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AN ALTERNATIVE MULTIDISPLINARY INDEX TO EVALUATE THE MARKET PERFORMANCE AND ITS VULNERABILITY: MPVT-INDEX

Artículo de investigación científica

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Resumen

Este artículo de investigación científica presentará un nuevo indicador analítico aplicable sobre el estudio del desempeño y la vulnerabilidad del mercado. Se basa en la observación de un único índice que puede mostrar la inconsistencia permanente del rendimiento del mercado que siempre se experimenta en diferentes períodos de la historia. El desempeño del mercado y la vulnerabilidad pueden materializarse bajo la forma de crisis comercial, energética o financiera.

Básicamente, suponemos que el mercado se ve afectado por cinco fuerzas: fuerzas económicas, fuerzas sociales, fuerzas políticas, fuerzas tecnológicas y fuerzas naturales.

Todas estas cinco fuerzas siempre interactúan simultáneamente; afectan el comportamiento del mercado directamente sin ninguna restricción o aislamiento. Por lo tanto, el objetivo de este documento de opinión es ofrecer a los responsables políticos e investigadores una nueva herramienta analítica para estudiar el desempeño del mercado y la vulnerabilidad en la economía de cualquier país desde una nueva perspectiva. De hecho, este artículo de investigación científica, pretende establecer un nuevo índice multidisciplinario para analizar el desempeño y la vulnerabilidad del mercado. Este nuevo índice multidisciplinario se titula «El índice de tendencia del desempeño y la vulnerabilidad del mercado (índice MPVT)». El índice MPVT intenta estimar cinco fuerzas unidas que pueden influir en la tendencia del mercado a corto y largo plazo, el mismo índice no pretende ser un modelo de pronóstico en ningún caso. Finalmente, el índice MPTV se aplicó al estudio del desempeño del mercado de EE. UU. y su vulnerabilidad.

Palabras clave: *Econograficología, enfoque multidisciplinario, gráficos multidimensionales y geometría multidimensional*

Abstract

This research paper will present a new applicable analytical indicator on the study of market performance and vulnerability. It is based on the observation of a single index that can show the permanent inconsistency of the market performance that is always experienced across different periods in history. Market performance and vulnerability can materialize under the shape of trade, energy or financial crisis. Basically, we assume that the market is affected by five forces: economic forces, social forces, political forces, technological forces and natural forces. All these five forces always interact simultaneously; they affect market behavior directly without any restriction or isolation. Hence, the objective of this research paper is to offer policy-makers and researchers a new analytical tool to study the market performance and vulnerability in the economy of any country from a new perspective. In fact, this opinion paper intends to establish a new multidisciplinary index to analyze the market performance and vulnerability. This new multidisciplinary index is entitled «The Market Performance and Vulnerability Trend Index (MPVT-Index)». The MPVT-Index attempts to estimate five forces together that can influence the market trend in the short and long run, the same index is not intended to be a forecasting model in any case. Finally, the MPTV-Index was applied to the study of U.S. market performance and its vulnerability.

Keywords: Econographicology, Multidisciplinary approach, Multi-Dimensional graphs and Multi-Dimensional Geometry

1. Introduction

This research paper is willing to explain the complex and dynamic behavior of the market from a multi-dimensional perspective. Initially, we assume that exist five global forces are interacting together and affect on the market behavior simultaneously. These five global forces are the economic global forces, social global forces, political global forces, technological global forces and natural global forces. Hence, all these global forces always keep in a constant quantitative and qualitative transformation(s) across time and space. Additionally, we also assume that the market became more vulnerable to suffer anytime a crisis. It is according to the advance stages in the evolution of the market. Usually, the traditional explanation about the market behavior is based on the uses of demand and supply forces. In our case these forces can only give us a basic explanation about the dynamic and complex behavior of the market.

Moreover, the theoretical contribution by Adam Smith, David Ricardo, Augustin Cournot and Alfred Marshall (Barber, 2009 and Gordon, 1965) about the market behavior was great to explain how the market works and the failures of market. If we analyze the point of view about the market behavior by these four economists then we can find different conceptions and views, this may be caused by different historical timing that each of these economists were lived. This research agrees that all these economists are right at the moment to explain the dynamic and complex behavior of the market into its historical momentum, but they are unavailable to explain the behavior of the market in our days.

