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ECONOMETRIC MICRO- AND MACROECONOMIC MODELLING IN ROMANIA:FINDING SIMPLICITY IN COMPLEXITY AND GENERATING STATISTICAL SIMPLEXITY

Abstract: *This paper describes, in its introduction, its main objective and some of its investigative premises,emphasizing the need to address micro- and macroeconomic models using the major principles of statistical thinking. A central section is devoted to the concepts of complexity and simplicity, rediscovering the paradox of approaching them simultaneously and the paradigm of simplexity, first formulated by Jeffrey Kluger. In the next section, a set of hypotheses, formulated as a real alternatives, and in an innovative alternative, renamed statistical simplexity, supported by statistical thinking, as well as the econometric parameter method, exploits the software package Eviews, thus allowing validation of a number of models focused on the endogeneity-exogeneity reciprocity, related to the specific micro- and macro-modelling of economic results in Romania. The conclusions reveal a paradoxical, yet harmonious interdependence between complexity and simplicity, in the context of statistical thinking of the statistical simplexity type.*
Keywords: *complexity, simplicity, econometric model, statistical simplexity.*

JEL Classification: E01,F41, F43, F61, F62, D24, C46, C52, C58, R15

1. Introduction

The science or theory of complexity becomes increasingly important in the space of applied trans-, inter- and multidisciplinarity, and especially in the practice of contemporary modeling. In order to be able to know, understand and estimate the developments of a number of processes and phenomena of great factorial diversity, the macro- or microeconomic ones to conflicts and natural disasters, from the environment to global climate trends, more varied methods, techniques and tools of scientific investigation or forecast are combined into practical approaches. In parallel with the modern unified approach of a system expanded beyond the traditional boundaries of mono-disciplinary sciences, by means of trans-, inter- and multidisciplinary collaborative work, there also coexists modern investigation focused on simplicity(Săvoiu, Dinu and Tăchiciu, 2014). The apparent conflict between complexity and simplicity is itself present in this paper, the main objective of which is to optimize econometric modelling in Romanian economy, interpreting the process simultaneously by means of simplexity, i.e. the concept specific to Jeffrey Kluger's thinking.

In nearly all economic researches, the very definition of a process as simple or complex is relatively difficult, because either everything seems to be very simple in a superficial or approach, or, upon closer examination, it appears that there is a complex set of phenomena constituting simplicity.A prime example could be macro-aggregates of the GDP type, which may seem rather simple, yet become more complex when one is trying to structure or estimate them, while, in another example, technology begins by complexity gradually turns into a simple/accessible variable in econometric modelling. This perpetual interconnection in the process of knowing complexity through simplicity, or of simplicity through complexity, has given rise to the concept of *simplexity*, which explains why and how *certain simple phenomena become complex, and conversely*, how certain complex phenomena can be considered simple (Kluger, 2007).In model-based statistical thinking, a complex process is never to be confused with a complicated one (Săvoiu, 2015).The present article makes use of micro- and macro-economicdatabases, transiting from the complexity of interdependencies to the simplicity of modeling. The structure of the paper reflects a necessary balancing between the *concepts of complexity and simplicity*, to the *contemporary scienceof complexity*, finally *exploiting the paradigm ofstatistical simplexity, and through* the Eviews software package, it validates a set of specified and parameterized models, bringing together the sphere of micro- and macro-econometrics by means the micro and macro-economic results as structured in Romania after 1998. The conclusions show an economy dependent on an essential input (the oil resource), predictable, through econometric models, under the impact of statistical simplexity.

2.Complexity, simplicity and statistical simplexity

Today's meaning assumed for the concepts of complexity and simplicity is a constant projection, in both time and space, of the concerns specific to Aristotle's and early Daoist thought. For the ancients, the most important aspects of thought and knowledge are their being connected to the source, and the notion of the whole, behind which there lie simplicity and complexity.Aristotle associated simplicity with the source of the information, identifying it with the *divine* or the *eternal*, while Daoist texts explicitly state that *less is always more* (Wong, 2011). In the case of Daoist texts, Daodejing and Zhuangzi add to the concept of simplicity the connotations of movement and change, but also the multitudinousness out of which it must be extracted. Complexity, in the Aristotelian sense, though lacking value, appears as a seeming interconnection to the necessity arising from our complex nature, while Daoist texts lead to a perpetual recognition of the need for complexity

Modern thinking has since evolved, and complexity, as a singular notion, denotes *interconnected or interwoven elements*, and, at the level of the economic system, the same concept of complexity brings together the amount of information needed to describe them (Bar-Yam, 1997). The more complex and random the system, the more it tends to apparently nullify the possibility of simplification (Casti, 1994), limiting any such attempt to the dimension and representation of the system itself (Wainwright and Mulligan, 2013), and assessing complexity thus becomes its sole virtuosity.An integrated and interconnected system formed of EU countries in the last few decades can be a good example of evolution in economic environment.

