99999	0.99999	0.99993	1.00004	1.00002	0.999990	0.999991	0.429	7.9853													
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	45	64029												
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5	60776												
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	74528												
<b>Result:</b>	<b>0.264160</b>	<b>0.436150</b>	<b>0.66474</b>	<b>19.871440</b>	<b>1.10552</b>	<b>1.846</b>	<b>2.40158</b>	<b>8.50109</b>	<b>0.56977</b>	<b>5.92176</b>	<b>1.40113</b>	<b>4.50065</b>	<b>6.29052</b>	<b>7.1541081</b>	<b>17.2501550</b>	<b>3.7005</b>	<b>6.79541</b>	<b>1.73844</b>	<b>0.42503</b>													

Balancing Matrix																
Item Type	Sum of row	Units Sold	UnitPrice	UnitCost	TotalRevenue	TotalCost	TotalProfit									
Baby Food	672645.31	8237.42	80243.84	72644.82	138721.44	159082.63	244715.35									
Cereal	1345290.61	23748.7	64184.15	88109.56	287376.17	300442.28	581429.75									
Office Supplies	2017935.95	8450.86	309609.5	601959.34	323742.57	479241.4	254852.28									
Fruits	2690581.05	783390.7	132639	237209.04	429968.24	586616.2	521757.87									
Household	672645.31	3731.97	52848.14	95826.13	188712.2	202599.21	170927.66									
Vegetables	1345290.63	30487.21	240778.7	342685.9	184948.08	200456.32	366034.42									
Personal Care	2017935.91	87123.64	140422.9	234771.38	418083.7	533956.79	603777.61									
Clothes	2690581.22	47488.73	664616.06	525573.78	382793.51	183892.24	963788.97									
Cosmetics	3363226.54	80350.27	178209.09	258013.06	729144.38	806486.81	1362241.33									
Beverages	4035871.78	303819.75	201023.07	324739.96	64063.53	1043362.22	1314883.26									
Meat	4708517.19	42015.35	422898.41	801440.74	1042758.42	1655242.1	664165.15									
Snacks	5381162.47	816651.81	491276.38	756446.3	7530681.85	2817349.42	1782337.51									
<b>Total:</b>	<b>Sum by columns:</b>	<b>1473413.51</b>	<b>2946827.04</b>	<b>4420240.59</b>	<b>5893654.1</b>	<b>7367067.62</b>	<b>8840481.15</b>									

2a Scenario:  
Parameters, Starting, and Target matrix:





## 2b Scenario: Parameters, Starting, and Target matrix:

## 2c Scenario: Parameters, Starting Matrix, and Balancing Coefficients:

It balanced by 10000 steps with Precision equal 203 for 2016 and 248 for 2017:

It balanced by 100000 steps with Precision = 1:

Advanced Analytics | Google Charts | oureports.net/OUReports/AdvancedAnalytics.aspx

Recalculate Analytics | Correlation | Data and Statistics | Report and Charts | List of User Dashboards | Analytics | Matrix: Balancing Help | OUReports Help | Log off

### Sample Sales Records by year - Advanced Analytics - Matrix Balancing

Select Scenario: 2b: Balancing matrix of aggregated field1 for iterations of starting and target values of the field2

Steps: 1000 | Precision: 1 | Partial rows/columns: 0.0 | adjust by start matrix

2b: The starting value of field2 to get the Starting matrix of field1 values and target value of field2 to get Target matrix

Enter:

Matrix rows by: Region | columns by: Item Type

Matrix items by field1: TotalProfit | aggregation function: Sum

Iterations by the field2: OrderYear | starting value: 2010 | and target value: 2017

(2b) Balancing matrix of aggregated field1 for iterations of starting and target values of the field2

(2c) Balancing coefficients for matrix of field1 values and all iterations between starting and target of the field2 values

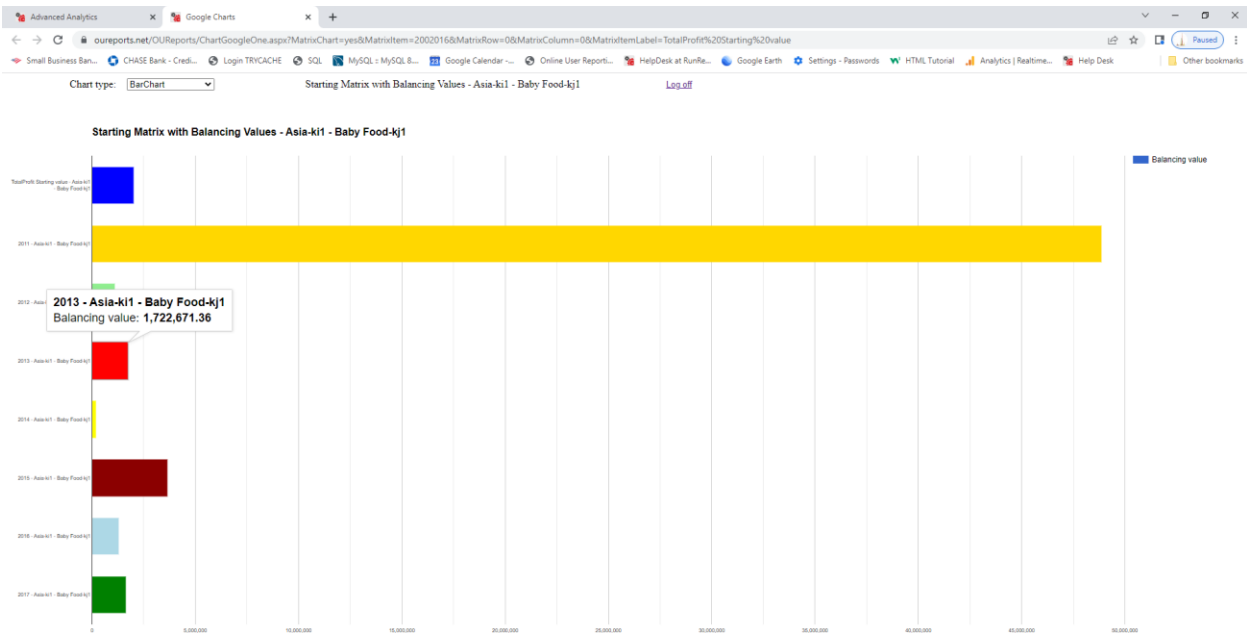
**Starting Matrix of Sum of TotalProfit where OrderYear=2010\*** | Export to Excel

Region	Sum of Sum of TotalProfit by Region	Baby Food	Beverages	Cereal	Clothes	Cosmetics	Fruits	Household	Meat	Office Supplies	Personal Care	Snacks	Vegetables
Asia	2602016	2002235	0	0	0	0	0	0	0	0	0	0	0
Australia and Oceania	1953921	1226488	0	0	727423	0	0	0	0	0	0	0	0
Central America and the Caribbean	0	0	0	0	0	0	0	0	0	0	0	0	0
Europe	8006991.38	0	0	0	865418	5233492	0	0	0	1774188	133895.38	0	0
Middle East and North Africa	5134100	0	0	0	1028150	4152440	0	0	0	0	0	0	0
North America	0	0	0	0	0	0	0	0	0	0	0	0	0
Saharan Africa	75112.5	0	0	0	0	0	75112.5	0	0	0	0	0	0
<b>Total: 17102140.88</b>	<b>Sum of Sum of TotalProfit by ItemType: 3238514</b>	<b>0</b>	<b>2620999</b>	<b>5339432</b>	<b>75112.5</b>	<b>0</b>	<b>1774188</b>	<b>133895.38</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Balancing coefficients** | Export to Excel

Step	k1	k2	k3	k4	k5	k6	k7	k8	k9	k10	k11	k12	Precision							
2011	24403.165	0	12003.46145	0	1E-05	0	613960.91522	0	1700.36667	0	7979.40526	0	8284.35757	0	2540.83245	982.92305	0.56935			
2012	0.01607	0.0054	1102394.46824	0.32178	0.06924	1355575.16587	36902589.52084	34.66644	0	35.85867	5.07041	1.96522	0	53.07385	6.473	5.04215	7.34555	0	19.58329	0.87677
2013	0.36873	0.70175	11485445.05008	0.02998	0.10306	0.00399	172296984.10619	2.3336	0	2.95319	0	12.20802	0	0	9.07421	3.0072	0	0	0	0.91811
2014	0.00183	0.00376	0.00951	0.13083	0	709270.6729	32646731.62959	85.61212	16.10878	58.86244	18.77151	4.0489	0	41.56776	0	9.39374	0	0	0	0.92275
2015	3.24498	2.35992	0	7.82323	0.1796	92.34767	594.1504	0.56124	637861.63810	0.16482	0.15335	0.00032	3438083.06504	0	0.03197	0.92165	0	0	0	0.98896
2016	2172.20154	0	21836540.58023	0.15669	0.1061	0.00465	194410883.10635	0.0003	0.75866	8.03868	0.79567	5.55387	0	0	4.44415	0.60426	0.60741	5.00831	0	0.99996
2017	11118.44007	0	39927619.92476	0.46364	0	0.00185	73258308.92349	0.00073	0	22.81477	0	3.23417	0	20.62313	3.78101	0	5.89642	0.72563	0	0.99996

Clicking on the link in the starting matrix cell for Asia & Baby Food, we open the chart showing the profit of Baby Food sales in Asia by year:



3a Scenario:  
Parameters, Starting Matrix and Balancing Coefficients:

Advanced Analytics | Google Charts | Google Charts | +

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### Online User Reporting

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Sample Sales Records by year - Advanced Analytics - Matrix Balancing

Select Scenario: 3a. Balancing coefficients for matrix of aggregated field1 values and for iterations of multiple selected aggregated fields Steps: 8000 Precision: 1 Partial rows/columns: 0.0 adjust by start matrix

Enter: 3a: Get balancing coefficients for Starting Matrix of aggregated values of field1 and multiple Target Matrix of aggregated selected fields

Matrix rows by: ItemType columns by: Region

Matrix items by field: OrderID aggregation function: Count

Multiple fields:  Select all fields  Unselect all fields

TotalRevenue, TotalCost, TotalProfit aggregation function: Sum

(3a) Balancing coefficients for matrix of aggregated field1 values and for multiple selected aggregated fields