In the study of the market, always is common to observe the uses of the *Ceteris Paribus* assumption. In our case the application of the *Ceteris Paribus* assumption became unnecessary, it is because we argue that the study of the market you cannot isolate some variables that they are considered less important into the study of the market behavior. For this reason, we suggest the uses of new assumptions and graphical modeling to explain more clearly the dynamicity and chaotic behavior of the market can experience across time and space. Firstly, this research assume that the market always experience a dynamic imbalance state. It is only possible by the application of the *Omnia Mobilis* assumption (everything is moving).

The uses of the Omnia Mobilis assumption can help to include more variables without any isolation in the study of the market. Additionally, we suggest the application of multidimensional graphical modeling to facilitate the visualization of the market behavior from a global perspective. On the other hand, the market can be considered as a complex and multidimensional system under the interaction of the private and public sector. In the end both sectors became complementary and inseparables to keep alive the economy of any country. In our opinion the market is not a simple place that we can only exchange goods and services. Hence, the market is a dynamic multidimensional system that is affected by different global forces. And all these global forces always keep in constant quantitative and qualitative transformation(s) all the time. According to this research the study of the market behavior basically depend on the five global forces volatility and the historical momentum of humanity experience in different phases.

Therefore, in the study of the market at the last past fifty years, we can observe the application of sophisticates and complex econometrics and mathematical models and techniques that try to catch up as a whole the dynamic and complex behavior of the market. But we can observe that all these models and techniques are not available to enclosed a large number of variables and reduce the isolation of some variables that there are considering not important to be accounted into its modeling.

Finally, we like to propose an alternative multidimensional model to analyze and visualize the fast changes of the market behavior. It is based on the uses of five global forces outputs follow by: global economic forces output, global social forces output, global political forces output, global technological forces output and global natural forces output. Each global force output is running in real time and affect directly on the market behavior simultaneously without any isolation of some variable(s).

2. Model

This model attempts to use a multidimensional mathematical and multidimensional graphical approach. We propose the uses of the 6-dimensional coordinate space (vertical position) (Ruiz Estrada, 2016). This specific coordinate space offers six axes to plot five exogenous variables and one endogenous variable, now we are available to observe the changes of each exogenous variable and the endogenous variable into its axis separately at the same graphical space (Ruiz Estrada, 2012). We also suggest the application of the *Omnia Mobilis* assumption (Ruiz Estrada, 2011) to generate the relaxation of the five global forces of the market. The main objective is to observe in real time the behavior of the market without any isolation. In our case we fix each market force into its axis. These five global forces are follow by the economic global forces ($X_{1)}$ (See Expression 1), social global forces (X_2) (see Expression 2), political global forces (X_3) (see Expression 3), technological global forces (X_4) (see Expression 4) and natural global forces (X_5)

(see Expression 5). Each global force has its specific function with a large number of factors (i) that always keep changing in real time (☼) (see Annex 2). All these factors (i) in our model can be considered such as independent sub-variables. At the same time we suggest that each global force apply infinity partial derivatives (∂) are running in real time (☼) and affect directly on the final market performance and vulnerability trend index (MPVT-Index) result.

$$X_1 = f(☼f_{11}, ☼f_{12}, \ldots, ☼f_{1n}) \text{ and } n = \infty \quad (1)$$

$$X_2 = f(☼f_{21}, ☼f_{22}, \ldots, ☼f_{2n}) \text{ and } n = \infty \quad (2)$$

$$X_3 = f(☼f_{31}, ☼f_{32}, \ldots, ☼f_{3n}) \text{ and } n = \infty \quad (3)$$

$$X_4 = f(☼f_{41}, ☼f_{42}, \ldots, ☼f_{4n}) \text{ and } n = \infty \quad (4)$$

$$X_5 = f(☼f_{51}, ☼f_{52}, \ldots, ☼f_{5n}) \text{ and } n = \infty \quad (5)$$

The measurement of each global force is based on the equation 6, where we are running several partial derivatives (∂) in real time (☼) between different periods of time: the past time <t-1> and the future time <t+1>.

$$☼X_i = ☼\,[\partial X_{i<t+1>} / \partial X_{i<t-1>}] \Rightarrow i = \{1,2,3,4,5\} \quad (6)$$