The study of this environment systematically towards complexity and chaos later on have been a reason of exploring a new methods and establishing a new since for the matter called the complexity science (Weaver, 1948). The study of systems and its evolution within physics, mathematics, biology, economics, engineering, and computer science have proven that systems have the same shape structure (Elsner, Heinrich &Schwardt, 2015). French philosopher and complexity theorist Edgar Morin (2007) shows in his works two paradigms of complexity altitudes in systems the restricted complexity and general one, Morin explains the differences between them. General complexity concerns with compression of multiple interrelated process. Either restricted complexity main goal is to extract laws and rules from complex behavior. Distinguish professors from United States, in 1984, among them Murray Gell-Mann Nobel prize winner in physics founded a scientific organization in Santa Fe New Mexico specialized in studying complex adaptive systems (Felipe, *et al.*, 2012). Forming later what is been known the complex theory. That work was influenced by Warren Waver’s paper, published in 1948, in which he explained how to deal with two kinds of complexities the disorganized complexity, which concerns phone manes solved within probability theory and statistical approaches while organized complexity. Related to phenomena’s that cannot solve with these methods and uses large numbers of interrelated factors in an organic whole. In 1991, a French biophysicist specialized on ageing and mutation and philosopher at

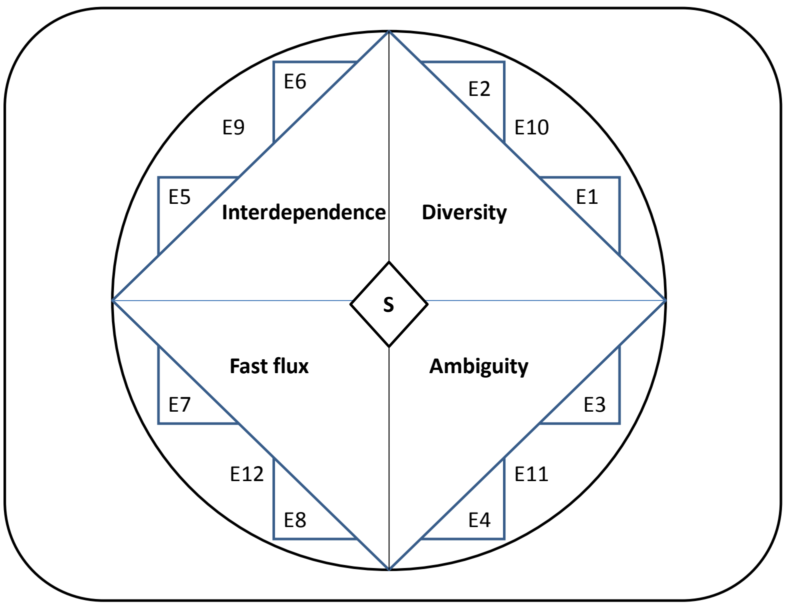
University of California and Berkeley, named Henri Atlan,developed two integral concepts to complexity which he called algorithmic and natural complexity. Algorithmic complexity is concerned with the difficulty to solve a given well-defined problem (Vasconcelos& Ramirez, 2011). Well defined problems can be solved after using the right algorithm as a predefined set of procedures that can be processed in a computer, and institutionalized as rules. Problems can be simple or complicated simples one requires a short algorithm while. Complicated ones needs a longer one, other kind of problems may needs a structure in calculations, alternatives selection to reach a known end for instance visiting space is a kind of these problems category (Vasconcelos& Ramirez, 2011). Natural or contextual complexity concerns "*situations in which finality is not a priori known by the actor in question".* Complexity in this condition is to measure on absent information (Smith, Martinez & Giraud-Carrier, 2013). As a result of continuous growing in the business environment world firms are confronted with several levels and categories of algorithmic and natural complexity (Vasconcelos& Ramirez, 2011). Most firms as an established business and profit maximizing, have expanded their product lines, and indulged in what appears to be every promotional activity, an effort to stimulate customers interest and gain share the consequences creates an enormous increase in the complexity of their business (Felipe, *et al.,* 2012) which in return increases their fixed costs, complexity comes in many forms macro- and microeconomic effecting everything from operations to senior management strategic plans (Table 1).

