

## Chapter 15

### **Are the New Fact-findings in the Endogenous-Equilibrium Ever Consistent with Roles and Hypotheses in Economic Analyses Using Statistics Data?**

#### *Foreword to Chapter 15*

This digest chapter summarizes the essentials of *eleven* papers. These *eleven* papers have common features such that 1) new fact-findings are all included, although they spurted up just after the publication of “*Earth Endogenous System*,” (the *EES* hereafter; lxviii, 568, 15 May 2013); 2) each paper solely uses reduced forms corresponding with endogenous equations of the *EES*, and accordingly, no inconsistency exists among new fact-findings and the *EES*; 3) each paper concentrates on its essence with hyperbola functions and hyperbola graphs, theoretically and empirically; 4) each paper stays in the two-dimensional plane or, within severely scientific framework, where three and four dimensions are not introduced into any paper; 5) each paper compares its essence with that in the corresponding papers or books in the literature but, surprisingly almost always, expresses reversed-results and reversed-conclusions and finally; 6) each paper was quite recently presented to a reputed journal or already under review by its editor(s), after examining interrelations among these *eleven* papers. That is, each paper is not unpublished but already open and just summing up in this digest chapter.

Then, what is the purpose of this digest chapter? The purpose is to reconfirm interrelated essences and to plainly explain these essences avoiding duplicate, based on one hundred endogenous equations and hyperbola functions. It is important for a researcher to communicate with readers so that here our readers may understand a whole design or picture of *eleven* papers.

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### 1. Similarities and differences of *eleven* papers

A natural question arises: what are the similarities and difference among *eleven* papers here and corresponding researches in the literature?

First for similarities, regardless of whether assumptions are required for justifying systems and models or not: i) Equilibrium, general; ii) Perfect competitions and/or marginal productivity of capital=the rate of return and marginal productivity of labor=the wage rate,  $MPK=r$  and  $MPL=w$ ; iii) No unemployment and a certain level of inflation/deflation (or, minus inflation); iv) Years for convergence in the transitional path or its coefficient; v) Stop macro-inequality and higher wage rate and finally and most importantly; vi) Consumption and technology or, utility and the rate of technological progress, exogenous and endogenous.

Second, for differences, in a few words, if similarities are replaced by purely endogenous, results are all reversed. These differences do not express absolute differences but relative differences. These relative differences are results of the market principles that show no causes but results and only vertically by nature. The above similarities and differences are mischiefs of the nature or God. The market principles are next to God, which implies no one can manage continuously and anywhere, even in several countries that reject price and interest trading. As long as the demand and supply curve exists after human introduced money exchange for goods and services, it is a fact that prices and quantities are separately expressed in the literature. It is most difficult for researchers to introduce this fact into theories and practices. Researchers and economists have made greatest efforts to message these difficulties at any rate hitherto. The *EES* and hyperbola functions have just simplified these difficulties by proving the relative price level  $p$ =absolute price level  $P=1.00000$  and then the elasticity of substitutions,  $\sigma = 1.00000$ .

*Purely endogenous* made it possible for researchers to measure  $p=P=1.00000$  and  $\sigma = 1.00000$  immediately under any circumstance. *Purely endogenous* produces *seven endogenous parameters* to express essential values to control all the parameters and variables, independent and dependent. *Seven endogenous parameters* are derived using absolute values such as population, net investment after capital consumption, capital stock, returns, wages, and national disposable net income. There is no problem in the initial data, which simultaneously and instantly turn to endogenous, where causes and

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results express the sides, with no tautology and with cyclical movements, stable and dynamic, and, balanced and unbalanced under ‘the Minus and Plus Principle’ that correspond with ‘the Yin and Yang principle’ in the old China. Note that the Minus and Plus Principle is proved numerically in hyperbola functions, while the Yin and Yang principle is independent of numerical theories and thoughts.

Here is the list of these eleven papers:

