

IDEAScript - Relative Size Factor Test (RSF)

The purpose of the Relative Size Factor test (RSF) IDEAScript is to identify anomalies where the largest amount for subsets in a given key is outside the norm for those subsets. This test compares the top two amounts for each subset and calculates the RSF for each. The RSF test is based on Chapter 11 of Mark J. Nigrini's book, entitled, "*Forensic Analytics: Methods and Techniques for Forensic Accounting Investigations*".¹ Utilizing the largest and the second largest amount to calculate a ratio based on purchases which are grouped by vendors, in order to identify potential fraudulent activities in invoice payment data, has often been suggested in fraud examination literature. One such reference is the, "*Principles of Fraud Examination*" written by Joseph T. Wells.²

In chapter 11 of Dr. Mark Nigrini's Forensic Analytics book, he introduces the RSF test which expands on this concept and states, "In this chapter we compare large amounts to a benchmark to see how large they are relative to some norm, hence the name the *relative size factor test*. The relative size factor test is a powerful test for detecting errors. The test identifies subsets where the largest amount is out of line with the other amounts for that subset. This difference could be because the largest record either (a) actually belongs to another subset, or (b) belongs to the subset in question, but the numeric amount is incorrectly recorded. The relative size factor (RSF) test is an important error-detecting test."

$$\text{Relative Size Factor} = \frac{\text{Largest Record in a Subset}}{\text{Second Largest Record in a Subset}}$$

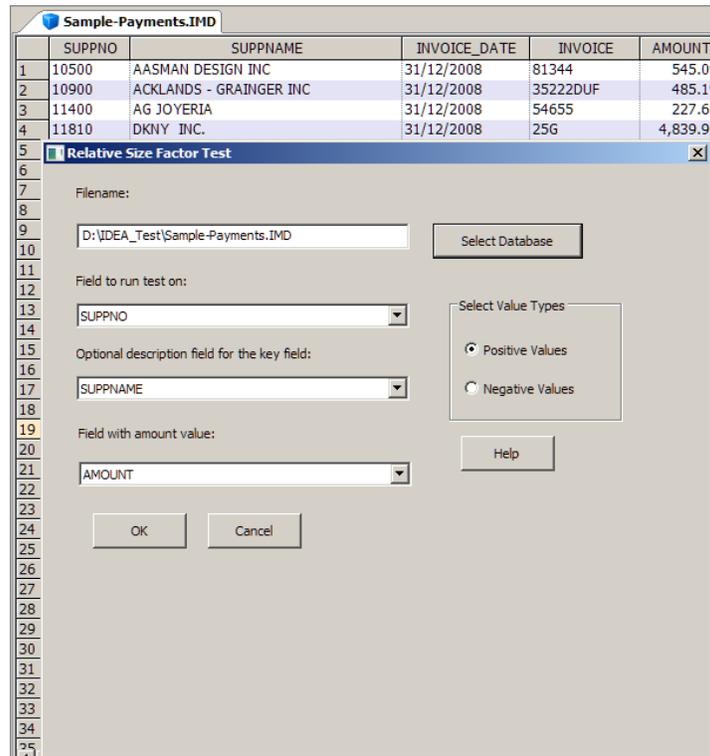
Subsets in a data file are identified as "Keys" in IDEA. An example would be vendors in an Accounts Payable file. The test identifies records that are outliers to the rest of the amounts within the subset groups. Outliers may not be the largest amounts in the entire dataset but are large in respects to particular members of the subset. Large differences might be attributed to errors such as the record belongs to another subset or that the amount was posted incorrectly (e.g., shifted decimal point). Large differences may also be an indication of fraudulent activity, such as occupational accounts payable fraud, falsified invoices for HST input tax credits, offset money laundering revenue, or product sales to related companies (offshore transfer pricing). Dr. Mark Nigrini in his book discusses the forensic results regarding investigations of sales numbers, insurance claim payments, inventory numbers, and health care claims using the RSF test.

¹ Nigrini, Mark J., *Forensic Analytics: Methods and Techniques for Forensic Accounting Investigations*, New Jersey: John Wiley & Sons, Inc., 2011: Print

² Wells, Joseph T., *Principles of Fraud Examination, 3rd Edition*, New Jersey: John Wiley & Sons, Inc., 2011: Print

The IDEAScript allows the user to select either positive or negative amounts in a dataset to which the RSF test can be applied. The first step is to select the file to be tested. Files from within the current IDEA working folder are presented as options. The second step is to select the subset or key field. The third and final step is to identify the numeric amount field for purposes of the RSF ratio calculation.