Table1. The specificity of the macro- and microeconomic complexity

The Macroeconomic Complexity	**The Microeconomic Complexity**
Financial events in the last decades have changed the view of economy dynamics with the idea of standard economics that agent's behavior in an economy formed of producers, consumers, banks, investors, and others tend to behave in equilibrium. Standard economics does not consider behavior an effect element to production (Ho &Basu, 2002). The realty is contrary economics have new behavior at all time making economy in continuous change mode and is virtually never at equilibrium, which is a more realistic scenario Brian Arthur argue. A close look to the economy dynamic movements will show us that business works under uncertainty trying to adapt	Organizations handle a lot of surrounding challenges in the way to keep itself in the market and maintain its competitiveness against the others. Complexity in Microeconomics can be defined as the hidden cost of doing business and it is dependent on several factors: decisions made by managers, future vision, company structure and information systemsproduction standardization, projects financing, supplier versification, maintain customers (Johnson, 2009). The microeconomic complexity is also concerned with international business models which faces two kinds of diversity a multiplicity one and it is concern with the numbers of elements within the system and the second concerns elements variety (the dissimilarity of elements) and both are based on quantitative measurers. Diversity helps a business

to changing in environment, which can cause further disequilibrium. So complexity economics looks into non-equilibrium economics (*Complexity Explorer*, 2015).	environment to integrate states of process within a certain time, and is the key to determine the level of complexity in an organization, and common features will be recognized for more system function understanding (Akgün, *et al.*, 2014).

The real structures of a complex adaptive system are somehow divided into four major elements or components.



Source: Created by the authors based on IMD Compexity Model (Steger, Amann, &Maznevski, 2007).

Figure 1. The various elements on an organization system and components forming complex adaptive system

In essence, in complexity one can distinguish the three specific dimensions of statistical thinking: space, time and structure, which generate information or series of chronological, territorial and structural. A special category of structural information is brought together within complexity in a specific manner, as shown by that in the previous schematization, in fact, quality multipliers or de-multipliers: diversity, interdependence, ambiguity and fast flux.**Diversity** in organizations can be presented by many ways human resources the way of thinking, culture and behavior in administrating the organization, system control, products and process, goals, strategies and business structures (Ho &Basu, 2002). External complexity can be represented by various factors for instance the confrontation of business competitors with it strategies, customer different requirements and needs, shareholders needs, economic and different legal environments.**Ambiguity** is next major component related phenomenon to a complex system, the amount of accurate predictability and information found around environment surrounding the organization. High ambiguity can be the reason of the lack of predicting relevant aspects inside and outside an organization.Ambiguity can be defined as "*too much information with less and less clarity on how to interpret and apply findings*." (Oliver Holmes) Uncertainty is determinant factor of ambiguity and the complexity concept as, in respect to the internal environment of an organization. Ambiguity can be defined as the existence of multiple, conflicting interpretations of situations, goals and processes. Hence, it is an important driver of organizational complexity.**Interdependence** is the next major element to form a complex system it can be easily noted. More increasingly interconnected elements forming components is becoming a more complex system (Vasconcelos& Ramirez, 2011).**Fast Flux** the last element of complex systems is describes the impact of different events and the transit nature of the organization and its environment, fast flux major role is to measure the amount of this change, duration with timing and description (Akgün, *et al*., 2014).

The specific thinking of complexity theory includes elements of systemic thinking and emphasizes interdependencies and associations, being an all-inclusive, trans- and interdisciplinary type of thinking, building bridges between sciences (Mulej, 2007), accepting the role and importance of mono-disciplinary specialization, while supplementing it with cooperation between the methods, theories and even sciences, which leads to the final impact of clearly exposing the real complexity. If viewed under this angle, *complexity induces simplicity*. Econometric complexity theory, observing the spirit of the complexity theory thinking, via minimum level and number of errors, improves the quantitative approach, using minimum solutions, from tests and exogenous variables, to methods, generating a real set of expected results (Caines*et al.*, 1986) and a philosophical viewpoint about *finding simplicity in complexity* (Wainwright, Mulligan, 2013). The central idea is to minimize the complexity or to simplify it to a minimum system, not only in a "decomposition" procedure of macro-economy, but also in harmony with the constructive nature of microeconomic firms indicators, based on statistical way of thinking, dealing with the theory of complexity.

