DESCRIPTIVE STATISTICS AND SIZING MODELS POTENTIALLY APPLICABLE IN THE INTERIOR OF CARS

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Abstract

This article presents some descriptive statistics of several variables specific to the environment of a modern car, focused on the data series of a sample divided into three distinct sub-samples (three-volume low class cars, compact cars of the van type, and three-volume medium class vehicles). The statistical analysis of the data collected, specific to the complex thought of this science, and the aggregate or individualized study of the sub-samples identify an original indicator, which the the authors consider to be an interesting investigative solution, both original and complex. Very much like the architectural harmony of those buildings that have turned into cultural heritage in the course of history, the article shows a similar perspective coming from modern vehicles, whose correlations, specific to general sizing, but especially the interior of the vehicle, with the inspiration in the physical deformation of the liquid droplet (in a single or triple version), and are likely to generate the Renaissance *golden rules* or *standards* comparable to those made use of in statistical graphing.

Keywords: ratio of deviations, descriptive statistics, correlation matrices, econometric modelling, harmony of interior, Kernel density distribution, droplet deformation, maximum deformation.

Introduction

The classification of a modern car is subject to various criteria and, especially, to a permanently upward dynamics of typologies. Thus, the shape of the body generates:

a) minivans, or types of cars that bring together, in one volume, the trunk, the interior and the engine compartment, their essential characteristic being conferred by the angle of the windscreen, which is continued in the bonnet (examples: Ford B-Max, Opel Zafira, Volkswagen Touran, Renault Modus, etc.);

b) hatch cars, where the interior and engine compartment are two separate volumes, while the luggage compartment and the interior are part of the same volume (examples: Citroën C3, Renault Mégane hatchback, Citroën C4 hatchback, etc.);

c) three-volume (oe sedan) cars, whose silhouette contains three separate volumes, i.e. trunk, interior, engine compartment (examples: Renault Clio Symbol, Renault Mégane Sedan, Mazda 6, BMW 5 Series, Mercedes S).

Depending on the length of the body, six classes of cars can be distinguished, which are long established types:

i) class A (mini), which comprises three- or five-door cars, whose length does not exceed 3.7 m and can carry two to five passengers, representing Class cars in city traffic (examples: Fiat Panda, Chevrolet Spark, Toyota Aygo, Renault Twingo, etc.);

ii) class B (small), which includes sedan type cars, hatchbacks having whose length is between 3.7 meters and 4.1 meters (examples: Seat Cordoba, Renault Symbol, Suzuki Swift, Skoda Fabia, Citroën C3, Mazda 2, Nissan Micra, etc.);

iii) class C (compact), which includes cars with a length of 4.1 to 4.5 m, of the sedan type, hatchbacks or minivans (examples: Volkswagen Touran, Renault Mégane, Opel Zafira, Citroën C4, Ford Focus, Skoda Octavia, Seat Altea, Volkswagen Golf, etc.);

iv) class D (medium), cars with a length between 4.5 and 4.7m (examples: Opel Vectra, Citroën C5, Ford Mondeo, Renault Laguna, Toyota Avensis, VW Passat, etc.);

v) Class E (large) includes cars whose length is between 4.7 and 5 m. Examples: BMW 5 Series, Audi A6, Mercedes E, Skoda Superb, etc.);

vi) class F (premium) characterizes those cars whose body length may exceed 5 meters.

This classification of cars, which combines the most possible criteria (from the use and destination to the body type, weight, length, etc.) identifies, apart from the six standard classes described above, another seven typologies or specific structures, from G to N, in accordance with the Latin alphabet (G – class of coupes, H – class convertible and roadster, I – universal allroad, K – SUVs and pickups, L – minivans, M – N small small vans, and N – large commercial cars).