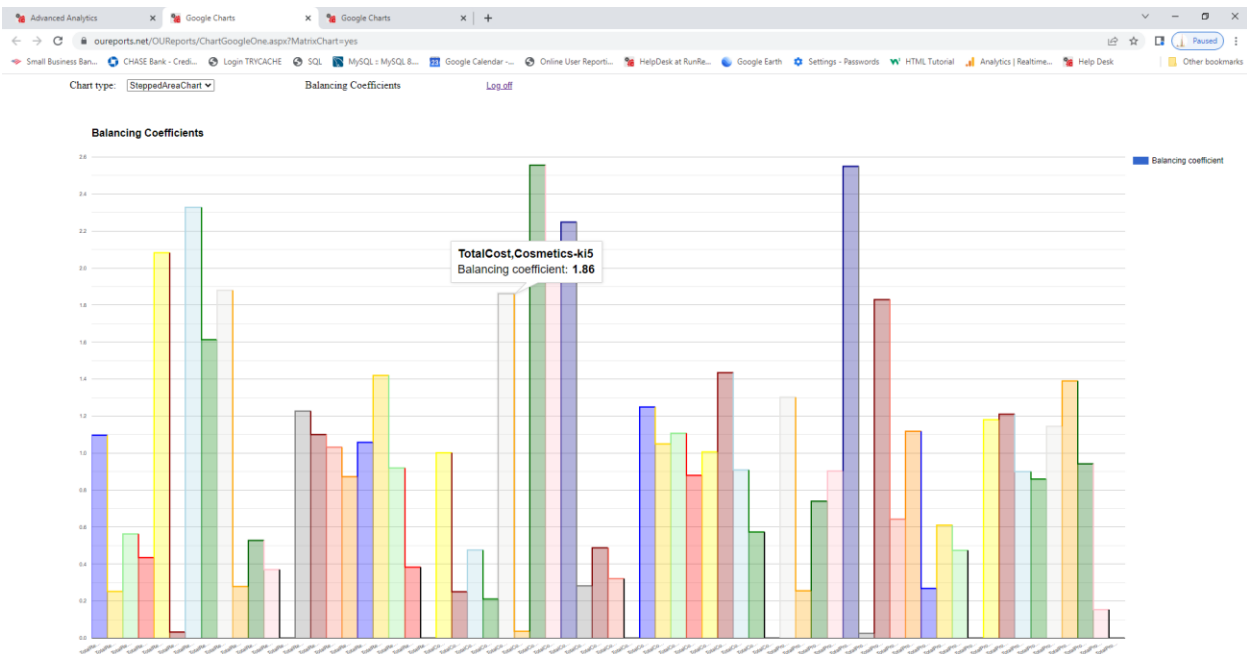
Done!

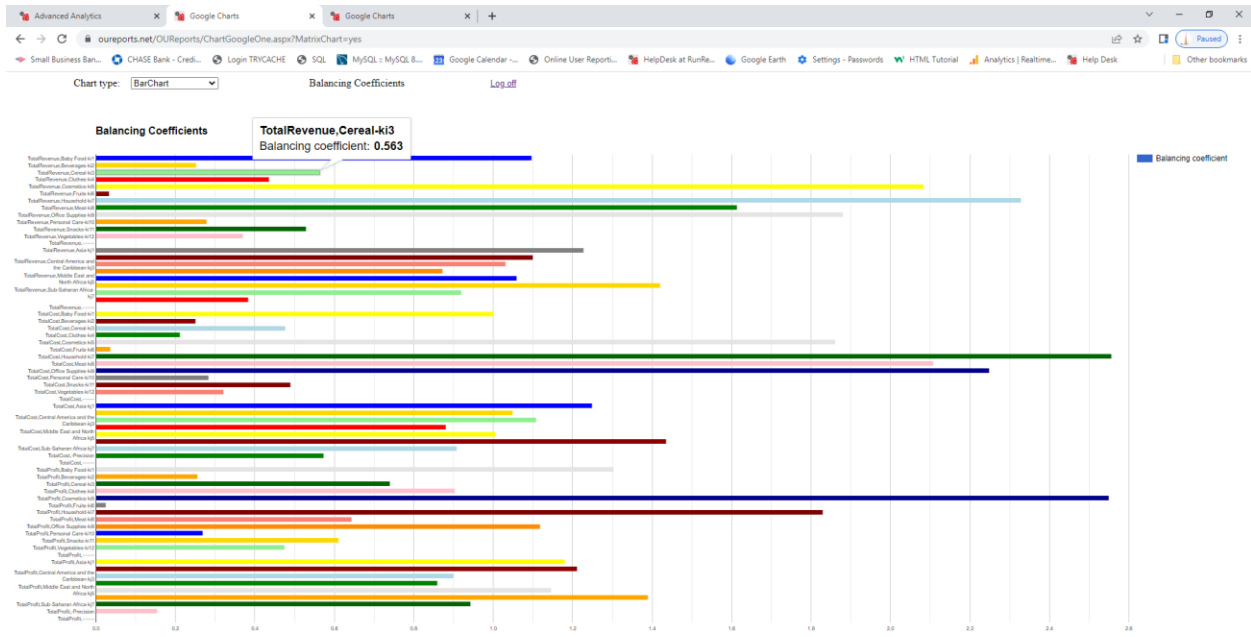
#### Starting Matrix of Count of OrderID

Item Type	Sum of Count of OrderID by Item Type	Asia	Australia and Oceania	Central America and the Caribbean	Europe	Middle East and North Africa	North America	Sub-Saharan Africa
Baby Food	7	2	0	0	0	0	0	1
Beverages	8	0	2	0	0	0	0	3
Cereal	7	0	1	1	1	0	1	4
Clothes	13	2	1	1	1	3	2	4
Cosmetics	13	1	1	1	1	5	3	2
Fruits	10	1	2	0	0	0	3	4
Household	9	2	0	1	1	2	0	3
Meat	2	0	1	0	0	0	0	1
Office Supplies	12	2	1	0	3	1	0	5
Personal Care	10	1	0	1	1	2	0	4
Snacks	3	0	0	1	0	0	0	2
Vegetables	6	0	0	0	1	0	0	3
Total: 100	Sum of Count of OrderID by Region:	13	9	7	22	10	3	36

#### Balancing coefficients

Steps	k1	k2	k3	k4	k5	k6	k7	k8	k9	k10	k11	k12	k13	k14	k15	k16	k17	Precision		
TotalRevenue	1.09667	0.26258	0.56291	0.43522	0.62510	0.03280	2.3286	1.61326	1.87973	0.27842	0.52804	0.37000	1.2273	1.10003	1.03144	0.8728	1.05653	1.4197	0.91926	0.38355
TotalCost	1.00174	0.25628	0.47819	0.21113	1.86908	0.03676	2.55592	1.66752	2.48194	0.23274	0.48856	0.3212	1.24672	1.04947	1.05950	0.8797	1.00612	1.43491	0.90893	0.57332
TotalProfit	1.30165	0.25582	0.73985	0.50364	2.54963	0.02529	1.82952	0.64332	1.11831	0.26847	0.61081	0.47376	1.18032	1.21014	0.90067	0.85922	1.14465	1.38984	0.94195	0.1538





3b Scenario:  
Parameters:

The screenshot shows the 'Online User Reporting' interface. The main content area is titled 'Sample Sales Records by year - Advanced Analytics - Matrix Balancing'. The configuration includes:

- Select Scenario:** 3c: Balancing coefficients for matrix of rows and multiple cols for iterations between start and target of field2 values
- Steps:** 100
- Precision:** 1
- Partial rows/columns:** 0,0
- adjust by start matrix:**
- 3c: Get balancing coefficients for Starting Matrix as rows by matrix group field for rows and columns from selected multiple fields, for all iterations between starting and target of the field2 values**
- Enter:**
  - Matrix rows by: **ItemType**
  - Iterations by the field2: **OrderYear** starting value: **2010** and target value: **2017**
  - Multiple fields:  select all fields  unselect all fields
  - UnitsSold,UnitPrice,UnitCost,TotalRevenue,TotalCost,TotalPr

Starting, Target, and Balancing Matrices:

Advanced Analytics

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UnitsSold UnitPrice UnitCost TotalRevenue TotalCost TotalPr...

(3b) Balancing matrix of rows and multiple columns for iterations of starting and target values of the field2

(3c) Balancing coefficients for matrix of rows and multiple cols for iterations between start and target of field2 values

Balancing for sum of rows and columns of the starting matrix and sums of rows and columns of the target matrix.  
**Balanced, precision: 0.10443, steps: 7, maximum difference of cells in balancing and target matrix = 668573.19, maximum difference of cells in balancing and starting matrix = 5396580.00**

Starting Matrix for OrderYear=2010								Target Matrix for OrderYear=2017							
ItemType	Sum of row	Units Sold	UnitPrice	UnitCost	TotalRevenue	TotalCost	TotalProfit	ItemType	Sum of row	Units Sold	UnitPrice	UnitCost	TotalRevenue	TotalCost	TotalProfit
Clothes	1342973.12	8116	109.28	35.84	868356	219197	449159	Clothes	1814370.12	8263	109.28	35.84	902981	296146	606835
Household	5123946.81	3830	668.27	502.54	2559478	1842730	634748	Household	12004254.81	8974	668.27	502.54	5997050	4509790	1487260
Cosmetics	6925110.53	7910	437.2	263.33	3452250	2092940	1375310	Cosmetics	1589551.53	8015	437.2	263.33	793518	477944	315574
Snacks	0	0	0	0	0	0	0	Snacks	2243481.02	7327	152.58	97.41	1117950	713943	404011
Personal Care	45035.98	273	81.73	56.67	22312.3	15470.9	6841.38	Personal Care	495985.3	8015	81.73	56.67	246416	170660	75555.9
Meat	0	0	0	0	0	0	0	Meat	4027855.58	8167	421.89	304.69	2011160	1738480	272672
Cereal	0	0	0	0	0	0	0	Cereal	3570053.79	8656	265.7	117.11	1785540	1013700	776435
Beverages	0	0	0	0	0	0	0	Beverages	0	0	0	0	0	0	0
Office Supplies	0	0	0	0	0	0	0	Office Supplies	0	0	0	0	0	0	0
Vegetables	0	0	0	0	0	0	0	Vegetables	0	0	0	0	0	0	0
Baby Food	5077639.7	9925	255.28	159.42	2533650	1582240	951410	Baby Food	0	0	0	0	0	0	0
Fruits	114476.75	5822	9.33	6.92	54319.3	40280.7	14031	Fruits	0	0	0	0	0	0	0
Total: 29431796.06	Sum by columns:	42163	2212.3	1549.89	14692937.6	10215286.14477727.38		Total:	Sum by columns:	42817	2076.65	1437.62	12849615	8920862.99	3928742.9

Balancing coefficients

Steps	k1	k2	k3	k4	k5	k6	k7	k8	k9	k10	k11	k12	k1	k2	k3	k4	k5	Precision			
1	1.544452	4.878219	26.24	427.450376	66756.12	59994787	427212	21396	68020253	6424	1.143180	0	0	0.425760	0.01260	0.00880	1.34144	257510	95239	1164494	36562
2	0.839290	793380	80822	1.67633	0.80563	1.67633	1.67633	1.67633	78814	1.67633	0.80664	0.83534	0.60064	0.59705	0.59669	1.05210	0.99920	0.67633	1456023	59686	
3	1.006380	985180	9923	1.01942	0.98797	1.01942	1.01942	1.01942	98269	1.01942	0.99123	0.98609	0.9811	0.98097	0.98996	1.00216	1.00030	0.99239	70943	66579	
4	1.000420	999920	99997	1.00008	0.99943	1.00008	1.00008	1.00008	99916	1.00008	0.99910	0.99930	0.99913	0.99912	0.99912	1.00001	1.00002	0.99964	13347	19573	
5	1.000020	999970	99998	1.00004	0.99997	1.00004	1.00004	1.00004	99996	1.00004	0.99998	0.99997	0.99996	0.99996	0.99996	1	0.99998	157	1209		
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7.36882			
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.34547			
Result: 1.3051	2.091780	210377	31135301	84361	10.81356	1312650911	24584	1163456408	45773	1.955360	1.955360	0	0.81517	0.000740	0.00051	1.41457	1.25780	0.81972	0.10443		