Each global force in our model can be measure by expression 7, 8, 9, 10 and 11. After, these five global forces will be plotted directly on its axis at the 6-dimensional coordinate space respectively:

$$☼X_1 = ☼\,[\partial X_{1<t>} / \partial X_{1<t-1>}] \quad (7)$$

$$☼X_2 = ☼\,[\partial X_{2<t>} / \partial X_{2<t-1>}] \quad (8)$$

$$☼X_3 = ☼\,[\partial X_{3<t>} / \partial X_{3<t-1>}] \quad (9)$$

$$☼X_4 = ☼\,[\partial X_{4<t>} / \partial X_{4<t-1>}] \quad (10)$$

$$☼X_5 = ☼\,[\partial X_{5<t>} / \partial X_{5<t-1>}] \quad (11)$$

In the case of the market performance and vulnerability trend index (MPVT-Index) can be calculated by the equation 12. The final result of the market performance vulnerability trend index (MPVT-Index) always is represented by an absolute value.

$$\text{MPVT-Index} = \sum_{i=1}^{5} ☼\,[\partial X_{i<t>} / \partial X_{i<t-1>}] \Rightarrow i = \{1,2,3,4,5\} \quad (12)$$

However, the final measurement of the market performance and vulnerability trend index (MPVT-Index) (see Expression 13) continue apply infinity partial derivatives (∂) are running in real time (☼) (see Annex 1). All these global forces were mentioned before, these are interconnected to a common variable that is called «The Market Performance Vulnerability Trend Index (MPVT-Index)». At the same time this index requests to apply the interconnectivity principle (╬) (see Annex 3).

$$\text{MPVT-Index} = \text{☼} [\partial X_{1<t+1>} / \partial X_{1<t-1>}] \text{╬} \text{☼} [\partial X_{2<t+1} > / \partial X_{2<t-1} >] \text{╬} \text{☼} [\partial X_{3<t+1>} / \partial X_{3<t-1>}] \text{╬} \text{☼} [\partial X_{4<t+1} > / \partial X_{4<t-1>}] \text{╬} \text{☼} [\partial X_{5<t+1>} / \partial X_{5<t-1>}] \quad (13)$$

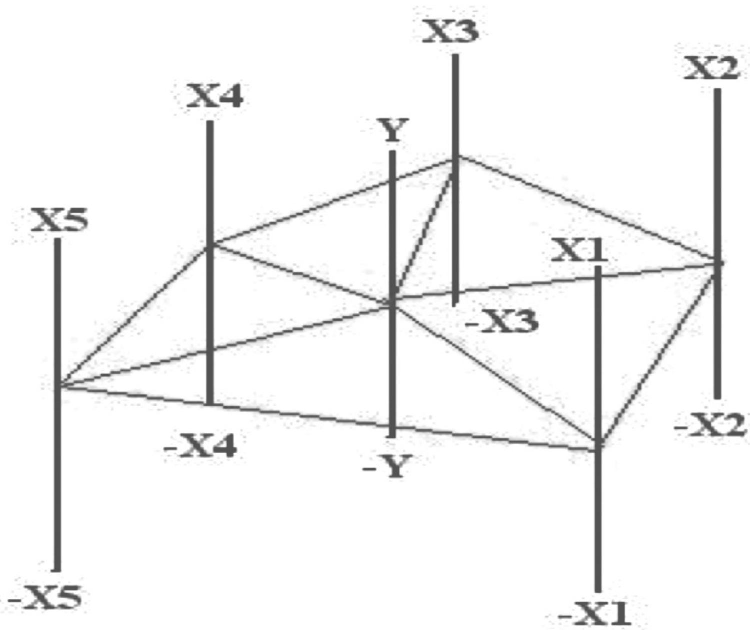
The final analysis of this model depends on the final output from the global economic forces, global social forces, global political forces, global technological forces and global natural forces and the market performance and vulnerability trend index (MPVT-Index). If we find the final output for all global forces and the market vulnerability trend index then we can start to plot each final output into its axis at the 6-dimensional coordinate space respectively (see Figure 1). Finally, we proceed to join all final outputs was plot into its axis by apply straights lines until we can build a single surface. This surface will be called «the market surface». Finally, the market surface can show three possible results (see Figure 2):

(1.) If the market surface is located on high level at the 6-dimensional coordinate space then we are referring to a «high vulnerability intensity».

(2.) If the market surface is located between a high and low level at the 6-dimensional coordinate space then we are referring to a «unstable vulnerability intensity».