Samples, variables and methods

The analysis of the internal dimensions of the cars in this article is built on three micro-samples (equal to five cars more often presented in the specific market), depending on the size of the cabin interior, the distances between its various components, which impacts on passenger comfort and the possibility of luggage transport:

a) the micro-sample of the medium class cars in three volumes, details the internal dimensions of the car for this class:

Database of the micro-sample of medium class cars in three volumes

Table no. 1

Dimensions or variables[mm]	Opel Vectra	Nissan Primera	Rover 75	Ford Mondeo	Renault Laguna
Length	4595	4567	4750	4730	4576
Width	1798	1760	1780	1810	1772
Height	1460	1482	1430	1460	1429
Wheelbase	2700	2680	2745	2755	2748
Front / rear gauge	1535/1525	1530/1535	1510/1510	1520/1535	1520/1480
Distance seat to ceiling	985-1038	970-1000	955-1025	973-1023	940-1112
Distance seat to steering wheel	115-235	165-220	120-195	151-255	130-220
Distance seat to ceiling to pedals	375-585	345-545	370-590	355-540	340-550
Height of driver's seat	235-310	250-270	255-280	280-325	255-305
Width of seat	525	515	510	525	550
Shoulder width front	1415	1415	1405	1370	1410
Distance back seat to ceiling	955	920	900	940	910
Space legs at back seat	145-330	160-415	130-295	230-398	140-320
Back seat length	525	490	530	530	545
Back seat width	1300	1285	1335	1282	1345
Rear shoulder width	1375	1370	1380	1400	1395
Maximum depth of trunk	1805	1890	1854	1927	1650
Maximum width of trunk	1130	1420	1355	1400	1100
Minimum width of trunk	1115	1080	1005	975	990
Minimum depth of trunk	1010	975	985	1010	1005

Source: The data were drawn by the authors from catalog presentations of the cars

b) the micro-sample of the cars from table 2 reveals the internal dimensions of the cabin of the one-volume (MPV) cars for the compact class:

Database of the micro-sample of the one-volume (MPV) cars from compact class

Table no. 2

Dimensions or variables[mm]	Renault Scenic	Seat Altea	Ford Focus C-Max	Volkswagen Touran	Opel Zafira
Length	4260	4280	4335	4390	4470
Width	1810	1770	1825	1795	1800
Height	1620	1570	1560	1650	1635
Wheelbase	2685	2580	2640	2675	2705
Front / rear gauge	1515/1515	1535/1525	1535/1530	1540/1520	1490/1510
Distance seat to ceiling	950-970	950-1040	860-1030	960-1020	900-990
Distance seat to steering wheel	110-210	200-300	210-230	170-280	190-220
Distance seat to ceiling to pedals	390-560	320-570	330-550	300-550	360-540
Height of driver's seat	350-370	340-370	350-380	370-390	340-370
Width of seat	510	500	490	490	510
Dimensions or variables[mm]	1420	1390	1440	1440	1410
Distance back seat to ceiling	910	980	920	970	950
Space legs at back seat	450-470	140-390	140-390	200-450	210-470
Back seat length	460	480	510	450	510
Back seat width	1310	1250	1050	1030	1270
Rear shoulder width	1390	1350	1441	1420	1430
Maximum depth of trunk	1710	1540	1870	1860	1880
Maximum width of trunk	1040	990	1060	1310	1090
Minimum width of trunk	1040	990	1060	1050	1040
Minimum depth of trunk	890	730	870	1040	1000

Source: The data were drawn by the authors from catalog presentations of the cars

c) the micro-sample of the small class cars in three volumes, derived from the small class cars, to which was added a third volume (the trunk) in order to increase the capacity of luggage transport;

Database of the micro-sample of small size class cars in three volumes

Table no. 3

Dimensions or variables[mm]	Seat Cordoba	Fiat Albea	Renault Symbol	Skoda Fabia	Suzuki Swift
Length	4280	4185	4150	4220	4095
Width	1700	1705	1639	1645	1590
Height	1440	1490	1415	1450	1380
Wheelbase	2460	2440	2471	2460	2665
Front / rear gauge	1420/1410	1415/1440	1406/1386	1435/1425	1365/1340
Distance seat to ceiling	945-1100	965-1045	980	950-1040	975
Distance seat to steering wheel	160-250	150-245	170-200	135-255	210
Distance seat to ceiling to pedals	325-535	320-545	425-540	285-540	120-275
Height of driver's seat	290-340	300-330	330	305-325	310
Width of seat	530	520	510	500	520
Dimensions or variables[mm]	1355	1340	1355	1310	1300
Distance back seat to ceiling	950	955	915	965	960
Space legs at back seat	120-440	140-350	140-250	140-450	120-380
Back seat length	530	540	520	500	510
Back seat width	1240	1235	1240	1230	1220
Rear shoulder width	1300	1310	1310	1290	1270
Maximum depth of trunk	1550	1565	1525	1580	1550
Maximum width of trunk	1480	1490	1290	1510	1400
Minimum width of trunk	970	975	1000	970	975
Minimum depth of trunk	935	950	970	880	900