Balancing Matrix							
ItemType	Sum of row	Units Sold	UnitPrice	UnitCost	TotalRevenue	TotalCost	TotalProfit
Clothes	1814370	808.89	0	0	1079354.71	314577.61	420331.79
Household	12004254.81	106.28	0	0	6624853.68	4427238.58	5892604.94
Cosmetics	1589551.53	32.07	0	0	902224.94	481846.02	207458.41
Snacks	2243481.02	9699.06	873.04	327.55	594722.7	803993.15	524265.5
Personal Care	495985.52	36.26	0	0	276469.98	170365.47	49122.8
Meat	4027855.58	17413.31	849.28	580.07	1624302.75	1443456.97	941245.19
Cereal	3570053.79	15434.13	752.75	521.23	1439686.23	1279396.19	834264.26
Beverages	0	0	0	0	0	0	0
Office Supplies	0	0	0	0	0	0	0
Vegetables	0	0	0	0	0	0	0
Baby Food	0	0	0	0	0	0	0
Fruits	0	0	0	0	0	0	0
Total:	Sum by columns:	42817	2075.07	1436.85	12849614.99	8920862.99	3928742.89

### 3c Scenario: Parameters:

Advanced Analytics

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## Online User Reporting

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 See Groups Statistics

### Sample Sales Records by year - Advanced Analytics - Matrix Balancing

Select Scenario: 3c: Balancing coefficients for matrix of rows and multiple cols for iterations between start and target of field2 values Steps: 100 Precision: 1 Partial rows/columns: 0,0 adjust by start matrix

3c: Get balancing coefficients for Starting Matrix as rows by matrix group field for rows and columns from selected multiple fields, for all iterations between starting and target of the field2 values

Enter:

Matrix rows by: **ItemType**  
 Iterations by the field2: **OrderYear** starting value: **2010** and target value: **2017**  
 Multiple fields:  select all fields  unselect all fields  
 UnitsSold,UnitPrice,UnitCost,TotalRevenue,TotalCost,TotalPr...

(3b) Balancing matrix of rows and multiple columns for iterations of starting and target values of the field2

(3c) Balancing coefficients for matrix of rows and multiple cols for iterations between start and target of field2 values

### Starting Matrix and Balancing Coefficients by year:



Online User Reporting

Sample Sales Records by Year - Advanced Analytics - Matrix Balancing

Select Scenario: 3c. Balancing coefficients for matrix of rows and multiple cols for iterations between start and target of field2 values

Get balancing coefficients for Starting Matrix as rows by matrix group field for rows and columns from selected multiple fields, for all iterations between starting and target of the field2 values

Matrix rows by: Item Type

Iterations by the field: OrderYear starting value: 2010 and target value: 2017

Multiple fields: Select all fields

UnitsSold,UnitPrice,UnitCost,TotalRevenue,TotalCost,TotalProfit

(3b) Balancing matrix of rows and multiple columns for iterations of starting and target values of the field2

(3c) Balancing coefficients for matrix of rows and multiple cols for iterations between start and target of field2 values

Done!

Item Type	Sum of row Item Type	Units Sold	Unit Price	Unit Cost	Total Revenue	Total Cost	Total Profit
Clothes	1342973.12	6116	109.28	35.84	668356	219197	449159
Household	9123946.81	3030	860.27	902.24	2558470	1924730	634740
Cosmetics	6925119.53	7919	432.2	263.33	3454250	249240	1375310
Snacks	0	0	0	0	0	0	0
Personal Care	45035.98	273	61.73	56.67	22312.3	15470.9	6841.38
Meat	0	0	0	0	0	0	0
Cereal	0	0	0	0	0	0	0
Beverages	0	0	0	0	0	0	0
Office Supplies	10802613.17	8287	551.21	524.96	3396580	4350340	1046230
Vegetables	0	0	0	0	0	0	0
Baby Food	9077639.7	9925	295.28	159.42	2633650	1582240	951410
Fruits	114476.75	5822	9.33	6.92	64319.3	46288.2	14031
Total: 29431796.06	Sum by columns:	42163	2212.3	1549.68	14692937.6	10215206.1447727.38	

Steps	k1	k2	k3	k4	k5	k6	k7	k8	k9	k10	k11	k12	k13	k14	k15	k16	Precision		
2011	0.246591	1.769150	0.703262	4.422761	0.0	0.3732	0.3732	439774364.401121	0.07210	648711101.53082	0	1.83277	0.02250	0.00101	0.0013	1.18708	1.69771	0.89122	0.45081
2012	1.07121	1.09044	0.87079	1.65622	10.55625	137791103.0737	241083958.11813	1.65622	0.18838	551034968.0296	0.68850	0.07359	0.02223	0.00125	0.00089	1.23773	1.17640	0.84575	0.76733
2013	0	0	1.69961	2.93057	12.54262	2.93057	137631426.34808	2.93057	0.36079	2.93057	0.76888	1.05665	0.26120	0.01092	0.01309	1.01348	1.00643	0.9086	0.07681
2014	1.12132	1.8324	0.92840	2.03937	10.25442	0.93937	924273454.79548	396071613.828510	2.16282	2.93937	0.66860	0.89327	0.04765	0.00217	0.0016	1.12280	1.03703	0.97050	0.91473
2015	1.66712	2.96020	4.98652	5.9625	29.23889	5.9625	2.59625	225275081.4406	0.48561	2.59625	0.17710	1.6621	0.1814	0.01369	0.00965	1.02146	1.01402	0.96544	0.09914
2016	2.22921	0	1.99816	5.59517	86.33945	23401.42636	32604393.60144	366993054.27606	0.27579	377104573.60766	0	0.04393	0.00303	0.00201	1.17146	1.08607	0.96891	0.46786	
2017	1.3051	2.09170	2.19377	3.11353	6.4361	10.81356	1312650911.24564	1163456408.457731	1.95536	0	0	0	0.01517	0.00074	0.00051	1.414571	1.25708	0.819270	1.0443

#### 4a Scenario: Balanced sums by each of 5 columns:

Multidimensional Balancing

Sample Sales Records by year - Multidimensional Balancing

Select Scenario: 4a. Starting Matrix of aggregated field1 to balance for sums of selected columns of the Target Matrix of the aggregated field2

Starting Matrix of aggregated field1 to balance for sums of selected columns of the Target Matrix of the aggregated field2

Balancing by: OrderYear,Region,Item Type,SalesChannel,OrderPriority

Matrix items by field1: TotalCost aggregation function: Sum

Iterations by the field: TotalProfit aggregation function: Sum

(4a) Balancing matrix of field1 for the sums by selected columns of the matrix of field2

Balancing for sum of fields: OrderYear,Region,Item Type,SalesChannel,OrderPriority of the starting matrix for sum values of the field1 TotalCost and the target matrix for sum values of the field2 TotalProfit. Balanced in 23 steps. Precision = 0.67 reached on the balancing by the sums of the SalesChannel field. Maximum precisions for selected fields: 19.83, 33.04, 53.77, 85.19, 130.75, maximum difference of cells in balancing and target sums = 5.14, maximum difference of cells in balancing and starting sums = 29253365.52, maximum difference of cells in starting and target sums = 29253365.2

OrderYear	Region	Item Type	SalesChannel	OrderPriority	Sum of field1	Sum of field2	
2010	Asia	Household	Offline	L	20769399.78		
2011	Australia and Oceania	Baby Food	Online	H	31857940.3		
2012	Europe	Clothes	C	C	12106729.8		
2013	East and North Africa	Cosmetics	M	M	23446501.54		
2014	Sub-Saharan Africa	Office Supplies					
2015	Central America and the Caribbean	Personal Care					
2016	North America	Fruits					
2017		Vegetables					
		Beverages					
		Snacks					
		Meat					
		Cereal					
Total:	93180571.4	Total:	93180571.4	Total:	93180571.4	Total:	93180571.4

OrderYear	Region	Item Type	SalesChannel	OrderPriority	Sum of field1	Sum of field2	
2010	Asia	Household	Offline	L	20769399.78		
2011	Australia and Oceania	Baby Food	Online	H	31857940.3		
2012	Europe	Clothes	C	C	12106729.8		
2013	East and North Africa	Cosmetics	M	M	23446501.54		
2014	Sub-Saharan Africa	Office Supplies					
2015	Central America and the Caribbean	Personal Care					
2016	North America	Fruits					
2017		Vegetables					
		Beverages					
		Snacks					
		Meat					
		Cereal					
Total:	44168190.26	Total:	44168190.26	Total:	44168190.26	Total:	44168190.26

OrderYear	Region	Item Type	SalesChannel	OrderPriority	StartValue	TargetValue	FinalCoeff	FinalPrecision	FinalValue
2010	Asia	Household	Offline	L	1924730	534745	0.69	0.67	634745.39
2010	Australia and Oceania	Baby Food	Online	H	1582240	951410	1.25	0.67	951409.73
2010	Australia and Oceania	Clothes	Offline	C	354995	727423	4.27	0.67	727423.62

OrderYear	Region	Item Type	SalesChannel	OrderPriority	Sum of field1	Sum of field2
2010	Asia	Household	Offline	L	24920715.08	
2011	Australia and Oceania	Baby Food	Online	H	16891582.96	
2012	Europe	Clothes	C	C	6748332.73	

OrderYear	Region	Item Type	SalesChannel	OrderPriority	StartValue	TargetValue	FinalCoeff	FinalPrecision	FinalDelta
2010	Asia	Household	Offline	L	1924730	634746	0.69	0.67	634746.39
2010	Australia and Oceania	Baby Food	Offline	H	1502240	951410	1.25	0.67	951409.73
2010	Australia and Oceania	Clothes	Offline	C	354995	727423	4.27	0.67	727423.62
2010	Europe	Clothes	Online	C	81321	166635	4.23	0.67	166635.62
2010	Europe	Cosmetics	Online	H	2022948	1375310	1.37	0.67	1375312.25
2010	Europe	Office Supplies	Offline	H	4350340	1046230	0.5	0.67	1046231.66
2010	Europe	Personal Care	Online	M	15470.9	6841.38	0.93	0.67	6841.36
2010	Middle East and North Africa	Clothes	Offline	H	219197	449159	4.28	0.67	449157.45
2010	Middle East and North Africa	Cosmetics	Online	M	1904930	1257780	1.38	0.67	1257777.41
2010	Sub-Saharan Africa	Fruits	Online	L	40288.2	14031	0.73	0.67	14031.07
2011	Asia	Fruits	Offline	L	43387.6	15103.5	0.74	0.67	15103.48
2011	Asia	Vegetables	Offline	C	239351	235601	1.45	0.67	235600.85
2011	Asia	Vegetables	Online	H	11275.3	7828.12	1.46	0.67	7828.08