Simplicity facilitates the creation of fluidity, the validity of estimation, and represents an adequate respond both to microeconomic and macroeconomic complexity, a solution to adjust the business turbulence and economic environmental changes, caused by time, space and structure in the specific way of statistical thinking. The evolution of simplicity in statistical thinking can be portrayed according to the paradoxical combination of simplicity and complexity into the concept of simplexity, and this new notion synthesizes simplicity and complexity in a duality and illustrates the point of view of the authors of this paper. In estimated evolution, or in efficient decision-making mechanisms, *simplicity can trump complexity* (Johnson, Fowler, 2013), but simplexity remains a real and authentic solution.Simplicity will by no means respond the billions of problems that characterize a complex system (Jereb, Ivanuša and Rosi, 2013), such as that of an economy addressed holistically, at every level (national, regional or global), nevertheless, it could provide an econometric model of good prediction with a minimum error level, by applying a type of statistical model-based thinking suited to it, one that is not focused solely on economic variations, forced externally (with noise from internal variability), nor only focused on complexity models (e.g. economic fluxes), whereby natural internal variability is the intrinsic signal (Held, 2014).

This transformation of simplicity into statistical simplexity is defined by always taking into account the major source or major input of the analyzed economic fabric (the main raw material), the dominant changes, or the dominant technologies (still focused on petroleum products), and the comparability of the phenomenon in the absolutely necessary three-dimensionality (time – space – structure), as well as the final result, or the output of the economic process investigated.

3. Some steps and methods in statistical simplexity

Statisticians generally tend to prefer, in an aprioric manner, simpler econometric models of an explanatory and predictive nature (regressions, specified, validated and monitored in the databases available). It goes without saying that the most important thing statistical simplexity is the correctly graded and methodic balance between complexity and simplicity. Hence two questions naturally arise: (a) what is a correctly graded balance stages (and the answer depends on the purpose or intention of the modelling, with carefully managed iteration or repetitive steps), and (b) what the correctly balanced set of the methods, or the methodic equilibrium specifically looks like, as a simple enumeration of methods.

For the first question, the contents already stated for statistical simplexity includes the steps in a correctly described manner.

1st step: *identifying the input or the major source of the phenomenon under investigation* (in this case, the major resource having a dominant influence in the Romanian economy, and not only on the Romanian economy, but also globally, remains oil, in the present contemporary Kondratief cycle);

2nd step:*the dominant or prevalent transformations, or the dominant technology* (in present-day Romanian economy, they have remained centred on specific technologies based on petroleum products, or else are implemented using petroleum products);

3rd step: providing statistical comparability of the macro- and micro-economic phenomenon in its absolutely necessary three-dimensionality (time – space – structure), which specifically involves building databases comparable on longer periods of time (in the article we were able to macro-economically ensure information bases based on *Eurostat* databases for long periods, but at the micro-economic level, in the specificity of processing oil products and producing fuels, data was mainly identified that was only comparable for 1998-2014, which is finally the chronological referential of the modeling; spatial comparability was ensured based on the sphere of Romania's economy, and the structural one – globally starting from Pareto's principle, 20/80, then also observing, in a detailed manner, the minimal principle of 60/60, also used in official statistics, providing an optimum level of representativeness, information was selected from databases *Thomson Reuters Eikon* for three companies: OMV Petrom (where OMV Aktiengesellchaft owns 51% of shares), Rompetrol (purchased in 2007 by the national oil and gas company of Kazakhstan, KazMunayGas), and the Astra Romana SA Refinery in Ploiesti, insolvent by mid-2014);

4th step: providing information about the final result or the output of the economic process investigated macro- and micro-economically.

Finally, the data resulted in a substantial number of indicators grouped in two medium-sized databases, thus placing statistical investigation within the framework of simplexity, i.e. in-between integrative complexity and selective simplicity:

I. ***the macroeconomic database***, originally having a total of 35 macro-indicators (significant macroaggregates), whose single source was Eurostat (Table 2):

Table 2.Typology of macroeconomic indicators in Romania (1998 -2014)

SER	Macroeconomic indicators	SER	
01	Imports of goods and services	19	Subsidies on products
02	External balance of goods and services	20	Taxes less subsidies on products
03	External balance - Services	21	Final consumption expenditure of general government
04	Compensation of employees	22	Household and NPISH final consumption expenditure
05	Wages and salaries	23	Individual consumption expenditure of general government
06	Exports of goods and services	24	Gross domestic product at market prices
07	Exports of goods	25	Collective consumption expenditure of general government
08	Exports of services	26	Individual consumption expenditure of general government
09	Taxes on production and imports	27	Final consumption expenditure of NPISH
10	Subsidies	28	Final consumption expenditure of households
11	Taxes on production/imports	29	Final consumption expenditure
12	Final consumption expenditure and gross capital formation	30	Household and NPISH final consumption expenditure *Note: NPISH = Non Profit Institutions Serving Households
13	Final consumption expenditure, gross capital formation and exports	31	Changes in inventories and acquisitions less disposals of valuables
14	Employers' social contributions	32	Gross fixed capital formation
15	Operating surplus and mixed income	33	Gross capital formation