Source: The data were drawn by the authors from catalog presentations of the cars

A homogeneous approach, in terms of statistic thinking, required that the variables described in the range of values should be further detailed, in both *minimum* and *maximum* subvariants, with direct reference to front / rear gauge, distance from seat to ceiling, distance from seat to steering wheel, distance from seat to pedals, height of driver's seat, leg space at the back. Compared to the six variables that are initially described in the scientific literature, the present study includes twice as many, which is also true of the descriptive analysis conducted, so the resulting number is virtually double that number, i.e. 12, which, if added to the other 14 variables that were left unmultiplied or already expressed dually (maximum and minimum), extended the total number of associated or correlated characteristics to 26). Assigning codes to them was done in a fluent manner, as shown in Table 4, to simplify the process of association and correlation:

Signification of the variables coded in the descriptive statistics and the correlation matrices

Table no. 4

SER01 = length	SER02 = width	SER03 = height
SER04 = wheelbase	SER05 = front gauge	SER06 = back gauge
SER07=minimum distance from seat to ceiling	SER08= maximumm distance from seat to ceiling	SER09 = minimum distance from seat to steering wheel
SER10=maximum distance from seat to steering wheel	SER11= minimum distance from seat to pedals	SER12= maximum distance from seat to pedals
SER13 = minimum height driver seat	SER14= maximum height driver seat	SER15 = seat width
SER16 = width shoulders front	SER17 = distance from backseat to ceiling	SER18 = minimum leg space back
SER19 = maximum leg space back	SER20 = length back seat	SER21 = width back seat
SER22 = width shoulders back	SER23 = maximum depth of trunk	SER24 = minimum depth of trunk
SER25 = maximum width of trunk	SER26 = minimum width of trunk	-

Synthetically, the new database of the sample (with the micro-samples distinctly identified by color, and also increasing in size from top to bottom) is shown in Table 5

Database of aggregate sample for the 26 final variables

Table no. 5

SER 01	SER 02	SER 03	SER 04	SER 05	SER 06	SER 07	SER 08	SER 09	SER 10	SER 11	SER 12	SER 13	SER 14	SER 15	SER 16	SER 17	SER 18	SER 19	SER 20	SER 21	SER 22	SER 23	SER 24	SER 25	SER 26
4280	1700	1440	2460	1410	1420	945	1100	160	250	325	535	290	340	530	1355	950	120	440	530	1240	1300	1550	1480	970	935
4185	1705	1490	2440	1415	1440	965	1045	150	245	320	545	300	330	520	1340	955	140	350	540	1235	1310	1565	1490	975	950
4150	1639	1415	2471	1386	1406	980	980	170	200	425	540	330	330	510	1355	915	140	250	520	1240	1310	1525	1290	1000	970
4220	1645	1450	2460	1425	1435	950	1040	135	255	285	540	305	325	500	1310	965	140	450	500	1230	1290	1580	1510	970	880
4095	1590	1380	2665	1340	1365	975	975	210	210	120	275	310	310	520	1300	960	120	380	510	1220	1270	1550	1400	975	900
4260	1810	1620	2685	1515	1515	950	970	110	210	390	560	350	370	510	1420	910	450	470	460	1310	1390	1710	1040	1040	890
4280	1770	1570	2580	1525	1535	950	1040	200	300	320	570	340	370	500	1390	980	140	390	480	1250	1350	1540	990	990	730
4335	1825	1560	2640	1530	1535	860	1030	210	230	330	550	350	380	490	1440	920	140	390	510	1050	1441	1870	1060	1060	870
4390	1795	1650	2675	1520	1540	960	1020	170	280	300	550	370	390	490	1440	970	200	450	450	1030	1420	1860	1310	1050	1040
4470	1800	1635	2705	1490	1510	900	990	190	220	360	540	340	370	510	1410	950	210	470	510	1270	1430	1880	1090	1040	1000
4595	1798	1460	2700	1525	1535	985	1038	115	235	375	585	235	310	525	1415	955	145	330	525	1300	1375	1805	1130	1115	1010
4567	1760	1482	2680	1530	1535	970	1000	165	220	345	545	250	270	515	1415	920	160	415	490	1285	1370	1890	1420	1080	975
4750	1780	1430	2745	1510	1510	955	1025	120	195	370	590	255	280	510	1405	900	130	295	530	1335	1380	1854	1355	1005	985
4730	1810	1460	2755	1520	1535	973	1023	151	255	355	540	280	325	525	1370	940	230	398	530	1282	1400	1927	1400	975	1010
4576	1772	1429	2748	1480	1520	940	1112	130	220	340	550	255	305	550	1410	910	140	320	545	1345	1395	1650	1100	990	1005