#### 4b Scenario: Balanced sums by each of 3 columns:

**Sample Sales Records by year - Multidimensional Balancing**

Select Scenario: 4b. The starting value of field2 to get the Starting matrix of field1 values to balance for sums of selected columns of target matrix of field2. Balanced in 43 steps. Precision = 0.77 reached on the balancing by the sums of the Region field. Maximum precisions for selected fields: 1.68, 2.53, 3.8, maximum difference of cells in balancing and target sums = 1.24, maximum difference of cells in balancing and starting sums = 6987576.24, maximum difference of cells in starting and target sums = 6987576.24

OrderYear	Region	Item Type	SalesChannel	OrderPriority	StartValue	TargetValue	FinalCoeff	FinalPrecision	FinalDelta
2010	Asia	Household	Offline	L	1924730	634746	0.69	0.44	1369983.78
2010	Australia and Oceania	Baby Food	Offline	H	1502240	951410	1.25	0.71	363580.34
2010	Australia and Oceania	Clothes	Offline	C	354995	727423	4.27	0.71	370287.67
2010	Europe	Clothes	Online	C	81321	166635	4.23	0.71	85314.39
2010	Europe	Cosmetics	Online	H	2022948	1375310	1.37	0.71	687638.11
2010	Europe	Office Supplies	Offline	H	4350340	1046230	0.5	0.71	3304110.36
2010	Europe	Personal Care	Online	M	15470.9	6841.38	0.93	0.71	8629.52
2010	Middle East and North Africa	Clothes	Offline	H	219197	449159	4.28	0.72	170038.45
2010	Middle East and North Africa	Cosmetics	Online	M	1904930	1257780	1.38	0.72	647152.41
2010	Sub-Saharan Africa	Fruits	Online	L	40288.2	14031	0.73	0.72	26257.13
2011	Asia	Fruits	Offline	L	43387.6	15103.5	0.74	0.72	28284.12
2011	Asia	Vegetables	Offline	C	239351	235601	1.45	0.72	3750.49
2011	Asia	Vegetables	Online	H	11275.3	7828.12	1.46	0.72	3447.18



## Balanced sums by each of 4 columns:

Multidimensional Balancing

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Export Data to Delimited File  
Export Data to XML  
Show Report  
Show Report Graph  
Export Report to Excel  
Export Report to Word  
Export Report to PDF  
Show Analytics  
See Data Overall Statistics  
See Group Statistics  
Export Statistics to Excel  
See Field Conditions  
Matrix Balancing

Balancing by: OrderYear,Region,ItemType,SalesChannel

Matrix items by field1: TotalCost aggregation function: Sum  
Iterations by the field2: SalesChannel starting value: Offline and target value: Online

(4b) Balancing matrix for the sums by selected columns of aggregated field1 for iterations of starting and target values

Balancing for sum of fields OrderYear,Region,ItemType,SalesChannel of the starting matrix for sum values of the field1 TotalCost for SalesChannel=Offline and the target matrix for SalesChannel=Online :  
Balanced in 4 steps. Precision = 0.37 reached on the balancing by the sums of the SalesChannel field. Maximum precisions for selected fields: 11416235.35, 12460412.92, 9759263.89, 12870460.04 , maximum difference of cells in balancing and target sums = 7976760.51, maximum difference of cells in balancing and starting sums = 54174080.6, maximum difference of cells in starting and target sums = 54174080.36

Starting Sums of TotalCost where SalesChannel=Offline							Target Sums of TotalCost where SalesChannel=Online								
OrderYear	Sums by OrderYear	Region	Sums by Region	ItemType	Sums by ItemType	SalesChannel	Sums by SalesChannel	OrderYear	Sums by OrderYear	Region	Sums by Region	ItemType	Sums by ItemType	SalesChannel	Sums by SalesChannel
2010	8431502	Asia	8561810.6	Household	22335390	Offline	64174080.6	2010	4124950.1	Asia	6671432.3	Household	141716	Offline	0.04
2010	4841601.6	Australia and Oceania	2315580	Baby Food	3541696	Offline	0	2011	3546564.5	Australia and Oceania	7056521.2	Baby Food	2621982	Offline	39006490.76
2012	11577042	Europe	12547534	Clothes	1464815	Offline	0	2012	11108582.54	Europe	9738955.2	Clothes	1089142.2	Offline	0
2013	7142259	Middle East and North Africa	2824057	Cosmetics	10993768	Offline	0	2013	6471776.5	Middle East and North Africa	5467455.7	Cosmetics	11051704	Offline	0
2014	8384256	Sub-Saharan Africa	17960987	Office Supplies	10918645	Offline	0	2014	2366498	Sub-Saharan Africa	9527846.41	Office Supplies	13737149.99	Offline	0
2015	6002220	Central America and the Caribbean	5778293	Personal Care	2286636	Offline	0	2015	2429225.16	Central America and the Caribbean	5451800	Personal Care	473647.9	Offline	0
2016	2921212	North America	4185411	Fruits	96215.6	Offline	0	2016	4547821	North America	0	Fruits	249770.4	Offline	0
2017	4872988			Vegetables	474382	Offline	0	2017	4411073			Vegetables	1348855.3	Offline	0
				Beverages	1322002	Offline	0					Beverages	480664	Offline	0
				Snacks	0	Offline	0					Snacks	1328789	Offline	0
				Meat	0	Offline	0					Meat	3893070	Offline	0
				Cereal	480451	Offline	0					Cereal	2590000	Offline	0
Total:	54174080.6	Total:	54174080.6	Total:	54174080.6	Total:	54174080.6	Total:	39006490.8	Total:	39006490.81	Total:	39006490.79	Total:	39006490.8

Starting Values of Sum of TotalCost and final Balancing Coefficients, Precisions, and Values							Balancing Sums of TotalCost									
OrderYear	Region	ItemType	SalesChannel	StartValue	TargetValue	FinalCoeff	FinalPrecision	FinalValue	OrderYear	Sums by OrderYear	Region	Sums by Region	ItemType	Sums by ItemType	SalesChannel	Sums by SalesChannel
2010	Asia	Household	Offline	1924730	0	0	0.37	0	2010	11742932.17	Asia	12449700.71	Household	141716.01	Offline	0.3
2010	Australia and Oceania	Baby Food	Offline	1652240	0	0	0.37	0	2011	1188930.41	Australia and Oceania	5269835.24	Baby Food	2621982	Offline	39006490.5
2010	Europe	Clothes	Offline	354995	0	0	0.37	0	2012	3131822.03	Europe	9731395.69	Clothes	1089142.2	Offline	0
2010	Europe	Cosmetics	Offline	2082949	49563394.52	0.36	0.9966732	4859667.32	2013	13974378.46	Middle East and North Africa	78563375.15	Cosmetics	11051704	Offline	0
2010	Europe	Office Supplies	Offline	4350340	0	0	0.37	0	2014	2840345.2	Sub-Saharan Africa	3881665.05	Office Supplies	13737149.99	Offline	0
2010	Europe	Personal Care	Offline	15470.9	424340170.95	0.36	0.7353565	473535.65	2015	3733897.53	Central America and the Caribbean	175518.77	Personal Care	473647.91	Offline	0
2010	Middle East and North Africa	Clothes	Offline	219197	0	0	0.37	0	2016	177983.15	North America	0.01	Fruits	249770.4	Offline	0
2010	Middle East and North Africa	Cosmetics	Offline	1504930	5539175237.26	0.36	0.7614743	5076147.43	2017	2216190.85			Vegetables	1348855.3	Offline	0
2010	Sub-Saharan Africa	Fruits	Offline	40288.2	8502342.28	0.36	1.453781	8502342.28				Beverages	480664	Offline	0	
2011	Asia	Vegetables	Offline	43367.6	0	0	0.37	0				Snacks	1328789	Offline	0	
2011	Asia	Vegetables	Offline	339351	0	0	0.37	0				Meat	3893070	Offline	0	
2011	Asia	Vegetables	Offline	0	11275.3	0.10339465	0.36	855669.54				Cereal	2590000	Offline	0	
Total:									Total:	39006490.8	Total:	39006490.81	Total:	39006490.79	Total:	39006490.8

## Not balanced by 4 columns (ItemType values has zeros):

Multidimensional Balancing

oureports.net/OUReports/MultidimensionalBalancing.aspx?sel=4

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Report Data Definition  
Report Format Definition  
Export Report Data  
Export Data to Excel  
Export Data to CSV  
Export Data to Delimited File  
Export Data to XML  
Show Report  
Show Report Graph  
Export Report to Excel  
Export Report to Word  
Export Report to PDF  
Show Analytics  
See Data Overall Statistics  
See Group Statistics  
Export Statistics to Excel  
See Field Conditions  
Matrix Balancing

Sample Sales Records by year - Multidimensional Balancing

Select Scenario: 4b. The starting value of field2 to get the Starting matrix of field1 values and target value of field2 to get Target matrix, and balance by sums of selected columns

(4b) The starting value of field2 to get the Starting matrix of field1 values and target value of field2 to get Target matrix, and balance by sums of selected columns

Balancing by: OrderYear,Region,ItemType,OrderPriority

Matrix items by field1: TotalCost aggregation function: Sum  
Iterations by the field2: SalesChannel starting value: Offline and target value: Online

(4b) Balancing matrix for the sums by selected columns of aggregated field1 for iterations of starting and target values

Balancing for sum of fields OrderYear,Region,ItemType,OrderPriority of the starting matrix for sum values of the field1 TotalCost for SalesChannel=Offline and the target matrix for SalesChannel=Online :  
Not balanced in 100 steps for each balancing selected field. Maximum precisions for selected fields: 234738.76, 241018.68, 247388.27, 253842.51 , maximum difference of cells in balancing and target sums = 114888.09, maximum difference of cells in balancing and starting sums = 20047184.31, maximum difference of cells in starting and target sums = 20067430

Starting Sums of TotalCost where SalesChannel=Offline							Target Sums of TotalCost where SalesChannel=Online								
OrderYear	Sums by OrderYear	Region	Sums by Region	ItemType	Sums by ItemType	OrderPriority	Sums by OrderPriority	OrderYear	Sums by OrderYear	Region	Sums by Region	ItemType	Sums by ItemType	OrderPriority	Sums by OrderPriority
2010	8431502	Asia	8561810.6	Household	22477196	L	15542643.6	2010	4124950.1	Asia	6671432.3	Household	2495976	L	12236232.16
2011	7920837.6	Australia and Oceania	2315580	Baby Food	3541696	H	21897123	2011	3542928.5	Australia and Oceania	7056521.2	Baby Food	2621982	H	9960817.31
2012	11718758	Europe	12609650	Clothes	1464815	C	6873969	2012	13376542.54	Europe	12066015.2	Clothes	1089142.2	C	5695948.8
2013	7142259	Middle East and North Africa	2824057	Cosmetics	10993768	M	12681097	2013	6471776.5	Middle East and North Africa	5467455.7	Cosmetics	11051704	M	15476924.53
2014	8384256	Sub-Saharan Africa	21840223	Office Supplies	13815375			2014	2366498	Sub-Saharan Africa	11623310.4	Office Supplies	15551939.99		
2015	6002220	Central America and the Caribbean	5778293	Personal Care	2286636			2015	2429225.16	Central America and the Caribbean	5451800	Personal Care	473647.9		
2016	2921212	North America	4185411	Fruits	96215.6			2016	4547821	North America	0	Fruits	249770.4		
2017	4872988			Vegetables	1504588			2017	4411073			Vegetables	1348855.3		
				Beverages	1322002							Beverages	761338		
				Snacks	0							Snacks	1328789		
				Meat	0							Meat	3893070		
				Cereal	480451							Cereal	2590000		
Total:	57395032.6	Total:	57395032.6	Total:	57395032.6	Total:	57395032.6	Total:	43369914.8	Total:	43369914.8	Total:	43369914.79	Total:	43369914.8