16	Individual consumption expenditure of general government	34	Actual individual consumption
17	Value added, gross	35	Changes in inventories
18	Taxes on products		

Source: Eurostat: http://appsso. eurostat.ec.europa .eu /nui/ show.do?dataset=nama_10_gdp&lang=en

II.*the microeconomic database*, also generated from a single source, Thomson Reuters Eikon: http://financial.thomsonreuters.com/en/products/tools-applications/tradinginvestment-tools/eikon-trading-software.html, initially brought together over 195 indicators, from which 41 identical indicators (of ensured statistical comparability) were finally selected from the first two companies, and only 28 indicators for the third company, which is insolvent; out of a total number of 110 comparable indicators in the models presented in this paper, only eight microeconomic indicators were used to illustrate various situations for statistical simplexity (Table 3):

Table 3.Database extraction of microeconomic indicators for the companies

SER38	Short Term Investments	SER42	Inventories - Finished Goods
SER39	Accounts Receivable - Trade, Net	SER60	Revenue
SER40	Total Receivables, Net	SER61	Gross profit
SER41	Total Inventory	SER72	Long Term Investments

Source: Thomson Reuters Eikonhttp://financial.thomsonreuters.com/en/products/tools-applications/ trading investment-tools/eikon-trading-software.html

In selecting the methods, the authors started from two major aspects of the interrogative cycle of model-based statistical thinking, which remain fundamental by their intrinsic value, as core truths of explanatory research: i) the residual relativity with which is fitted a present-day model in order to explain and, especially, to predict a tomorrow unique evolution; ii) *it is not helpful to ask whether a model is true; rather, one should ask whether it is a good description* (Christie, Cliffe, Dawid and Senn, 2011).Based on this, but also on the conceptual duality of (macro- and micro-economic) complexity, as well as the qualitative primacy of the databases exploited in the modeling, the method of descriptive statistics was used in order to remove the abnormally distributed series of information by means of the EViews software package, applying the Jarque–Bera test.By analyzing the content of the information, by ascertaining the identity of SER35 (Changes in Inventories) and SER31 (Changes in inventories and acquisitions less disposals of valuables) the final series was eliminated, and the method of descriptive statistics of macroeconomic data series also reduced another two series (SER03 and 31) that were abnormally distributed, in keeping with the permitted limit value of 5.99 of the Jarque–Bera test (Table 4).

Table 4. Abnormall distributed series according to descriptive statistics

Sample: 1998 - 2014	SER03	SER31
Mean	9132.941	-3115.706
Median	353.0000	3453.000
Maximum	58666.00	15555.00
Minimum	-5067.000	-70737.00
Std. Dev.	18265.14	24410.00
Skewness	1.791276	-2.037193
Kurtosis	4.958748	5.833875
Jarque-Bera	**11.80889**	**17.44729**
Probability	0.002727	0.000163
Sum	155260.0	-52967.00
Sum Sq. Dev.	5.34E+09	9.53E+09

Source:Created by the authors based onEviews Software

The remaining 32 data sets, are homogeneous, slightly asymmetric and flattened, and also normally distributed, and can lead to the creation of econometric models for analysis and prediction both as endogenous and exogenous variables. Applying the method of descriptive statistics leads to an enhanced process of eliminating either identical series (examples from table 5 for a single company show that of the eight series selected for illustration, SER 38 and SER40 are abnormally distributed, which eliminates them from the modelling).

Table 5. Descriptive statistics of a set of microeconomic variables (illustration)