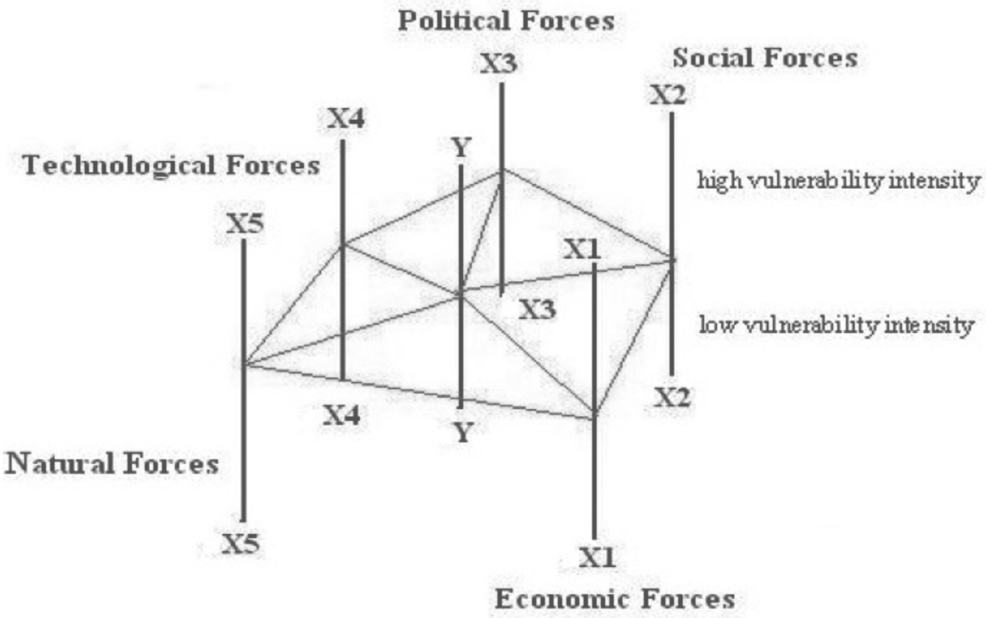
(3.) If the market surface is located under low level at the 6-dimensional coordinate space then we are referring to a "low vulnerability intensity"

Figure 1
The 6-Dimensional Coordinate Space



Source: Author, 2016.

Figure 2
The Multidimensional Graphical Modeling of the Market Surface



Source: Author, 2016.

3. Analysis of the final results

The study case for this research paper is the United States –U.S.– market vulnerability between 20th century and 21th. We are using 1500 variables (exogenous sub-variables) distributed into the five general exogenous variables (five global forces) that fix the economic global forces (500 variables), social global forces (300 variables), political global forces (400 variables), technological global forces (200 variables) and natural global forces (100 variables) respectively. Our final target is to measure the market performance and vulnerability trend index (MPVT-Index) (general endogenous variable). It is to compare the vulnerability of the market between these two centuries on the U.S. market. This model applies partial derivatives in real time under the uses of average values per decade from the same century (see Table 1).

Table 1

Levels of Vulnerability into the Global Economic, Global Social, Global Political, Global Technological and Global Natural Forces and The Market Vulnerability Trend Index (MVT)

Variable Century	Global Economic Forces (X1)	Global Social Forces (X2)	Global Political Forces (X3)	Global Technological Forces (X4)	Global Natural Forces (X5)	MPVT-Index
20th Century	0.6852114	0.425143	0.454813	0.468715	0.558741	0.61852468
21th Century	0.8521247	0.512544	0.885484	0.852414	0.858713	0.81025594

Source: Green Peace (2015); Haya Court (2015); Human Rights Watch (2015); NATO (2015); NBER (2015); North America Free Trade Area (NAFTA) (2015); Oil Producers Organization (OPEC) (2015); The Federal Reserves System (2015); The Library of Congress U.S. (2015); Transparency International (2015); United Nations (2015); World Bank –WB–. (2015); World Health Organization (2015).