The methods made use by in this article are analysis of variance, asymmetry and kurtosis by means of descriptive statistics, the method of correlation by calculating several extended matrices of correlation ratio values, and also some original methods such as the method of deviations ratio, with an innovative instrumental construction, namely a ratio between the relative amplitude and the coefficient of homogeneity.

The original method proposed by the authors is based on the study of a set of variables often described by maximum and minimum values (as the variables that characterize the interior of a car represent a good example in this respect).

The ratio of the relative magnitude and the homogeneousness or uniformity coefficient is ultimately a ratio between the absolute magnitude (maximum deviation) and the standard deviation of a variable:

$$R_{A/\sigma} = A_x(\%) : C_O(\%)$$

$$R_{A/\sigma} = \frac{\dfrac{x_{max} - x_{min}}{\bar{\bar{x}}}}{\dfrac{\sigma}{\bar{\bar{x}}}}$$

or

$$R_{A/\sigma} = (x_{max} - x_{max}) : \sigma = Ax : \sigma \qquad (1)$$

The values of maximum and minimum $R_{A/\sigma}$ depend on maintaining the harmony of the balances in the real world in a state of equilibrium, or else lack of equilibrium. When using only the statistical content of the indicators, we may know their maximum and minimum limits, starting from the limits of signal of homogeneity of the relative amplitude (100% – 200%) and the empirical limit of the coefficient of uniformity (40%).

One should remember that a first signal, a first trend of normality or homogeneity of a series of one-dimensional frequency distribution, is given by $A_x(\%) \leq 100\% - 200,0\ \%$ (Săvoiu, 2007).

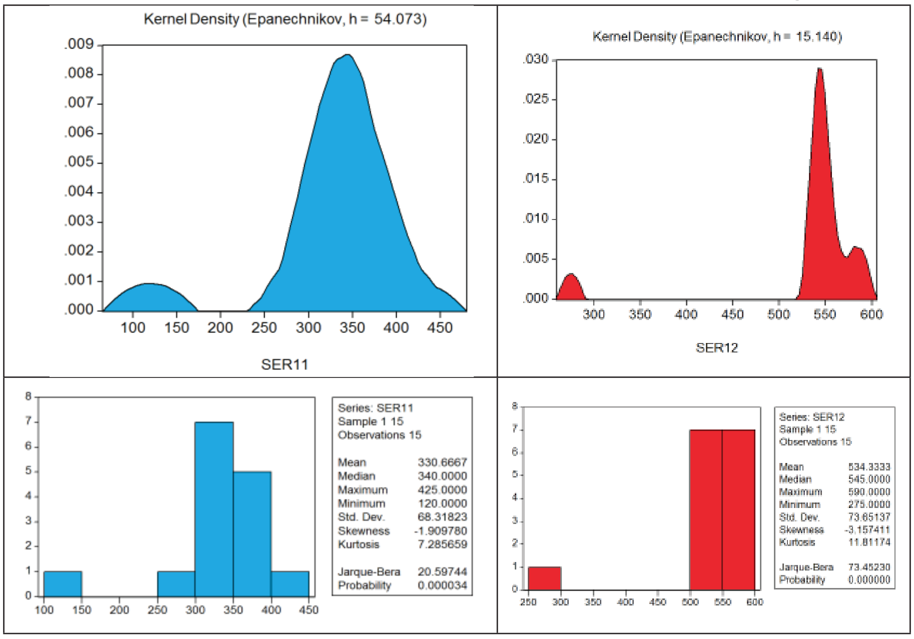
Accordingly, $R_{A/\sigma}$ or the ratio of amplitude and standard deviation, can be at least 0 for a constant variable and can attain 2.5, and at most 5, which are also the accepted limits of the indicator newly built by the authors (for the specific case of the variables having a very high degree of variation).