Sample: 1998 2014	SER38 Short Term Investments	SER39 Accounts Receivable– Trade, Net	SER40 Total Receivables, Net	SER41 Total Inventory	SER42 Inventories - Finished Goods	SER60 Revenue	SER61 Gross Profit	SER72 Long Term Investments
Mean	34818.47	350368.8	436677.8	449766.1	222628.8	3604431.	1294120.	489526.2
Median	14695.00	324943.0	423344.0	447852.0	248017.0	3689552.	1494264.	496984.0
Maximum	247884.0	516576.0	996792.0	684830.0	298461.0	5896893.	2517136.	1527058.
Minimum	0.000000	168076.0	197475.0	258934.0	109278.0	1904337.	-255007.0	18638.00
Std. Dev.	60599.31	99496.92	183531.7	125868.3	63223.74	1405780.	878645.9	438882.3
Skewness	2.770556	0.042026	1.572559	0.009366	-0.348733	0.295389	-0.525412	0.972117
Kurtosis	10.23568	2.031306	6.175250	2.108894	1.648869	1.602228	2.239902	3.424587
Jarque-Bera	**58.83348**	0.669682	**14.14823**	0.562715	1.637676	1.631139	1.121318	2.805224
Probability	0.000000	0.715452	0.000847	0.754758	0.440944	0.442387	0.570833	0.245954
Sum	591914.0	5956269.	7423523.	7646023.	3784689.	61275327	20705915	8321946.
Sum Sq.Dev.	5.88E+10	1.58E+11	5.39E+11	2.53E+11	6.40E+10	3.16E+13	1.16E+13	3.08E+12

Source:Created by the authors based onEviews Software

Another preliminary analysis is based on the method of the correlation matrixes, applied to macro- and micro-economic indicators in a graded and iterative manner (having previously removed the series that are abnormally distributed), the correlation ratio obtained in some cases describing very high intensity for some links, and revealing the existence of macro-micro-interdependencies able to simplify the complexity through econometric models made by statistical simplexity (Table 6).

Table 6. Matrix of correlation of selected macro and microeconomic variables

Macro/ micro	SER01	SER02	SER04	SER05	SER06	SER07	SER08	SER09	SER10	SER11
SER39	-0.476858	0.039828	-0.020418	-0.179483	-0.079969	0.085386	-0.028024	0.108098	-0.097460	0.033166
SER41	0.484296	-0.608583	0.560496	***0.863594***	0.639732	0.602896	0.435307	***0.759339***	***0.704469***	0.518523
SER42	0.358879	-0.077927	0.406522	0.594814	0.619482	0.476290	0.520908	0.534589	0.477111	0.455703
SER60	0.606255	-0.373115	***0.797742***	***0.891844***	***0.905522***	0.636116	0.693932	0.699061	***0.877523***	***0.848011***
SER61	0.379486	-0.561676	***0.694693***	0.657302	0.615529	0.350294	0.475256	0.487352	***0.766586***	***0.695340***
SER72	0.252293	***-0.727293***	0.583310	0.625980	0.472604	0.391610	0.378576	0.541885	0.694103	0.536799

Macro/ micro	SER12	SER13	SER14	SER15	SER16	SER17	SER18	SER19	SER20	SER21	SER22
SER39	-0.037211	-0.113131	-0.003989	-0.103346	0.080432	0.026382	-0.147674	0.268610	-0.151208	-0.180971	-0.20389
SER41	0.498636	***0.782479***	0.482780	***0.746614***	0.443181	***0.835952***	0.638333	0.424612	0.642040	***0.840710***	0.637085
SER42	0.336289	0.601524	0.139409	0.615304	0.327946	***0.695426***	***0.681690***	0.503045	0.679348	0.578505	0.247265
SER60	0.589842	***0.927528***	0.517599	***0.930245***	0.666668	***0.897302***	***0.884804***	0.467378	***0.889341***	***0.881107***	0.336794
SER61	0.606632	0.686576	0.528794	0.652401	***0.697621***	0.580459	0.391052	0.272272	0.397823	0.653398	0.381568
SER72	0.550278	0.601494	0.543625	0.542633	0.620940	0.544681	0.200025	0.310142	0.206238	0.615016	0.554132

Macro/ micro	SER23	SER24	SER25	SER26	SER27	SER28	SER29	SER30	SER32	SER33	SER34
SER39	-0.095606	0.512968	0.485368	-0.095606	0.426969	0.484457	0.520981	0.409547	0.628486	0.604988	0.523194
SER41	-0.329533	-0.353950	-0.360457	-0.329533	-0.518961	-0.347720	-0.355515	-0.329892	-0.418516	-0.490041	-0.48963
SER42	0.443181	***0.799286***	0.531904	0.443181	0.662713	0.545228	0.680208	0.637085	***0.737879***	***0.851457***	***0.795612***
SER60	0.666668	***0.927030***	0.774861	0.666668	0.894461	0.751343	***0.861075***	0.336794	0.653383	***0.901396***	***0.920234***
SER61	0.697621	0.648632	0.639537	***0.697621***	0.602102	0.644830	0.575660	0.381568	0.618676	0.667680	***0.706524***
SER72	0.620940	0.546413	0.540549	0.620940	0.462420	0.546958	0.507538	0.554132	0.628463	0.631912	0.634183