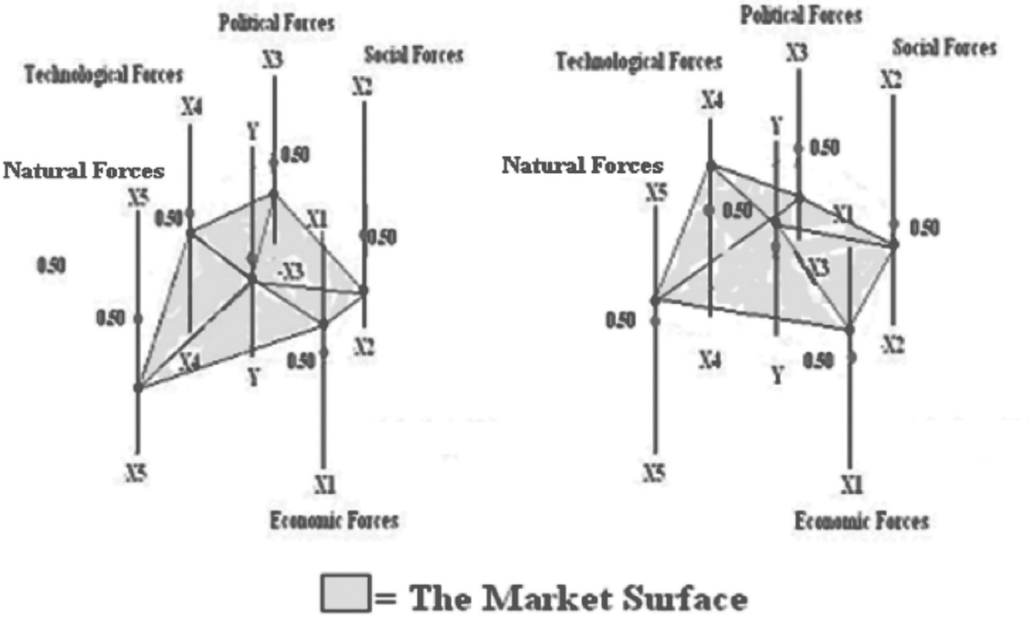
The final results in this model shows that the U.S. market behavior between 20th century and 21th century became more vulnerable according to market performance and vulnerability trend index (MPVT-Index) from 0.61852468 to 0.81025594 (see Table 1). In the case of the economic global forces vulnerability of U.S. market shows a level of vulnerability of 0.8521247 in the 21th century compare to 0.6852114 in the 20th century.

In the case of the global social forces and global political forces vulnerability of U.S. market. Both global forces experience small growth expansion into its rates of vulnerability compare to the economic global forces vulnerability. In the case of the global social vulnerability of U.S. market show a vulnerability rate from 0.425143 to 0.512544 according to the Table 1. Subsequently the political global forces vulnerability rate of U.S. market experiences rates from 0.454813 to 0.885484 (see Table 1).

The technological global forces of U.S. show the largest rate vulnerability among these two centuries that change from 0.468715 to 0.852414. Something similar happens to the natural global forces rate for U.S. market that is possible to be observed by a considerable expansion of its vulnerability rate from 0.558741 to 0.858713 (see Figure 3). Hence, we can probe that the market behavior of the U.S. market became more vulnerable according to the fast advance stages that the U.S. market can experience. If we refer to the figure 3 then we can observe clearly that the market surface of U.S. for the 20th century is lower than the market surface of U.S. in the 21th century.

Figure 3

The Market Surface of the United States in the 20th and 21th Century



Source: Green Peace (2015); Haya Court (2015); Human Rights Watch (2015); NATO (2015); NBER (2015); North America Free Trade Area (NAFTA) (2015); Oil Producers Organization (OPEC) (2015); The Federal Reserves System (2015); The Library of Congress U.S. (2015); Transparency International (2015); United Nations (2015); World Bank –WB–. (2015); World Health Organization (2015).

4. Concluding Remarks

This research paper concludes that the performance and vulnerability of the market behavior basically depend on five global forces follow by economic global forces, social global forces, political global forces, technological global forces and natural global forces. All these five global forces interact and keep in constant changes across time and space. We also encourage include all possible general-variables and sub-variables can affect the market behavior without any isolation or restriction. At the same time, we request the application of multidimensional graphical modeling in real time to observe the complex and dynamic behavior of the market as a whole. Finally, we can conclude that the analysis of the U.S. market became more vulnerable according to the advance stages of evolution in the humanity and the fast changes into each global force. It is possible to be observed in the final results of our model in the case of U.S. market performance and its vulnerability.

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Annex

Annex 1: Multidimensional partial differentiation rules

$$dy_{ij}/dx_{ij} = 0 \text{ or } f'(x_{ij}) = 0 \qquad (A.1.1)$$

$$d/dx_{ij} = nx^{n-1}{}_{ij} \text{ or } f'(x_{ij}) = nx^{n-1}{}_{ij} \qquad (A.1.2)$$

$$d/dcx_{ij} = cnx^{n-1}{}_{ij} \text{ or } f'(x_{ij}) = cnx^{n-1}{}_{ij} \qquad (A.1.3)$$