Starting Values of Sum of TotalCost and final Balancing Coefficients, Precisions, and Values							Balancing Sums of TotalCost									
OrderYear	Region	ItemType	OrderPriority	StartValue	TargetValue	FinalCoeff	FinalPrecision	FinalValue	OrderYear	Sums by OrderYear	Region	Sums by Region	ItemType	Sums by ItemType	OrderPriority	Sums by OrderPriority
2010	Asia	Household	L	1924730	0	0	0	15542643.6	2010	4119779.45	Asia	6629230.44	Household	2492921.49	L	12236232.16
2010	Australia and Oceania	Baby Food	H	1652240	0	1.18	26085.57	1480721.88	2011	5649315.77	Australia and Oceania	7077377.69	Baby Food	2616802.11	H	9960817.31
2010	Europe	Clothes	C	354995	0	0.81	88487.75	3414.54	2012	13321766.61	Europe	12099205.76	Clothes	1105025.16	C	5695948.81
2010	Europe	Cosmetics	H	0	2082949	0	26085.57	0	2013	6586664.59	Middle East and North Africa	5540196.71	Cosmetics	1106938.38	M	15476924.53
2010	Europe	Office Supplies	H	4350340	0	0.71	26085.57	2651471.16	2014	2402041.93	Sub-Saharan Africa	11529404.17	Office Supplies	15507651.64		
2010	Europe	Personal Care	M	15470.9	0	0	120165.45	0	2015	2412500.38	Central America and the Caribbean	534492.01	Personal Care	480607.34		
2010	Middle East and North Africa	Clothes	H	219197	0	0.82	26085.57	2793.65	2016	4564182.57	North America	0	Fruits	253437.82		
2010	Middle East and North Africa	Cosmetics	H	1504930	0	0	0	0								
2010	Sub-Saharan Africa	Fruits	H	40288.2	0	0	0	0								
2011	Asia	Vegetables	H	43367.6	0	0	0	0								
2011	Asia	Vegetables	H	339351	0	0	0	0								
2011	Asia	Vegetables	H	0	11275.3	0.10339465	0.36	855669.54								
Total:									Total:	43369914.8	Total:	43369914.8	Total:	43369914.79	Total:	43369914.8

Starting Sums of TotalCost where SalesChannel='Offline'							Target Sums of TotalCost where SalesChannel='Online'								
OrderYear	Sums by OrderYear	Region	Sums by Region	ItemType	Sums by Item Type	OrderPriority	Sums by OrderPriority	OrderYear	Sums by OrderYear	Region	Sums by Region	ItemType	Sums by Item Type	OrderPriority	Sums by OrderPriority
2010	8431502	Asia	8561818.6	Household	22477196	L	15542843.6	2010	4124950.1	Asia	6671432.3	Household	2405676	L	12236232.16
2011	7920837.6	Australia and Oceania	2915580	Baby Food	3641696	H	21897123	2011	5642028.5	Australia and Oceania	7056521.2	Baby Food	2621982	H	9960817.31
2012	11718758	Europe	12695650	Clothes	1648415	C	6873969	2012	13376542.54	Europe	12006015.2	Clothes	1089142.2	C	5695940.8
2013	7142259	Middle East and North Africa	2624057	Cosmetics	16993768	M	12681097	2013	6471776.5	Middle East and North Africa	5467455.7	Cosmetics	11051704	M	15476924.53
2014	8384256	Sub-Saharan Africa	21040223	Office Supplies	13815375			2014	2366498	Sub-Saharan Africa	11623310.4	Office Supplies	15551939.99		
2015	6002220	Central America and the Caribbean	5778293	Personal Care	2286636			2015	2429225.16	Central America and the Caribbean	545180	Personal Care	473647.9		
2016	2927212	North America	4805411	Fruits	96215.6			2016	4547821	North America	0	Fruits	249770.4		
2017	4872988			Vegetables	474382			2017	4411073			Vegetables	1346855.3		
				Beverages	1504588							Snacks	761338		
				Meat	0							Snacks	1328789		
				Cereal	440451							Meat	3993070		
												Cereal	2590000		
Total:	57395032.6	Total:	57395032.6	Total:	57395032.6	Total:	57395032.6	Total:	43369914.8	Total:	43369914.8	Total:	43369914.8	Total:	43369914.8

Balancing Sums of TotalCost							
OrderYear	Sums by OrderYear	Region	Sums by Region	ItemType	Sums by Item Type	OrderPriority	Sums by OrderPriority
2010	4119779.45	Asia	6629238.44	Household	2429921.49	L	12236232.16
2011	5649315.77	Australia and Oceania	7077377.69	Baby Food	2616002.11	H	9960817.31
2012	13321766.61	Europe	12099205.76	Clothes	1105025.16	C	5695940.81
2013	6586664.59	Middle East and North Africa	5540196.71	Cosmetics	11065938.38	M	15476924.53
2014	2402041.93	Sub-Saharan Africa	11529404.17	Office Supplies	15506751.64		
2015	2412500.38	Central America and the Caribbean	534492.01	Personal Care	480607.34		
2016	454182.57	North America	0	Fruits	253437.82		
2017	4313663.5			Vegetables	133204.78		
				Beverages	757123.78		
				Snacks	1321038.59		
				Meat	3919178.9		
				Cereal	2584884.82		
Total:	43369914.8	Total:	43369914.8	Total:	43369914.8	Total:	43369914.8

Starting Values of Sum of TotalCost and final Balancing Coefficients, Precisions, and Values								
OrderYear	Region	ItemType	OrderPriority	StartValue	TargetValue	FinalCoeff	FinalPrecision	FinalValue
2010	Asia	Household	L	8648796	0	0	234738.76	1079.81
2010	Australia and Oceania	Baby Food	H	1562240	0	1.18	26085.57	1400721.08
2010	Australia and Oceania	Clothes	C	384995	0	0.01	88487.75	3414.54
2010	Europe	Clothes	C	0	81321	0	88487.75	0
2010	Europe	Cosmetics	H	0	2062940	0	26085.57	0
2010	Europe	Office Supplies	H	4350340	0	0.71	26085.57	2651471.16
2010	Europe	Personal Care	M	0	15470.9	0	120165.45	0
2010	Middle East and North Africa	Clothes	H	219197	0	0.02	26085.57	2793.65
2010	Middle East and North Africa	Cosmetics	M	0	1904930	1.74	120165.45	0.01
2010	Sub-Saharan Africa	Fruits	L	0	40288.2	0	234738.76	0
2010	Sub-Saharan Africa	Fruits	L	43367.6	0	4.68	234738.76	155614.71
2011	Asia	Vegetables	C	339351	0	4.65	88487.75	1309891.68
2011	Asia	Vegetables	H	0	11275.3	0.12	26085.57	0
2011	Central America and the Caribbean	Beverages	C	259279	0	0	88487.75	0.01
2011	Middle East and North Africa	Fruits	L	0	26185.3	3900.13	234738.76	2.99
2011	Sub-Saharan Africa	Beverages	C	463100	463100	0	88487.75	25.76
2011	Sub-Saharan Africa	Clothes	M	0	31525.9	0	120165.45	0
2011	Sub-Saharan Africa	Household	M	2104140	0	0	120165.45	0.58
2011	Sub-Saharan Africa	Office Supplies	M	4711520	4711520	1.06	120165.45	4183780.04
2011	Sub-Saharan Africa	Snacks	L	0	396042	1.13	234738.76	0

#### 4c Scenario:

Parameters with manually entered target proportional values for balanced sums by each of 4 columns:

Online User Reporting

Sample Sales Records by Year - Multidimensional Balancing

Select Scenario: 4c: Starting Matrix of aggregated field1 to balance by manually entered sums by selected columns

4c: Starting Matrix of aggregated field1 to balance by manually entered sums by selected columns

Balancing by: OrderYear, Region, SalesChannel, OrderPriority

Matrix items by field1: TotalCost aggregation function: Sum

After selecting balancing fields and field1 above click here to enter target sums by selected fields before clicking the button below

OrderYear	Sums by OrderYear	Region	Sums by Region	SalesChannel	Sums by SalesChannel	OrderPriority	Sums by OrderPriority
2010	34567	Asia	12345	Offline	12345	L	98765
2011	76789	Australia and Oceania	45678	Online	12345	C	87654
2012	2334456	Europe	34567			H	43565
2013	2433656	Middle East and North Africa	23456			M	98765
2014	4567	Sub-Saharan Africa	234567				
2015	5678	Central America and the Caribbean	23456				
2016	5678	North America	5678				
2017	98765						

(4c) Starting Matrix of aggregated field1 to balance by manually entered sums by selected columns

Starting Matrix    Target Matrix

Balancing coefficients    Balancing Matrix

4c: Starting Matrix of aggregated field1 to balance by manually entered sums by selected columns

4c: Starting Matrix of aggregated field1 to balance by manually entered sums by selected columns

Matrix items by field1: TotalCost aggregation function: Sum

OrderYear

(4c) Starting Matrix of aggregated field1 to balance by manually entered sums by selected columns

Balancing for sums of fields OrderYear,Region,SalesChannel,OrderPriority of the starting matrix for sum values of the field1 'TotalCost' for manually entered sums for selected fields: Balanced in 52 steps. Precision = 0.99 reached on the balancing by the sums of the SalesChannel field. Maximum precisions for selected fields: 3953249.1, 3953249.42, 3953249.86, 3953250.48, maximum difference of cells in balancing and target sums = 328800.44, maximum difference of cells in balancing and starting sums = 51661452.55, maximum difference of cells in starting and target sums = 51661452.6, maximum difference in percentage between balanced sums and target sums = 2.2%

OrderYear	Sums by OrderYear	Region	Sums by Region	SalesChannel	Sums by SalesChannel	OrderPriority	Sums by OrderPriority
2010	1259642.1	Asia	1623250.9	Offline	5417400.6	L	25769399.76
2011	8389166.2	Australia and Oceania	8372101.2	Online	39006490.86	C	12106729.8
2012	22685624.5	Europe	22858989.15			H	31857940.3
2013	13615035.5	Middle East and North Africa	8291512.71			M	23446501.6
2014	10750754	Sub-Saharan Africa	27488833.5				
2015	8431445.16	Central America and the Caribbean	6323473				
2016	7469033	North America	4185411				
2017	9284061						
Total:	93180571.46	Total:	93180571.46	Total:	93180571.46	Total:	93180571.46