Source:Created by the authors based onEviews Software

In each of the three companies there appear the details of the correlated variables and correlation matrixes that lead to a synthesis (Table 7):

Table 7. Steps generating models in statistical simplexity

Statistical iterations previous to econometric modelling	Period integrally analysed	Number of variables analysed initially		of which: number of correlated variables generating models	
		macro	micro	unifactorial	multifactorial
OMVPetrom	1998 – 2014	35	195	41	123*
Rompetrol	1998 – 2014	35	195	41	123*
Astra Română Refinery	1998 – 2014	35	195	28	84*

Source:Created by the authors based onthe models generated with Eviews Software

The methodology previously described and exemplified allowed shaping practical solution to coherently simplify the economic complexity, by analyzing macro-micro-interdependencies. Identifying the critical input, alongside the dominant technology, remain the essential questions, and as such require preliminary argument-supported studies. (Săvoiu, Cruceru, 2009).

4. Results and discussions

Complexity analysis in business at the level of oil companies in Romania leads to the construction of simple models as appropriate explanatory and predictive solutions. In order to understand the interaction between complexity and simplicity and the resulting simplexity, the key role is held by the dominant technology as a changing factor, describing a process that increases uncertainty (and implicitly the modelling error) at the beginning and at the end of the Kondratief cycle itself. The attempt to simplify and stabilize using modelling remains a continuous process, or in other words, statistical simplexity, or else the profound simplicity out of which complexity arises, and also the complexity that turns into simplicity in an inseparable and paradoxical manner (Săvoiu, Dinu, 2015), frequetly providing, via modelling, a new concept of paradoxical statistical simplexity.A necessary illustration of that concept is represented by some econometric models resulting from simplifying business complexity in the Romanian economy, which is nevertheless conditioned by monitoring their level of predictability in the future.The first category is represented by the potential one-factor models (Table 8) resulting from monitoring the interdependency of the macro- and micro-economic results along the axis of input dominance, of technology and of output:

Table 8. Some potential one-factor models

The potential one-factor models (A) and the derived models (B) as resultof the changing the endogenous role into an exogenous role for the variables described	F-statistic R-squared
A.SER24 = α + β SER60 + εi or GDP = -363194.1 + 0.341 Revenue + εi	91.674
B.SER60 = α + β SER24 + εi or Revenue =1421825 + 2.519 GDP + εi	0.859385
A.SER24 = α + β SER41 + εi or GDP = -611070.8 + 3.285 Total Inventory + εi	26.535
B.SER41= α + β SER24 + εi or Total Inventory = 281272.7 + 0.194 GDP+ εi	0.638858
A.SER24 = α + βSER72 + εi or GDP = 551089.8+ 0.644 Long Term Investments + εi	6.385
B.SER72 = α+ βSER24 + εi or Long Term Investments = 87889.45 +0.464 GDP+ εi	0.298568

Source:Created by the authors based onEviews Software *Note: Neither of the previous one-factor models centred on the Total Inventory fail to pass Durbin-Watson test. (Method: Least Squares. Sample: 1998-2014. Included observations:17)

The examples of one-factor models presented are identified as potential for all three companies, but only some of those centred on the data for the first company, i.e. OMV Petrom, were parameterized synthetically here.

A second category is formed by the efficient multifactor models, from which the present paper selected two as dominant models in the three companies, and also capable of a good predictability of results at both the macro- and microeconomic levels.The first is the model that joins GDP with Total Inventory and Revenue or Net Sales:GDP = α + β Total Inventory + γ Revenue + εi.The parameterized OMV Petrom modelis GDP = -624666.6 + 1.181Total Inventory + 0.266 Revenue + εi

Dependent Variable: GDP - SER24	Method: Least Squares	Sample: 1999 2014	Included observations: 16	
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-624666.6	161395.1	-3.870419	0.0017
Total Inventory - SER41	1.180600	0.489895	2.409904	0.0303
Revenue - SER60	0.266348	0.043863	6.072225	0.0000
R-squared	**0.900613**	Mean dependent var		866360.8
Adjusted R-squared	0.886415	S.D. dependent var		517290.8
S.E. of regression	174339.0	Akaike info criterion		27.13418
Sum squared resid	4.26E+11	Schwarz criterion		27.28121
Log likelihood	-227.6405	F-statistic		63.43208
Durbin-Watson stat	1.789470	Prob(F-statistic)		0.000000