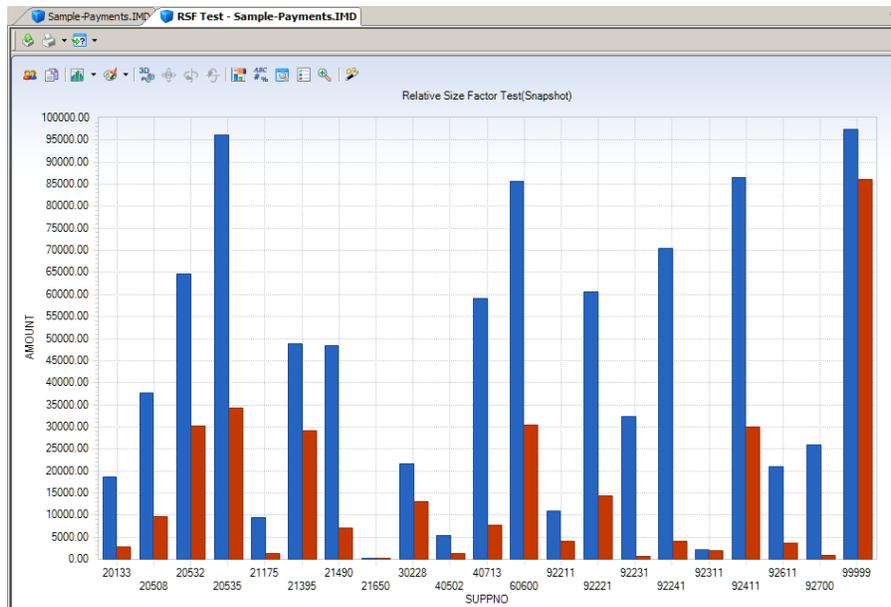
If there is a field in the file that describes the key, the “Optional description field for the key field” may be selected to include this field in the output.



Once the script is executed, subset members that have only a single transaction are eliminated. The test results are captured in a data file named, “RSF Test – *Original Filename*” which contains the fields Subset/Key, optional selected field, Largest_Amt, Second_Largest_Amt, Average_X_Largest, Count, and Relative_Size_Factor. The user can then extract records that exceed a determined RSF for further examination. The selection of the review threshold for the RSF ratio may be determined by the audit plan or by the professional judgement of the user.

Note: The Average_X_Largest field is the average of all positive or negative (as selected by the user prior to running the script) amounts excluding the largest amount. This field provides an indication of the “typical” amount within the subset members. Currently, creating an action field linking to the records in the selected file is not supported within IDEAScript. You may manually create it by selecting Data, Define Action Field, Create Action Link to display extraction preview, and the *original file*.

If there are fifty or less subset members, then a chart is created for all the subset members. If there are more than fifty, then the fifty highest RSF ratios are charted. A file with the fifty extractions is also created.



To display all the transactions within the chart view, click on “Data” in the “Properties” window located on the right. To return to the chart view, click on “Relative Size Factor Test” (from within the “Properties” window, “Results” area”).

	SUPPNO	SUPPNAME	LARGEST_AMT	SECOND_LARGEST_AMT	AVERAGE_X_LARGEST	COUNT	RELATIVE_SIZE_FACTO
1	92231	ROBERT BLUM GMBH	32,293.40	545.09	545.09	2	59.24
2	92700	SAGE PUBLICATIONS INC.	25,943.21	795.59	795.59	2	32.61
3	92241	ROSS RIVER SERVICE CENTRE LTD.	70,509.14	4,073.20	4,073.20	2	17.31
4	21175	CORPORATE EXPRESS	9,474.74	1,198.00	1,198.00	2	7.91
5	40713	MACKENZIE PETROLEUM LTD.	59,109.76	7,804.97	3,748.19	4	7.57
6	20133	BISHOP PUBLISHING INC.	18,682.41	2,713.16	2,713.16	2	6.89
7	21490	BULOVA INC.	48,399.72	7,106.92	7,106.92	2	6.81
8	92611	MORRIS GOLD INC	21,053.24	3,685.75	3,685.75	2	5.71
9	40502	LOCKSMITH SERVICES LTD	5,432.93	1,263.89	1,263.89	2	4.30
10	92221	RIO HORA INC	60,539.44	14,370.05	7,784.03	3	4.21
11	20508	FOSSIL INC.	37,754.37	9,620.16	9,620.16	2	3.92
12	92411	SAAN STORES LTD.	86,441.66	29,990.31	16,492.66	3	2.88
13	60600	MULTI-LINGUAL TEK INC.	85,728.78	30,457.59	30,457.59	2	2.81
14	20535	JOHN PETERSON	96,166.49	34,259.55	18,238.37	7	2.81
15	92211	RICARDO BAL	11,001.66	4,091.17	2,068.26	3	2.69
16	20532	WERNER KG	64,592.51	30,097.05	15,641.26	3	2.15
17	21650	DIALOG CORPORATION	251.58	144.34	144.34	2	1.74
18	21395	D A TOWNLEY & ASSOCIATES LTD	48,911.96	29,033.80	29,033.80	2	1.68
19	30228	FABRICA TOSONI	21,632.22	13,041.42	13,041.42	2	1.66
20	99999	PENNY CILLIN	97,376.40	86,117.39	19,371.30	81	1.13
21	92311	ROYAL TRUST CORPORATION	2,072.54	1,916.80	1,916.80	2	1.08