$$d/dx_{ij}\,[\alpha_{ij}(x_{ij}) \pm \theta_{ij}(x_{ij}) \pm \ldots \pm .\lambda_{ij}(x_{ij})] = d/dx_{ij}\,\alpha(x_{ij}) \pm d/d_{ij}\,\theta_{ij}(x_{ij}) \pm \ldots \pm .\lambda_{ij}(x_{ij}) \text{ or } \alpha'(x_{ij}) \pm \theta'(x_{ij}) \pm \ldots \pm .\lambda'(x_{ij}) \qquad (A.1.4)$$

$$\begin{aligned} d/dx_{ij}\,[\alpha_{ij}(x_{ij})\,\theta_{ij}(x_{ij}) \ldots \lambda_{ij}(x_{ij})] = {} & \alpha(x_{ij})\,d/dx_{ij} + \theta_{ij}(x_{ij}) + \ldots + .\lambda_{ij}(x_{ij}) \\ & \alpha(x_{ij}) + \theta_{ij}(x_{ij})\,d/dx_{ij} + \ldots + .\lambda_{ij}(x_{ij}) \\ & \alpha(x_{ij}) + \theta_{ij}(x_{ij}) + \ldots + .\lambda_{ij}(x_{ij})\,d/dx_{ij} \ldots \qquad (A.1.5) \end{aligned}$$

$$\begin{aligned} & d/dx_{ij}[\alpha_{ij}(x_{ij})/\theta_{ij}(x_{ij}) \ldots \lambda_{ij}(x_{ij})] = \alpha(x_{ij})\,d/dx_{ij} + \theta_{ij}(x_{ij}) + \ldots + \lambda_{ij}(x_{ij})/\,[\theta_{ij}(x_{ij}) + \ldots + \lambda_{ij}(x_{ij})]^2 \\ & d/dx_{ij}\,[\theta_{ij}(x_{ij})/\alpha_{ij}(x_{ij}) \ldots \lambda_{ij}(x_{ij})] = \alpha(x_{ij}) + \theta_{ij}(x_{ij})d/dx_{ij} + \ldots + \lambda_{ij}(x_{ij})/[\alpha_{ij}(x_{ij}) + \ldots + \lambda_{ij}(x_{ij})]^2 \\ & d/dx_{ij}\,[\lambda_{ij}(x_{ij})/\alpha_{ij}(x_{ij}) \ldots \theta_{ij}(x_{ij})] = \alpha(x_{ij}) + \theta_{ij}(x_{ij}) + \ldots + \lambda_{ij}(x_{ij})d/dx_{ij}/[\alpha_{ij}(x_{ij}) + \ldots + \theta_{ij}(x_{ij})]^2 \qquad (A.1.6) \end{aligned}$$

$$\begin{aligned} & d/dx_{0j}\,[\alpha'_{0j}(x_{0j}) \mathbin{\text{╥}} \theta'_{0j}(x_{0j}) \mathbin{\text{╥}} \ldots \mathbin{\text{╥}} \lambda'_{0j}(x_{0j})] \ldots \\ & d/dx_{1j}\,[\alpha'_{1j}(x_{1j}) \mathbin{\text{╥}} \theta'_{1j}(x_{1j}) \mathbin{\text{╥}} \ldots \mathbin{\text{╥}} \lambda'_{1j}(x_{1j})] \ldots \\ & d/dx_{\infty j}\,[\alpha'_{\infty j}(x_{\infty j}) \mathbin{\text{╥}} \theta'_{\infty j}(x_{\infty j}) \mathbin{\text{╥}} \ldots \mathbin{\text{╥}} \lambda'_{\infty j}(x_{\infty j})] \ldots \qquad (A.1.7) \end{aligned}$$

$$\begin{aligned} & d/dx_{0j}\,[\alpha'_{0j}(x_{0j}) \mathbin{\text{╥}} \theta'_{0j}(x_{0j}) \mathbin{\text{╥}} \ldots \mathbin{\text{╥}} \lambda'_{0j}(x_{0j})] \text{╫} \\ & d/dx_{1j}\,[\alpha'_{1j}(x_{1j}) \mathbin{\text{╥}} \theta'_{1j}(x_{1j}) \mathbin{\text{╥}} \ldots \mathbin{\text{╥}} \lambda'_{1j}(x_{1j})] \text{╫} \\ & d/dx_{\infty j}\,[\alpha'_{\infty j}(x_{\infty j}) \mathbin{\text{╥}} \theta'_{\infty j}(x_{\infty j}) \mathbin{\text{╥}} \ldots \mathbin{\text{╥}} \lambda'_{\infty j}(x_{\infty j})] \text{╫} \qquad (A.1.8) \end{aligned}$$