1. *IAER*. (IAER-D-13-00101, under review). (2013a). The Real Rate of Profits/Returns Equals Zero, Actually and Endogenously: With Money-Neutral of the Financial/Market Assets to the Real Assets. 20p.
2. *RES*, Manchester, presented (under review). (2013b). Royal Roads to a Utopian Economy, Wholly under the Endogenous-Equilibrium=the Price-Equilibrium. 21p.
3. *JFE*, (Jan 23, 2014, received). (2014c). Structural Improvement in Labor Productivity, Individual Life-Time versus Systems. 12p.
4. *AEJ* (AEJ-D-13-00049R1, after revised). (2013d). Consumption-Neutral to Growth and Technology: Actual versus Endogenous. 28p.
5. *JFE* (Dec 11, 2013, received). (2013e). Why is a Discrete Cobb-Douglas Production Function the Numerical Core of Social and Economic Science? 33p.
6. *IAES*, Madrid (Presented). (2013f). Stop macro-inequality and full-employment in reality: Starting with  $\alpha$ -neutral. 19p.
7. *IAES*, Savannah (Presented). (2013g). From the Break-Even Point to the Net Sales and Returns Equations: Commonly Macro and Micro. 14p.
8. *CMI* via a Journal (Historical). (2014h). Foundation of social/economic science proved by two-dimensional plane hyperbolas (2DPH) and by government and private sector, differently from mathematics and statistics. The first version was directly presented on 1st Sept 2013 but, at the responsibility of the author’s misprocessing.
9. *Review of Income and Wealth* (Jan 10, 2014, received). (2014i). The United-Measure System between Macro and Micro: the Prices-Parabolas, Concave, Convex, versus the Amounts-Hyperbolas. 20p.
10. *Review of Economic Studies* (Feb 13, 2014, presented to Wiley). (2014j). Optimum functions-measure numerated by using the curvature in the two-dimensional plane. 14p.
11. *Review of Economic Studies* (Feb 13, 2014, presented to Wiley). (2014k). Qualitative Democracy levels-measure by the curvature, towards moderation= the origin in the plane. 20p.

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Further, I have written up the following five manuscripts but without presenting each to a journal suitable for acceptance. These five manuscripts supplement the above eleven papers already presented.

1. Economics versus Management based on Peter Drucker (1999, 2002).
2. Economics versus Statistics based on physics.
3. Q & A: How to interpret James Tobin (1980).
4. Q & A: How to interpret Gregory, N. Mankiw (2006).
5. Q & A: How to interpret Microeconomics of Samuelson and Nordhaus (19e, the last edition, 2010).

Lastly, for readers' convenience, four figures are presented. These figures are directory for key words in the *EES* and new fact-findings and fitted for comparison with related literature. These figures have their own aspect and range by figure. **Fig. 1** (Whole design: from the literature to purely endogenous system) is most widely. **Fig. 2** (Strategies of enterprises united into macro-equilibrium aggregated system) stresses a new stream of macro economy, against the stream of literature based on micro analyses, comparing strategies in management with policies in economics. **Fig. 3** (Processes reaching united whole system in the two-dimensional plane) is more concretely and scientifically, stressing the importance of processes. **Fig. 4** (Strategies with actual statistics data and Policies based on endogenous database) is for differences and similarities of statistics and endogenous data. We intend to be more general and more common in theory=practice and causes=results.

### **2. Consistency with Roles and Hypotheses in Economic Analyses**

To show the consistency with roles and hypotheses in ample economic analyses using statistics data, *ten of eleven* digest papers are summarized respectively using abbreviated and underlined naming as follows.

- (1) *IAER*. (IAER-D-13-00101, under review) (2013a). The Real Rate of Profits>Returns Equals Zero, Actually and Endogenously: With Money-Neutral of the Financial Market Assets to the Real Assets. 20p. JEL codes: E44; E31; E43. Abbreviated to the  $RRR=0$ , not repeating its Abstract.

The  $RRR=0$  discusses the neutral-money and clarifies the essence of the

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market principles. Are financial and market policies able to raise the consumer price index, CPI, by increasing money supply or M2? This experiment is a challenge for the market principles. According to the KEWT database<sup>1</sup>, it is impossible for leaders and policy-makers by a country to manage the market principles and control the CPI. The market principles express resultant prices vertically by goods and services but, cannot express real causes behind curtains. Any researcher in the literature cannot tell us real causes and reasons, based on the real assets-side; historically, correctly and, purely endogenous. This shows a hidden limit of the market principles by nature. We need to supplement this indispensable limit and it is the *EES*. In fact, the KEWT database accurately proves three tests using the exchange rate, money supply using M2 and equivalents, ten year debt market yield, each by country.

The *EES* connects the market principles with hyperbola functions. Simply the  $RRR=0$  proves that the real<sup>2</sup> rate of return is zero,  $RRR=0$ , at once by hyperbola function of  $r(i)$  and a point of hyperbolic curve and its horizontal asymptote ( $HA=0$ , here vertical asymptote,  $VA=0$ ). It implies that the rate of inflation equals the nominal rate of return, where formula of nominal=real+inflation as clarified by I. Fisher (1907, 1930). At once, we recalls Edmund, S., Phelps' (1961, 65, 66) formula to the golden rule establishment. The essence of the golden rule is the same between endogenous and exogenous. Purely endogenous, much more concrete and numerical: Relation between the rate of return and the growth rate of national disposable net income is tied up with the relative share of capital  $\alpha = \Pi/Y$  divided by the product of the ratio of net investment to national disposable net income  $i = I_{NET}/Y$  and the qualitative net investment coefficient  $\beta^*$ . The Phelps coefficient,  $x \equiv r^*/g_Y^*$ , is obtained by using  $\alpha = \Omega \cdot r^*$  or  $r^* = \frac{\alpha}{\Omega}$  and accordingly,  $x = \alpha/(i \cdot \beta^*)$  holds, where  $r = r^* = r_0$ . The  $RRR=0$  proves under a constant population that  $\beta^* = 1.0000$  or  $(1 - \beta^*) = 0$ . It implies that at appoint of zero, no technological progress exists so that zero is an ultimate moderation immeasurable. In a closed system, where the balance of payments=0, saving is replaced by net investment so that the Phelps coefficient  $x = \alpha/(i \cdot \beta^*)$  has its implication more generally using the saving which F. P. Ramsey (1928) wanted to express mathematically and optimally.