Results and discussion

Subjected to rapid processing, using the software package Eviews, the database shows, through its descriptive statistics, two series that are abnormally distributed in the general or total sample; the abnormality of SER11 and SER12 series is visually revealed, and shown below in Figures 1 and 2 using Kernel type graphs of frequency distributions

Abnormality of data sets of variables minimum and maximum distance seat to pedals

Figure no. 1



Source: The data in Table. 5 were processed and displayed graphically with EViews software

The only heterogeneous variable is given by the minimum space legroom at the back of the car (with a coefficient of uniformity of 47.9%) and the abnormally distributed variable impacting the whole interior architectural harmonization is given by the (minimum and maximum) distance from the seat to the pedals – and we have to note that, if in the overall sample, the series are not normally distributed, in the micro-samples data distributions are normal.

The descriptive statistics identifies, in Tables 6a and 6b, several interesting and useful features to harmonize the whole of the car interior: almost complete homogeneity, negative majority asymmetry and dominant flattening, rarely alternating with excessive vaulting, both in the overall sample and in the micro-samples.

Descriptive statistics of the car interior variables collected in the sample

Table no. 6a

Sample: 1 15	SER01	SER02	SER03	SER04	SER05	SER06	SER07	SER08	SER09	SER10	SER11	SER12	SER13
Mean	4392.200	1746.600	1498.067	2627.267	1474.733	1489.067	950.5333	1025.867	159.0667	235.0000	330.6667	534.3333	304.0000
Median	4335.000	1772.000	1460.000	2675.000	1510.000	1515.000	955.0000	1025.000	160.0000	230.0000	340.0000	545.0000	305.0000
Maximum	4750.000	1825.000	1650.000	2755.000	1530.000	1540.000	985.0000	1112.000	210.0000	300.0000	425.0000	590.0000	370.0000
Minimum	4095.000	1590.000	1380.000	2440.000	1340.000	1365.000	860.0000	970.0000	110.0000	195.0000	120.0000	275.0000	235.0000
Std. Dev.	210.2978	73.11224	86.54435	114.5622	62.47567	58.58019	32.45847	41.10590	33.31981	29.45942	68.31823	73.65137	42.39272
Skewness	0.357185	-0.916826	0.594463	-0.639961	-0.867705	-0.885061	-1.661679	0.633160	0.124276	0.687546	-1.909780	-3.157411	-0.140358
Kurtosis	1.870809	2.524123	1.983708	1.847400	2.370970	2.290023	5.287457	2.906896	1.873229	2.776635	7.285659	11.81174	1.772852
Jarque-Bera	1.115873	2.242964	1.528997	1.854181	2.129577	2.273373	10.17323	1.007648	0.832119	1.212981	20.59744	73.45230	0.990434
Probability	0.572389	0.325797	0.465567	0.395703	0.344801	0.320880	0.006179	0.604216	0.659641	0.545261	0.000034	0.000000	0.609439
Sum	65883.00	26199.00	22471.00	39409.00	22121.00	22336.00	14258.00	15388.00	2386.000	3525.000	4960.000	8015.000	4560.000
Sum Sq. Dev.	619152.4	74835.60	104858.9	183742.9	54644.93	48042.93	14749.73	23655.73	15542.93	12150.00	65343.33	75943.33	25160.00
Observations	15	15	15	15	15	15	15	15	15	15	15	15	15

Source: The data in Table. 6a resulted from processing the series in Table no. 5 with Eviews software