OrderYear	Sums by OrderYear	Region	Sums by Region	SalesChannel	Sums by SalesChannel	OrderPriority	Sums by OrderPriority
2010	34567	Asia	163363.46	Offline	2512628.05	L	1509721.43
2011	76789	Australia and Oceania	604464.67	Online	2512627.95	C	1339878.72
2012	2324456	Europe	457430.93			H	665934.43
2013	2433656	Middle East and North Africa	310397.2			M	1509721.43
2014	45667	Sub-Saharan Africa	3104064.61				
2015	5678	Central America and the Caribbean	310397.2				
2016	5678	North America	75137.93				
2017	98765						
Total:	5025256	Total:	5025256	Total:	5025256	Total:	5025256.01

OrderYear	Region	SalesChannel	OrderPriority	StartValue	TargetValue	FinalCoeff	FinalPrecision	FinalValue
2010	Asia	Offline	L	1624730	n/a	0	0.98	0
2010	Australia and Oceania	Online	C	354995	n/a	0.33	0.98	8127.37
2010	Australia and Oceania	Online	H	1582240	n/a	0.01	0.98	1481.56
2010	Europe	Offline	H	4252340	n/a	0	0.98	0
2010	Europe	Online	C	81321	n/a	0	0.98	0
2010	Europe	Online	H	2062940	n/a	0	0.98	0
2010	Europe	Online	M	15470.9	n/a	0.44	0.98	325.5
2010	Middle East and North Africa	Offline	H	219197	n/a	0	0.98	0
2010	Middle East and North Africa	Online	M	1904930	n/a	0.2	0.98	18463.23
2010	Sub-Saharan Africa	Online	L	40288.2	n/a	0.43	0.98	1240.81
2011	Asia	Offline	C	339351	n/a	0	0.98	0
2011	Asia	Offline	L	43367.6	n/a	0	0.98	0
2011	Asia	Online	H	11275.3	n/a	0	0.98	0
2011	Central America and the Caribbean	Offline	C	259279	n/a	0	0.98	0
2011	Middle East and North Africa	Online	L	26185.3	n/a	0	0.98	0
2011	Sub-Saharan Africa	Offline	C	286674	n/a	0	0.98	0
2011	Sub-Saharan Africa	Offline	M	888888	n/a	0	0.98	12637.68

OrderYear	Sums by OrderYear	Region	Sums by Region	SalesChannel	Sums by SalesChannel	OrderPriority	Sums by OrderPriority
2010	29638.46	Asia	163363.46	Offline	2512628.05	L	1509721.43
2011	82452.15	Australia and Oceania	604464.67	Online	2512627.95	C	1465194.68
2012	2281136.7	Europe	457430.93			H	728217.86
2013	2464751.39	Middle East and North Africa	310397.2			M	1180920.99
2014	49034.92	Sub-Saharan Africa	3104064.61				
2015	6096.75	Central America and the Caribbean	310397.2				
2016	6096.75	North America	75137.93				
2017	106048.87						
Total:	5025255.99	Total:	5025256	Total:	5025256	Total:	5025256

Adjusted by Starting matrix:

Sample Sales Records by Year - Multidimensional Balancing

4c: Starting Matrix of aggregated field1 to balance by manually entered sums by selected columns

4c: Starting Matrix of aggregated field1 to balance by manually entered sums by selected columns

Matrix items by field1: TotalCost aggregation function: Sum

OrderYear

(4c) Starting Matrix of aggregated field1 to balance by manually entered sums by selected columns

Balancing for sums of fields OrderYear,Region,SalesChannel,OrderPriority of the starting matrix for sum values of the field1 'TotalCost' for manually entered sums for selected fields: Balanced in 52 steps. Precision = 0.98 reached on the balancing by the sums of the SalesChannel field. Maximum precisions for selected fields: 3953249.1, 3953249.42, 3953249.86, 3953250.48, maximum difference of cells in balancing and target sums = 5445296.49, maximum difference of cells in balancing and starting sums = 32067300.48, maximum difference of cells in starting and target sums = 51661452.6, maximum difference in percentage between balanced sums and target sums = 9.5%

OrderYear	Sums by OrderYear	Region	Sums by Region	SalesChannel	Sums by SalesChannel	OrderPriority	Sums by OrderPriority
2010	12596452.1	Asia	1623250.9	Offline	5417400.6	L	25769399.76
2011	8389166.2	Australia and Oceania	8372101.2	Online	39006490.86	C	12106729.8
2012	22685624.5	Europe	22858989.15			H	31857940.3
2013	13615035.5	Middle East and North Africa	8291512.71			M	23446501.6
2014	10750754	Sub-Saharan Africa	27488833.5				
2015	8431445.16	Central America and the Caribbean	6323473				
2016	7469033	North America	4185411				
2017	9284061						
Total:	93180571.46	Total:	93180571.46	Total:	93180571.46	Total:	93180571.46

OrderYear	Sums by OrderYear	Region	Sums by Region	SalesChannel	Sums by SalesChannel	OrderPriority	Sums by OrderPriority
2010	34567	Asia	163363.46	Offline	2512628.05	L	1509721.43
2011	76789	Australia and Oceania	604464.67	Online	2512627.95	C	1339878.72
2012	2324456	Europe	457430.93			H	665934.43
2013	2433656	Middle East and North Africa	310397.2			M	1509721.43
2014	45667	Sub-Saharan Africa	3104064.61				
2015	5678	Central America and the Caribbean	310397.2				
2016	5678	North America	75137.93				
2017	98765						
Total:	5025256	Total:	5025256	Total:	5025256	Total:	5025256.01

OrderYear	Region	SalesChannel	OrderPriority	StartValue	TargetValue	FinalCoeff	FinalPrecision	FinalValue
2010	Asia	Offline	L	1624730	n/a	0	0.98	0
2010	Australia and Oceania	Online	C	354995	n/a	0.33	0.98	158701.38
2010	Australia and Oceania	Online	H	1582240	n/a	0.01	0.98	27471.7
2010	Europe	Offline	H	4250340	n/a	0	0.98	0
2010	Europe	Online	C	81321	n/a	0	0.98	0
2010	Europe	Online	H	2062940	n/a	0	0.98	0
2010	Europe	Online	M	15470.9	n/a	0.44	0.98	6836.61
2010	Middle East and North Africa	Offline	H	219197	n/a	0	0.98	0
2010	Middle East and North Africa	Online	M	1904930	n/a	0.2	0.98	342353.55
2010	Sub-Saharan Africa	Online	L	40288.2	n/a	0.43	0.98	23007.59
2011	Asia	Offline	C	339351	n/a	0	0.98	0
2011	Asia	Offline	L	43367.6	n/a	0	0.98	0
2011	Asia	Online	H	11275.3	n/a	0	0.98	0
2011	Central America and the Caribbean	Offline	C	259279	n/a	0	0.98	0

OrderYear	Sums by OrderYear	Region	Sums by Region	SalesChannel	Sums by SalesChannel	OrderPriority	Sums by OrderPriority
2010	54968.88	Asia	163363.46	Offline	2512628.05	L	3851291.14
2011	1528865.14	Australia and Oceania	1208257.45	Online	4650284.75	C	27168302.95
2012	42297869.22	Europe	461891.4			H	1350345.18
2013	45702535.98	Middle East and North Africa	375525.35			M	2189717.6
2014	38927.68	Sub-Saharan Africa	37556971.1				
2015	113068.72	Central America and the Caribbean	375525.35				
2016	113068.72	North America	1393241.51				
2017	186486.19						
Total:	93180571.46	Total:	93180571.46	Total:	93180571.46	Total:	93180571.46

## Partial Matrix Balancing

If the goal is to balance the matrix to partially given sums by rows and columns for example to balance top left corner of matrix and low right corner, then resulting balancing coefficients can be applied to the rest of the matrix, because balancing coefficients for top left matrix and balancing coefficients for low right matrix are two complementary sets of balancing coefficients.





# Report: Gross Domestic Product GDP by Area in our Analytics from http://OUReports.com

**Gross Domestic Product GDP by Area**

GeoName	GeoCode	Description	col2010Q1	col2010Q2	col2010Q3	col2010Q4	col2011Q1	col2011Q2	col2011Q3	col2011Q4	col2012Q1	col2012Q2	col2012Q3	col2012Q4
91000 New England	3	Agriculture, forestry, fishing and hunting	13726.9	14481.1	14137	13778.6	12923.4	14077.3	13865.5	13935.5	14012.8	13973.2	13621.8	13669.1
91000 New England	6	Mining, quarrying, and oil and gas extraction	0	0	0	0	0	0	0	0	0	0	0	0
91000 New England	11	Construction	25456.4	26396	25795	25427.7	24915.4	25752.5	25942.1	27915.7	27410.2	27343.8	27385.8	27647.7
91000 New England	12	Manufacturing	91950.6	93480.1	96404.9	94579.7	95324.2	91600.9	95373.2	93950.4	96243.1	96057.8	96057.8	96229.2
91000 New England	34	Wholesale trade	48083.7	48827.7	48120.3	47023	47397.7	48419.9	48043.5	49779.4	48203.6	50827.9	50844.2	50723.5
91000 New England	36	Retail trade	42079.8	44053.9	43877.9	44144.1	42714.2	43028.9	44059.3	44812.4	44893.6	44931	45197.9	44442.2
91000 New England	36	Transportation and warehousing	13022.4	13437.2	13674.3	13811.1	13549.5	14235.1	14209.5	14245.9	14171.2	14363.9	14419.5	14531
91000 New England	45	Information	39913.4	41215.6	42337.6	42415.5	41382.4	42590.7	41265.9	41559.1	39959.3	40621.5	40587.3	40524.4
91000 New England	51	Finance and insurance	83245.4	80193.6	76347	72485.9	72628.8	76400	79796.2	80824.8	84095.3	80811.6	80377.8	80295
91000 New England	56	Real estate and rental and leasing	122224	120408	120516	126833	126302	129231	130264	132081	130820	131408	132101	130300
91000 New England	60	Professional, scientific, and technical services	70412.1	72083.8	74210.3	75091.6	74956.4	76135.9	76966.2	78866.2	80871	81949.1	81949.1	79168.1
91000 New England	64	Management of companies and enterprises	16162.2	16910.7	17474.2	17778.7	17193.9	21360.5	17679.9	18187.6	19441.1	19190.4	20148	22237.2
91000 New England	64	Administrative and support and waste management and remediation services	21163	21782.2	22076.7	22268.8	22281	22364.8	22564.3	22729.7	23675.9	23644.6	23618.2	23618.2
91000 New England	69	Educational services	22268	22825.6	23110.4	23193	23326.4	23446.5	23751	23922.2	24092.3	24145.4	24470.4	24536.5
91000 New England	70	Health care and social assistance	76289	76828.8	79031.2	77461.8	78919.3	78847.9	78847.9	80329.9	82359.9	82658.5	82762.6	83484.6
91000 New England	79	Arts, entertainment, and recreation	7894.2	8296.2	8337.7	8177.4	8040.9	8548.9	8554.6	8433.6	8035.7	8016.6	8008.8	8124.6
91000 New England	79	Accommodation and food services	20719.6	21302.4	21631.9	21718.4	21577.9	22956.9	22514.2	22775.5	23617.7	23834.4	24014	24343.6
91000 New England	82	Other services (except government and government enterprises)	16149.1	16425.8	16696.1	16663.6	16344	16515.6	16629.7	16895.7	16874.4	17129	17173.4	17381.6
92000 Midwest	3	Agriculture, forestry, fishing and hunting	0	0	0	0	0	0	0	0	0	0	0	0
92000 Midwest	6	Mining, quarrying, and oil and gas extraction	0	0	0	0	0	0	0	0	0	0	0	0
92000 Midwest	11	Construction	51878.9	51995.1	49990	48988.4	48913.5	51541.8	50708.5	51303.6	47638	47413.8	45840.5	48742.2
92000 Midwest	11	Utilities	85028.1	87261.2	87103.3	86068	84623.8	86885.2	87837.5	90765.4	91260.4	91260.4	91166.3	91166.3
92000 Midwest	12	Manufacturing	216778	219812	214443	212512	207106	207804	204843	207480	206625	204965	205829	201511
92000 Midwest	34	Wholesale trade	148490	152214	150599	150153	150486	150309	150440	150444	150429	150400	150225	149821
92000 Midwest	36	Retail trade	134765	137415	138018	138465	135841	141264	141802	144095	144095	144208	145485	146896
92000 Midwest	36	Transportation and warehousing	63340.1	65632.4	67681.4	68372.8	68031.2	69133.9	69150.5	70345.1	70229	70772.7	70782.1	70071.6

Click on the link Matrix Balancing in the bottom of the left menu and select scenario 2a and assign the Partial rows/columns to 5,3.