Annex 2: Economic Modeling in Real Time

Initially, economic modeling in real time is based on both the application of Econographicology and the construction of powerful and sophisticated software and an efficient network system. Hence, Econographicology can supply different multi-dimensional coordinate spaces to fix different multi-dimensional graphs. The construction of powerful and sophisticated software and an efficient network system follows a series of steps. Firstly, there must be a standard format to input information daily online. Secondly, all this information (I) is transferred to different databases (DB). At the same time, these databases (DB) are interconnected to a unique information data center. Thirdly, the same software can proceed immediately to plot different sets of information (I) from different databases (DB) into each axis in the multi-dimensional physical space, where each information database (DB) depends on different statistical sources such as the central bank, central government agencies, private companies, national statistics departments and public and private research institutes. Each point plotted on the multidimensional coordinate space is always changing position in real time. We are using the concept of data changes in real time (see Expression A.2.3). Basically, data changes in real time compare the information (I) between two periods of time (the past period of time and the present period of time), while the data changes in real time are simultaneously fixed into the multi-dimensional coordinate space that is itself changing position all the time. Additionally, all data changes in real time plotted in the multi-dimensional coordinate spaces are linked together by straight lines until they form a single surface in the same physical space (see Figure 4). Initially, economic modeling in real time starts with this input data function:

$$I_{C:R} = Q_1 : Q_2 : \ldots : Q_\infty \qquad \text{(A.2.1)}$$

I = Input answer **Q** = Question(s) **C** = Column **R** = Row

The next step is storage in the database (DB) equation, represented by

$$DB_{C:R} = ☼SI_{C:R} ╬ \ldots ╬ ☼SI_{C:R} \ldots \qquad \text{(A.2.2)}$$

$C = \{1, 2, 3 \ldots n\}$ $n = \infty$
$R = \{1, 2, 3 \ldots n\}$ $n = \infty$

DB = Database **C** = Column **R** = Row ☼ = Running information in real time
SI = Save Information
╬ = Interlink Database

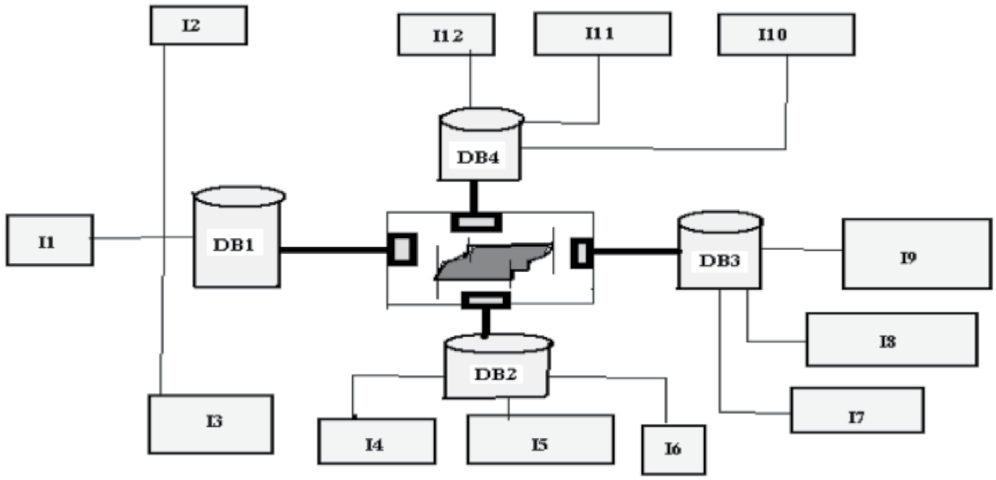
In the case of data changes in real time (☼**ΔIC: R**), we compare the information we received a day before (**t-1** = past period of time) and the information received today (**t** = actual period of time) (see Expression A.2.3).

$$☼\Delta I_{C:R} = ☼SI(t) - ☼SI(t-1) / ☼SI(t-1) \qquad \text{(A.2.3)}$$

Finally, the plotting of real time data is as follows:

$$Y_{sf} = f\,(☼\Delta I_{11} ╬ \ldots ╬ ☼\Delta I_{\infty\infty}) \qquad \text{(A.2.4)}$$

Figure 4
Economic Modeling in Real Time



Source: Author

Annex 3: The Interconnectivity of Multi-Dimensional Physical Spaces

Initially, the interconnectivity of multi-dimensional physical spaces is started by building a large number of n-dimensional coordinate spaces (vertical position) around the general vertical axis (see Figure 5). Each n-dimensional coordinate space (vertical position) can plot an infinite number of sub-exogenous variables into an infinite number of axes ($Y_{L:n}$) and a single sub-endogenous variable into its single axis ($X_{L:i:n}$).