Table no. 6b

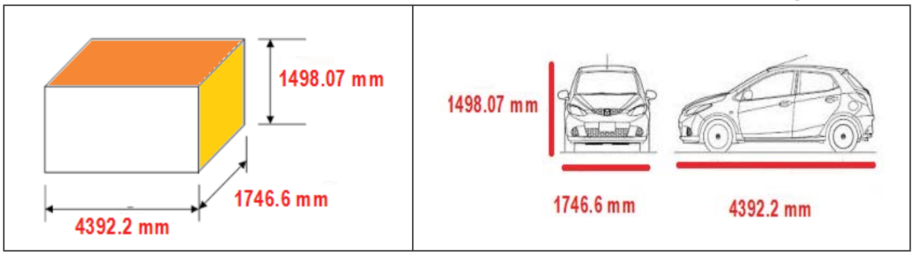
Sample: 1 15	SER14	SER15	SER16	SER17	SER18	SER19	SER20	SER21	SER22	SER23	SER24	SER25	SER26
Mean	333.6667	513.6667	1385.000	940.0000	173.6667	386.5333	508.6667	1241.467	1362.067	1717.067	1271.000	1015.667	943.3333
Median	330.0000	510.0000	1405.000	950.0000	140.0000	390.0000	510.0000	1250.000	1375.000	1710.000	1310.000	1000.000	970.0000
Maximum	390.0000	550.0000	1440.000	980.0000	450.0000	470.0000	545.0000	1345.000	1441.000	1927.000	1510.000	1115.000	1040.000
Minimum	270.0000	490.0000	1300.000	900.0000	120.0000	250.0000	450.0000	1030.000	1270.000	1525.000	990.0000	970.0000	730.0000
Std. Dev.	36.22680	15.75104	44.44097	25.35463	83.24805	66.45822	28.18730	90.25034	54.21316	156.1480	183.5970	45.62529	79.47746
Skewness	-0.064881	0.452740	-0.602716	-0.119072	2.652575	-0.499882	-0.773249	-1.394396	-0.258717	0.002670	-0.192305	0.756437	-1.259973
Kurtosis	2.041696	3.168122	2.196984	1.654167	9.356437	2.305490	2.627531	4.125192	1.805173	1.252195	1.478991	2.442278	4.380852
Jarque-Bera	0.584491	0.530098	1.311187	1.167488	42.84307	0.926171	1.581492	5.652136	1.059593	1.909283	1.538372	1.624902	5.160553
Probability	0.746585	0.767168	0.519134	0.557806	0.000000	0.629339	0.453506	0.059245	0.588725	0.384950	0.463390	0.443769	0.075753
Sum	5005.000	7705.000	20775.00	14100.00	2605.000	5798.000	7630.000	18622.00	20431.00	25756.00	19065.00	15235.00	14150.00
Sum Sq. Dev.	18373.33	3473.333	27650.00	9000.000	97023.33	61833.73	11123.33	114031.7	41146.93	341350.9	471910.0	29143.33	88433.33
Observations	15	15	15	15	15	15	15	15	15	15	15	15	15

Source: The data in Table. 6b resulted from processing the series in Table no. 5 with Eviews software

Essentially, the average values describe a car of the form illustrated graphically and geometrized in Fig. 3, which observes a few interesting golden rules.

Average three-dimensionality of the modern car in the sample (1.5 – 1.75 to 4.4)

Figure no. 3



The relationship between height, width and length for the sample considered are:

I) height – width (8.5/10); II) width – length (4/10); III) height – length (3.4/10)

The interior room, or cabin, resized by means of the variables in the sample, reveals interesting associations; for example, let us mention some of the seemingly harder associations, which however have a level of correlation ratio above the value of 0.5 (which is equivalent to an average intensity of the correlation between the two variables)

A suggestive extract, in the shape of a correlation matrix of some of the variables seemingly hard to correlate, yet naturally associated in keeping with an extended harmony of the car

Table no. 7

	SER02	SER05	SER12	SER15	SER17	SER19	SER20	SER21	SER23
SER01	0.665742	0.681932							0.761511
SER02			0.650851						
SER03						0.621561	-0.700206		
SER05			0.673742						0.750117
SER10					0.781769				
SER13				-0.694785			-0.634822	-0.661422	
SER14								-0.629538	

Source: The data in this table represent a relevant extract resulting from data processed by an extended correlation matrix of the 26 series with EViews.