Balance top left corner matrix (5 rows and 3 columns) and low right corner matrix (14 rows and 5 columns) and applying coefficients to the rest of starting matrix to get partially balanced matrix:

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**Advanced Analytics**

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Select Scenario: 2a Starting Matrix of aggregated field1 to balance for sums of rows and columns of the Target Matrix of the aggregated field2

Steps: 100 Precision: 1 Partial rows/columns: 5,3

z: Starting Matrix of aggregated field1 to balance for sums of rows and columns of the Target Matrix of the aggregated field2

Enter:

Matrix rows by field1: Description columns by: GeoName

Matrix items by field1: col2010Q1 aggregation function: Sum

Iterations by field2: col2010Q1 aggregation function: Sum

(2a) Balancing matrix of field1 for the sums by rows and by columns of the matrix of field2

Balancing for sum of rows and columns of the starting matrix for sum values of the field1 'col2010Q1' and the target matrix for sum values of the field2 'col2010Q1':

Top Left Corner: yes, balanced, precision: 0.27529, steps: 4, Low Right Corner: yes, balanced, precision: 0.98805, steps: 4, maximum difference of cells in selected parts of balancing and target matrix = 16267.25, maximum difference of cells in selected parts of balancing and starting matrix = balancing and target matrix = 170874.50, maximum difference of cells in balancing and starting matrix = 308809.24

Description	Sum of Sum of col2010Q1	Far West	Great Lakes	Midwest	New England	Plains	Rocky Mountain	Southeast	Southwest
Accommodation and food services	383928.6	63554.6	42265.8	62726.1	20791.6	21704.2	13781.3	96539.5	46837.7
Administrative and support and waste management and remediation services	425658.2	17890.4	65107.1	73305.1	21163	23142.8	13486.7	101836	54617.1
Agriculture, forestry, fishing and hunting	125368.6	37148.3	17242.7	0	0	26525.9	6631	23500	14342.7
Arts, entertainment, and recreation	148177.1	15965.7	18291.5	31456	7894.2	7899.2	4819.9	31070.1	9780.5
Construction	518406.7	62271.7	85211.2	85208.1	26456.4	34363.7	21225.3	122508	73336.3
Educational services	194983.1	20731.4	25912.2	26309.7	22268	10511	6093	14504.4	13787.4
Finance and insurance	1091519.8	127733	146506	307906	83245.4	77274.7	35440.2	165846	80497.5
Health care and social assistance	1091469.2	172523	146506	213203	75289	77306.9	31564.3	245684	112483
Information	734241.1	187318	67527.8	178960	39813.4	39505.6	25987.7	133426	82139.6
Management of companies and enterprises	251767.5	30865.6	44202.5	61847.4	16182.2	23778.8	1464	51847.3	18587.7
Manufacturing	1754075.2	309500	346152	216778	19190.6	19137	40812.6	408165	207440
Mining, quarrying, and oil and gas extraction	297077.2	38996.4	8714.6	0	0	7876.8	32466.4	46801	162122
Other services (except government and government enterprises)	322777.3	56648	48912.1	60764	16149.1	21047.5	11400.2	75241.4	34615
Professional, scientific, and technical services	1615295.4	208058	124095	238759	70412	47087	35340.3	208153	105679
Real estate and rental and leasing	1904271.6	424093	242630	383197	122224	103961	84313.6	393323	168580
Retail trade	838375.3	167244	117772	134755	43670.8	55704.1	30275.4	200915	98139
Transportation and warehousing	414489.7	71990.5	62400.6	63340.1	13022.4	33460.6	15934	99400.7	54939.8
Utilities	275006.2	40463.6	40387.3	51678.9	13726.9	18542.6	8775.1	86280.7	35151.1
Wholesale trade	862536.1	140862	132031	148468	45613.7	64484.8	25776.6	191066	114214
Total: 12613925.9	Sum of Sum of col2010Q1 by GeoName:	2327882.1	2703366.2	2363174.1	728182.8	821955.2	427217.6	2696791.1	1464119.4

Description	Sum of Sum of col2010Q1	Far West	Great Lakes	Midwest	New Engla
Accommodation and food services	573458	134008	95607.8	77137.4	31446
Administrative and support and waste management and remediation services	711421	137605	94079.7	112283	34785
Agriculture, forestry, fishing and hunting	201737.6	55762.3	31735.8	0	0
Arts, entertainment, and recreation	157836.9	37515	19837.2	28509.8	7366
Construction	940417.6	186129	115290	138263	42404
Educational services	254031.8	38011	29957.6	72500.6	29307
Finance and insurance	1805440.6	224625	264921	515889	12591
Health care and social assistance	1640165.1	226645	239092	311068	10556
Information	1227194.4	452972	85344.7	275228	59532
Management of companies and enterprises	421661.8	70307.8	66757.2	82919.2	26241
Manufacturing	2443956.2	446992	436785	258666	11516
Mining, quarrying, and oil and gas extraction	241122.1	19918.7	15811.5	0	0
Other services (except government and government enterprises)	427486.7	73380.2	59724	79997.2	20556
Professional, scientific, and technical services	1712500.1	374099	190428	360337	12108
Real estate and rental and leasing	3000468	758952	344409	544388	16564
Retail trade	1314921.6	274690	175431	191878	81426

## Target matrix:

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starting matrix for sum values of the field1 'col2010Q1' and the target matrix for sum values of the field2 'col2021Q1':  
 7529 steps: 4, Low Right Corner: yes, balanced, precision: 0.98605, steps: 4, maximum difference of cells in selected parts of balancing and target matrix = 16267.25, maximum difference of cells in balancing and starting matrix = 229810.37, maximum difference of cells in xsum difference of cells in balancing and starting matrix = 308509.24

Target Matrix of Sum of col2021Q1																		
Sum of Sum of col2021Q1 by Description																		
Description	Sum of Sum of col2021Q1 by Description	Far West	Great Lakes	Midwest	New England	Plains	Rocky Mountain	Southeast	Southwest									
Accommodation and food services	573458	134008	65607.8	77137.4	31440.9	30009.5	23384.2	139972	71898.2									
Administrative and support and waste management and remediation services	711421	137605	94079.7	112283	34789.1	36713.3	25188	173556	97206.9									
Agriculture, forestry, fishing and hunting	201737.6	55762.3	31735.8	0	0	82594.7	11344.7	35836	14464.1									
Arts, entertainment, and recreation	157826.9	37515	19837.2	28589.8	7366.6	8524.3	7038.4	35756.5	13289.1									
Construction	940417.6	108129	115295	133053	42048.1	55597.2	58029.3	220772	131506									
Educational services	254031.8	38011	29957.8	72580.8	29307.2	12479.7	7858.6	44046.5	19869.6									
Finance and insurance	1805440.6	224625	264921	515809	125912	135903	52444.6	315740	170906									
Health care and social assistance	1640165.1	208645	239092	311068	105594	116928	51652.1	354523	174663									
Information	1227194.4	452972	85344.7	275228	59358.8	44466.8	41239.2	176141	92266.9									
Management of companies and enterprises	421661.8	70307.8	66757.2	82919.2	26247.2	36065.1	13611.6	90981.9	34771.8									
Manufacturing	2443956.2	446992	496785	258686	115181	187223	87401.2	565942	305766									
Mining, quarrying, and oil and gas extraction	241122.1	199187	158115	0	0	19190	22563.4	27875.5	143151									
Other services (except government and government enterprises)	427486.7	73380.2	59724	79997.2	20559.3	27292.2	16991	100348	49284.8									
Professional, scientific, and technical services	1712500.1	374099	190428	360337	121000	78275.6	64557.5	338156	185567									
Real estate and rental and leasing	3000468	758952	344409	544388	165669	151441	115977	630143	289489									
Retail trade	1314921.6	274690	175431	191878	61426.6	62819.6	52670.4	315782	160224									
Transportation and warehousing	620272	120357	87739.7	88931.5	18677.4	44839.1	27428.9	140502	87246.4									
Utilities	368495	60827.1	53089.5	61788.0	18785.5	25515.3	11798.4	90065.4	46625									
Wholesale trade	1295737.6	229296	192406	198954	59125.6	91701	44542	299301	180412									
Total: 19358324.1	Sum of Sum of col2021Q1 by GeoName:	2628446.7	3398738.5	1042717.3	1202928.4	708422.5	4098881.8	2267706.8										

Sum of Sum of col2010Q1 by GeoName: 2327882.17833662 2363171.47281828 823195.2427217.6 2686791.114641819.4

Sum of Sum of col2021Q1

## Balancing coefficients for partial balancing:

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Balancing Matrix of Sum of col2021Q1																			
Balancing coefficients																			
Steps	k11	k12	k13	k14	k15	k16	k17	k18	k19	k10	k11	k12	k13	k14	k15	k16	k17	k18	k19
1	0.92962	1.06016	1.0488	0.64521	1.18138														
2	0.99827	1.00661	0.95687	1.03221	1.00568														
3	0.99995	1.00021	0.99817	1.00016	1.0002														
4	1	1.00001	0.99994	1.00001	1.00001														
Result:	0.92797	1.0674	0.99517	0.64739	1.18834														
1		0.86074	1.20235	0.97438	0.89712	1.14512	0.91757	0.5367	0.88161	1.09788	1.02695	1.02304	0.97171	0.88294	0.99719				
2		1.01647	1.01029	1.00351	1.00002	1.01041	0.99928	0.95290	0.9982	1.00021	1.00280	0.99745	0.95286	0.9965	0.99713				
3		1.00471	0.9931	1.00011	0.99964	1.00041	0.99970	0.9952	0.99991	1	0.99910	0.99940	0.9998	0.99980	0.99980				
4		1.00002	1.00001	1	1.00001	1	1.00001	1	1	1	1	1	1	1	1				
Result:		0.87529	1.2151	0.97791	0.89718	1.15752	0.91688	0.51003	0.88	1.09812	1.02951	1.02837	0.96457	0.87984	0.9942				
Final:	0.92797	1.0674	0.99517	0.64739	1.18834	0.87529	1.2151	0.97791	0.89718	1.15752	0.91688	0.51003	0.88	1.09812	1.02951	1.02837	0.96457	0.87984	0.9942