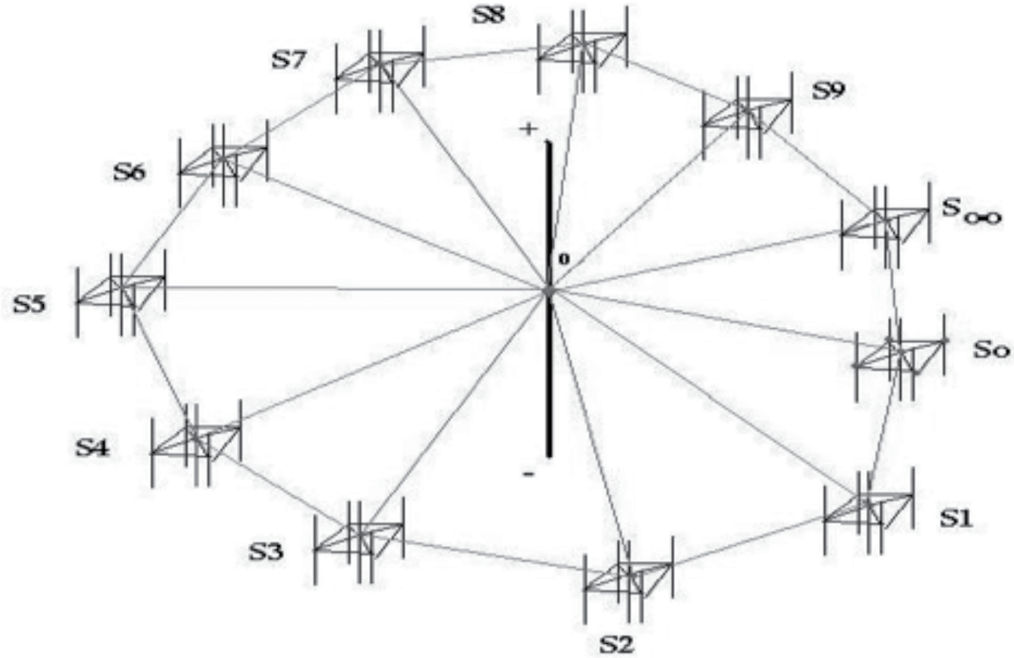
After all these variables have been plotted into its respective axes, all sub-endogenous variables ($S_{L:i:n}$) located in the center part of each n-dimensional coordinate space (vertical position) are joined to the general vertical axis through the application of straight lines until a single surface is built.

Hence, this single surface is pending among all n-dimensional coordinate spaces and the general vertical axis. This is possible under the application of the partial interconnectivity condition (╥) (see Expression A.3.1) and the general interconnectivity condition (╬) (see Expression A.3.2).

$$S0 = Y0{:}i = f\,(X0{:}0{:}i \text{ ╥ } X0{:}1{:}i \text{ ╥ } \ldots \text{ ╥ } X0{:}\infty{:}i)$$
$$S1 = Y1{:}i = f\,(X0{:}0{:}i \text{ ╥ } X0{:}1{:}i \text{ ╥ } \ldots \text{ ╥ } X0{:}\infty{:}i)$$
$$\ldots\ldots\ldots\ldots$$
$$S\infty = Y\infty{:}i = f\,(X0{:}0{:}i \text{ ╥ } X0{:}1{:}i \text{ ╥ } \ldots \text{ ╥ } X0{:}\infty{:}i) \quad (A.3.1)$$
$$I = S0\,(YL{:}n) \text{ ╬ } S1\,(YL{:}n) \text{ ╬ } \ldots \text{ ╬ } S\infty\,(YL{:}n)\ldots \quad (A.3.2)$$

From a graphical perspective, we can finally observe a large surface that is pending among all n-dimensional coordinate spaces and the general vertical axis. We assume that each n-dimensional coordinate space is moving at different speeds of time, and that the general vertical axis does so as well.

Figure 5
The Interconnectivity of Multi-Dimensional Physical Spaces



Source: Ruiz Estrada, 2016