The econometric modelling implications of a set of variables of the modern car becomes easier with the help of such variables, analyzed and associated. For example, a model of assessing the width of a car (SER02, endogenous variable) made according to the total length, height, wheelbase, back gauge and maximum distance seat to pedals (SER01, SER03, SER04, SER06 and SER12 constitute the explanatory or exogenous variables of the model), obviously also including a residual control variable (ε).

$SER02 = \lambda + \beta\ SER01 + \delta\ SER03 + \gamma SER04 + \delta\ SER06 + \mu\ SER12 + \varepsilon$

Dependent Variable: SER02 Method: Least Squares Sample: 1 15				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-32.01693	210.9645	-0.151765	0.8827
SER01	0.034370	0.093089	0.369217	0.7205
SER03	0.222689	0.143606	1.550689	0.1554
SER04	0.149120	0.169563	0.879437	0.4020
SER06	0.522824	0.347307	1.505366	0.1665
SER12	0.231611	0.226514	1.022503	0.3332
R-squared	0.922887	Mean dependent var		1746.600
Adjusted R-squared	0.880047	S.D. dependent var		73.11224
S.E. of regression	25.32185	Akaike info criterion		9.590387
Sum squared resid	5770.767	Schwarz criterion		9.873607
Log likelihood	-65.92790	F-statistic		21.54249
Durbin-Watson stat	2.116953	Prob(F-statistic)		0.000092

The parameterized model $SER02 = -32.02 + 0{,}03SER01 + 0.22SER03 + 0.15SER04 + 0.52SER06 + 0.723SER12 + \varepsilon$ is efficient if it has an $R^2 = 0.92$, and it emphasizes the ability of such an analysis to multiply the classic or existing models, and to enhance the overall association of explanatory factors and thus reduce estimation errors.

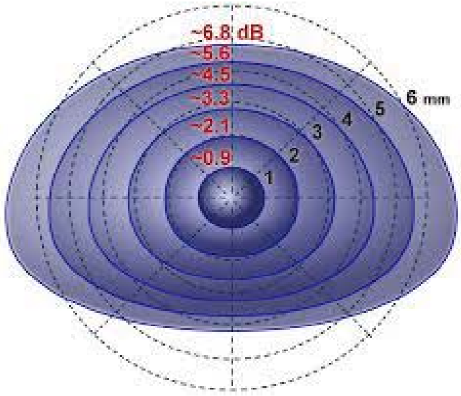
Some final remarks

Nicolae Georgescu-Roegen emphasized in *The Statistical Method*, his famous book published in the interwar period, which is fully valid even today, that the essential rule for the construction of harmonized charts is “simplicity, clarity and giving up everything that can be artificial”. The principle of representation via statistical charts “should be so simple that anyone looking at them should be able to understand them, or else any further artifice is useless”. The golden rule of ¾, so often invoked in the making of graphs, i.e. the relationship Oy = ¾ Ox, can be found at a higher level in the golden rules of modern automobile construction, where height is 0, 85 of its width (8.5/10), and the width is 0.4 of the length, very much in keeping with the empirical need for homogeneity (4/10).

In the raindrops deformed on coming against a surface, the ratio of height and width is 10/14, i.e. nearly 0.72 (Fig. 4), increasingly approaching visual equilibrium, Renaissance perspective and the harmony of nature, as will probably do future cars. The larger the raindrop, the more deformed it is on touching the ground, and the ratio changes harmoniously, in strict resonance with nature.

The ratio between height and diameter in the raindrop on touching the ground, which also inspired the essential principles in radar detection

Figure no. 4



Source: Wolff, C., *Principiile radiolocaţiei* (*Principles of radar*), available at: http://www.radartutorial.eu/html/author.ro.html

The article also opens a field of inter-, trans- and cross-discipline application for the method of the deviation ratio and its innovatively instrumental construction, or between the relative amplitude and the coefficient of homogeneity, which is verified for all 26 variables analyzed.

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