Balancing Matrix of Sum of col2021Q1																		
Description	Sum of Sum of col2021Q1 by Description	Far West	Great Lakes	Midwest	New England													
Accommodation and food services	566473.14	130210.22	68159.12	30360.59	27119													
Administrative and support and waste management and remediation services	715924.44	139545.08	97732.31	109156.95	31751.1													
Agriculture, forestry, fishing and hunting	197738.4	62058.15	26067.63	0	0													
Arts, entertainment, and recreation	147728.57	39005.64	19005.86	28386.23	7183.5													
Construction	959600.41	104063.79	117527.41	140843.83	42521.1													
Educational services	257440.24	42215.06	34595.13	66262.11	27396													
Finance and insurance	1857772.2	260539.65	269975.94	521514.14	142171													
Health care and social assistance	1633716.25	283207.39	250765.9	290621.75	103481													
Information	1014716.41	282097.5	92196.92	223805.87	50334													
Management of companies and enterprises	452410.44	71634.18	77862.72	99789.73	26296													
Manufacturing	2468811.26	476356.22	482984.92	277053.48	117392													
Mining, quarrying, and oil and gas extraction	247016.33	33387.12	6763.9	0	0													
Other services (except government and government enterprises)	436862.82	83680.82	62823.45	74535.8	19975													
Professional, scientific, and technical services	1744892.31	383509.57	207225.52	360872.67	108862													
Real estate and rental and leasing	3025345.6	732892.24	380127.51	549906.16	176861													
Retail trade	1321619.92	269333.55	182674.84	191663.09	62490													
Transportation and warehousing	618885.39	116564.86	91596.05	85162.5	17655													
Utilities	371635.6	59762.25	54075.78	63625.38	16976													
Wholesale trade	1320597.36	235119.12	199762.41	205792.65	64008													

## Partially balancing matrix:

Balancing Matrix of Sum of col2021Q1																			
Sum of Sum of col2021Q1 by Description																			
Description	Far West	Great Lakes	Mideast	New England	Plains	Rocky Mountain	Southeast	Southwest											
Accommodation and food services	566473.14	130218.22	68159.12	80360.59	27119.9	29980.36	21537.94	137238.31	71658.71										
Administrative and support and waste management and remediation services	701592.44	139545.08	97332.31	109156.95	31751.97	36635.69	24244.48	166347.12	96178.83										
Agriculture, forestry, fishing and hunting	197738.4	62058.15	26067.63	0	0	39149.73	11113.64	35801.38	23547.88										
Arts, entertainment, and recreation	147728.57	39085.64	19005.06	28386.23	7183.57	7584.21	5255.14	30781.9	10446.02										
Construction	954960.41	184063.79	117927.41	140843.83	42521.05	60562.24	42479.03	222788.07	143775										
Educational services	257449.24	42215.06	34595.13	66262.11	27396.66	13870.53	7080.22	46320.07	19909.46										
Finance and insurance	1857772.2	260539.65	269975.94	521514.14	142179.25	140066.48	54107.61	308020.55	161368.58										
Health care and social assistance	1633716.25	283207.39	250765.9	290621.75	103488.83	112119.04	51984.73	360040.57	181488.05										
Information	1014716.41	282097.5	92196.92	223805.67	50334.09	51968.13	39146.24	183192.09	91975.58										
Management of companies and enterprises	452410.44	71634.18	77862.72	99789.73	26296.19	40820.79	14550.62	91841.98	29614.22										
Manufacturing	2486811.26	476356.22	482984.92	277053.48	117396.18	174241.03	72208.49	572710.63	313783.29										
Mining, quarrying, and oil and gas extraction	247016.33	33387.12	6763.9	0	0	6033.75	27887.61	36528.97	136414.98										
Other services (except government and government enterprises)	436962.82	83680.82	62823.45	74535.8	19975.47	27469.36	16895.81	101327.75	50254.36										
Professional, scientific, and technical services	1744892.31	383509.57	287225.52	360872.67	108683.11	77980.68	65358.59	349800.33	191453.83										
Real estate and rental and leasing	3025345.6	732892.24	380127.51	549906.16	176869.16	115150.59	629133.37	286326.98											
Retail trade	1321619.92	269333.55	182874.84	191663.09	82490.81	84296	52626.93	313729.81	165204.88										
Transportation and warehousing	618885.39	116564.86	91596.05	85162.5	17655.93	47866.57	25884.63	146727.55	87427.31										
Utilities	371635.6	59762.25	54075.78	63625.38	16876.19	24195.66	13002.82	88974.4	51023.14										
Wholesale trade	1320597.36	235119.12	199762.41	289792.85	64008.33	95051.22	43159.76	29698.02	187005.63										

Balancing algorithm for the whole matrix ignoring corners resulted in

Balancing of Whole Matrix																			
Sum of Sum of col2021Q1 by Description																			
Description	Far West	Great Lakes	Mideast	New England	Plains	Rocky Mountain	Southeast	Southwest											
Accommodation and food services	573458	134279.44	66861.39	81897.17	27504.81	30451.84	22040.75	138559.71	71862.89										
Administrative and support and waste management and remediation services	711421	144313.11	96148.63	115565.68	32295.67	37319.36	24882.16	160434.06	96462.34										
Agriculture, forestry, fishing and hunting	201737.61	64420.9	25742.06	0	0	40031.2	11449.11	36387.69	23706.65										
Arts, entertainment, and recreation	157836.9	42475.57	19648.22	30487.21	7678	8118.48	5667.53	32752.49	11009.39										
Construction	940417.61	184806.63	112636.1	139757.46	41988.99	58894.88	42326.04	219010.25	139997.27										
Educational services	254031.79	42436.18	33082.22	65829.47	27086.33	13535.98	7063.12	45589.04	19409.46										
Finance and insurance	1805440.56	258122.47	254441.48	510627.67	138539.11	136685.48	53197.63	298782.13	155044.6										
Health care and social assistance	1640165.09	290079.36	244338.33	294189.15	104253.54	113117.22	52840.97	361066.79	180279.72										
Information	1227194.39	346563.4	107729.72	271686.22	60807.16	62875.52	47717.78	228311.91	109563.66										
Management of companies and enterprises	421661.79	68110.17	70425.05	93769.98	24590.58	38230.45	13729.52	85498.01	27307.24										
Manufacturing	2443956.22	478404.58	461432.23	274987.77	115957.19	172365.31	72044.74	563146.53	305617.86										
Mining, quarrying, and oil and gas extraction	241122.13	33334.64	6424.29	0	0	5933.91	27631.87	35708.98	132088.44										
Other services (except government and government enterprises)	427486.7	83478.44	59618.5	73485.15	19588.71	26991.74	16726.58	88968.63	48618.95										
Professional, scientific, and technical services	1712500.09	383169.79	196955.97	356332.4	106797.3	76750.6	64803.52	342182.02	185508.48										
Real estate and rental and leasing	3000467.98	739801.39	365018.76	548552.51	175594.22	157673.03	111704.82	621784.05	280299.21										
Retail trade	1314921.61	273217.06	176474.58	192150.76	62347.45	84228.98	52375.53	315999.72	162527.52										
Transportation and warehousing	620272.01	119209.45	89110.86	86075.14	17758.9	48218.07	26270.31	145918.3	86710.98										
Utilities	368495	60481.3	52965.44	63637.17	16897.35	24119.58	13059.11	88162.16	50076.70										
Wholesale trade	1295737.61	235448.22	190297.07	203668.57	63041.99	93756.89	42891.41	285019.32	181614.13										
Total:	19358324.08	3882092.1	2628446.71	3398738.48	1042737.3	1230296.4	708422.5	4099881.79	2267706.8										

aced Whole Matrix: maximum difference of cells in partially balancing and whole balancing matrices = 64405.9, maximum difference of partially balancing rows coefficients and whole balancing rows coefficients = 0.77, maximum difference of partially balancing columns coefficients 0.03

The difference between partially and whole balancing is color coded and not significant.

## References

1. [The Economics of Entropy - Resilience at https://www.resilience.org/stories/2009-07-30/economics-entropy/](https://www.resilience.org/stories/2009-07-30/economics-entropy/)

2. [Entropy of Complex Processes and Systems - 1st Edition \(elsevier.com\)](https://www.elsevier.com/books/entropy-of-complex-processes-and-systems/barsky/978-0-12-821662-0#reviews-tab) at <https://www.elsevier.com/books/entropy-of-complex-processes-and-systems/barsky/978-0-12-821662-0#reviews-tab>
3. [Entropy in Urban and Regional Modelling - Alan Wilson - Google Books](https://books.google.com/books/about/Entropy_in_Urban_and_Regional_Modelling.html?id=OHTKq7GHZ4UC) at [https://books.google.com/books/about/Entropy\\_in\\_Urban\\_and\\_Regional\\_Modelling.html?id=OHTKq7GHZ4UC](https://books.google.com/books/about/Entropy_in_Urban_and_Regional_Modelling.html?id=OHTKq7GHZ4UC) - First published in 1970, this groundbreaking investigation into Entropy in Urban and Regional Modelling provides an extensive and detailed insight into the entropy maximizing method in the development of a whole class of urban and regional models. The book has its origins in work being carried out by the author in 1966, when he realized that the well-known gravity model could be derived on the basis of an analogy with statistical, rather than Newtonian, mechanics.
4. [Entropy in Urban and Regional Modelling: Retrospect and Prospect](https://onlinelibrary.wiley.com/doi/10.1111/j.1538-4632.2010.00799.x) at <https://onlinelibrary.wiley.com/doi/10.1111/j.1538-4632.2010.00799.x> - Entropy in Urban and Regional Modelling introduced a new framework for constructing spatial interaction and associated location models. These ideas are reviewed briefly and then set in the wider context of the application of entropy in a range of disciplines. Related developments since 1970 are examined with particular reference to extensions of the core model, links to mathematical programming, the relationship to economics, and the introduction of a dynamic spatial structure hypothesis.
5. [Matrix balancing: Update matrix cells to match row and column sums - The DO Loop \(sas.com\)](#) *Matrix balancing* is an interesting problem that has a long history. Matrix balancing refers to adjusting the cells of a frequency table to match known values of the row and column sums. One of the early algorithms for matrix balancing is known as the RAS algorithm, but it is also called the *raking* algorithm in some fields. The presentation in this article is inspired by a paper by [Carol Alderman \(1992\)](#)
6. [Carol Alderman \(1992\)](#) at <https://www.lexjansen.com/mwsug/1992/MWSUG92013.pdf>
7. [Ilija J. Nikolic | Union Univerzitet - Nikola Tesla - Academia.edu](#)
8. Irina Yaroshevskaya, 1988 – Dissertation (Moscow, Russia УДК 519.688:65.012.2), Chapter 3 and references there to [3] and her articles.