Source:Created by the authors based onEviews Software

The similar Rompetrol model is GDP = 22638.26 + 0.107Total Inventory + 0.032 Revenue + εi (R-squared = 0.946804 and F-statistic = 115.691) and the Astra Română SA Refinery modelis GDP = 124083.8- 2.295Total Inventory - 0.214 Revenue + εi (R-squared = 0.717858 and F-statistic = 16.53801 and all the coefficients are negative because of the abnormality of the company's evolution, becoming insolvent by mid-2014; this is the reason for using only 16 terms to all comparative models).The second model is more extended, also involving Gross profit: GDP = α + β Total Inventory + γ Revenue + δ Gross profit + εi. The parameterized model of OMV Petrom is GDP = -32341.9 + 0.107Total Inventory + 0.017Revenue + 0.011 Gross profit + εi.

Dependent Variable: GDP - SER24	Method: Least Squares	Sample: 1999 2014	Included observations: 16	
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-32341.90	13816.83	-2.340760	0.0373
Total Inventory - SER41	0.107425	0.041632	2.580346	0.0241
Revenue - SER60	0.017426	0.004293	4.059491	0.0016
Gross Profit – SER61	0.011494	0.005163	2.226344	0.0459
R-squared	**0.924002**	Mean dependent var		96150.04
Adjusted R-squared	0.905002	S.D. dependent var		42902.93
S.E. of regression	13223.44	Akaike info criterion		22.02969
Sum squared resid	2.10E+09	Schwarz criterion		22.22284
Log likelihood	-172.2375	F-statistic		**48.63262**
Durbin-Watson stat	1.379873	Prob(F-statistic)		0.000001

Source:Created by the authors based onEviews Software

The similar Rompetrol model is GDP = 123633.5- 2.790Total Inventory -0.401 Revenue + 1.0343 Gross profit + εi (R-squared = 0.729919 and F-statistic = 10.81) and the Astra Română SA Refinery model is GDP = 30124.66 + 0,111Total Inventory + 0.031 Revenue - 0.0421.0343 Gross profit + εi (R-squared = 0.955718 and F-statistic = 86.33).The decision of validating the model is consistent in accordance with the values of the Durbin Watson test ($d_2 < d < 4 - d_2$), and the errors are independent, and after F-statistic, much higher than F-theoretical.Statistical simplexity was applied to the complexity of Romanian for the period of the past 16-17 years, and identified several model-based solutions, embodied in models capable to simplify complex macro-microeconomic systems and not to include more details in the business activities. Statistical simplexityreveals fluidity of Romanian economy focusing on: a) oil and derived products as critical and exogenous input; b) underlining the importance of technology, based on petroleum companies' products; c) simplifying both macroeconomic complexity and microeconomic, d) simple model's solutions to understand/predict the business turbulence and environmental changes.

5. Conclusions

The econometric models presented in this paper are the confirmation of the first of the two contradictory Impulses: seeking **simplicity**versus understanding and managing greater contemporary **complexity** in macro and microeconomic data. Statistical simplexity focused microeconomic investigation on a limited number of indicators selected from just three companies, namely OMV Petrom, Rompetrol and the Astra Romana Refinery in Ploiesti SA, as well as a set of 35 essential macro-aggregates of the Romanian economy. Even in the specific situation of insolvency of the Astra Romana, the parameterized model is relative competitive, with descriptive and predictive qualities (but with negative correlated variables, still offering the signals of strong intensity in the values of its correlation coeficients).

The paper also anticipates and allows some control solutions for certain complex models [e.g. GDP = Final Consumption + Gross capital formation + (Export – Import)] and many other useful macro- and micro-economic models can result, in the future too, from turning some exogenous variables into endogenous variables, and conversely. The comparative presentation of the concepts of complexity and simplicity highlighted the importance of these trends, stressing the development of the science or complexity theory in the context of today's economic globalization, while also revealing the strengths of classical and modern statistical thinking and the simplification trends centred on statistical discerning judgment. The concept of **statisticalsimplexity** and the derived method are the main original aspects of the paper, which hereby brings a well-deserved tribute to Jeffrey Kluger, the creator of the term and concept of *simplexity*, which synthesizes both simplicity and complexity in a duality which is felt as increasingly necessary in today's economy. This article tried to clarify practically, in the specific case of Romania, how simplicity appears from complexity occurs. Choosing simple models rather than complex one followed the intensity of the correlation of variables, the quality of forecasting, and especially the efficiency of research. If modeling and the approaches centering on complexity are increasingly used in comparison with the simple econometric model, the latter still retains its place, mainly in economic competition with limited resources.

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