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<sup>1</sup> The KEWT database is Kamiryo Endogenous World Table series, 1960/90-2012/13 for 86 countries; by country, sector (Total economy = the G sector + the PRI sector, based on amounts/absolute values), and area, whose original data (ten, in the real assets and, fifteen, external/exogenous) are taken from *International Financial Statistics Yearbook*, IMF.

<sup>2</sup> There are three sorts of real: 1) 'real' of nominal less inflation rate in I. Fisher (1907, 1930); 2) 'real' of the real assets in national accounts; and 3) 'real' in the real world where we live.

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- (2) *RES*, Manchester, presented (under review). (2013b). Royal Roads to a Utopian Economy, Wholly under the Endogenous-Equilibrium=the Price-Equilibrium. 21p. JEL codes: B41, C61, E61, O40, P51, Z10. Abbreviated to the Utopian Economy, not repeating its Abstract.

The Utopian Economy intends to enlarge the two-dimensional plane carefully and scientifically, without hurrying up new scientific stance. For this design, the Utopian Economy is full of figures and Appendices. There is much room for communications between readers, editors, and new fact-findings. We need tolerance until researchers feel sympathy and understand unique endogenous and graphical presentations in scientific ranges. Mathematics and geometry are united with graphs, proving new fact-findings and first appearances in known golden ratio and unknown silver ratio.

**Fig. 1** Royal roads connected with a circle of Utopia common universe economy by country and, the other is Appendices; **Fig. 2** Hyperbola real assets optimum principle and Parabola-maximized profits principle; **Fig. 3** Development of the relationship between circle and ellipse; **Fig. 4** Corrected bliss point of diagonal and circle; and, **Fig. 5** First proofs in plane topology: The Golden ratio equal to the Silver ratio.

For Appendices: **Appendix 2** Scientific approach to topology under two-dimensions. **A2-1** Development of the relationship between circle and ellipse; **A2-2** Corrected bliss point of diagonal and circle; and **A2-3** Proof for overlapping the Greece Golden ratio with the author's Japan Silver ratio.

The Utopian Economy, as shown in Fig. 1 at first, enjoys sweat fruit in a unique equilibrium such that the utopian economy to realize full-employment and no inflation. Utopia turns to 'in reality' from a fairy story. There are a lot of equilibriums in the literature under assumptions but, the speed years for convergence have common feature. This second paper of Utopia corresponds with the first paper of  $RRR=0$ , with different cut end. Busy readers may stay at the first and second papers.

- (3) *JFE*, (Jan 23, 2014, received). (2014c). Structural Improvement in Labor Productivity, Individual Life-Time versus Systems. 12p. JEL codes: D13, I31, J30, N10. Abbreviated to the Life-Time, not repeating its Abstract.

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The Life-Time recalls a typical case indispensable under the market principles and general in the literature.  $a = f(x_1, x_2)$  in econometrics text-books shows contour line/curve between two goods, where convex and concave appear on the same line/curve. Optimum/OPT is used broadly and MAX/MIN is derived on the same plane. New fact-findings geometrically discovered here advocate that OPT differs from MAX and MIN completely. OPT is obtained in hyperbola that requires two quadrants, the 1<sup>st</sup> and 3<sup>rd</sup> or the 1<sup>st</sup> and 2<sup>nd</sup> and the existence of the origin must be a necessary condition. MAX and MIN is drawn by parabola that requires no quadrant and no origin and, just obtained by solving a mathematical equation.

The Life-Time hit a new idea for the distinction of OPT from MAX and MIN, along with labor productivity; individual versus system and, convex versus concave. Convex might be a sort of expression of parabola whose stance is wholly given in a parabola. The literature longs for how to numerate individual utility function, without relying on differential and partial differential/integral calculus.

We distinguish individual with system. The Life-Time is limited to individual utility for next generations by the current person and its family. Individual labor-productivity differs from system labor-productivity by nature; human life versus sustainable organic system. Convex top-wards to the right holds generally for individual. Concave, bottom-wards to the right generally holds in the endogenous system.

Then, how can we measure convex and concave endogenously and commonly for individual and system utilities? This is the essence of the curvature-measure. The curvature-measure is common to hyperbola functions, as stated in (10) the United-Measure. In the *EES*, instead of the curvature-measure, combinations of the VA, the HA, the Width, and Shape were invented. The curvature-measure is one overall product among eleven fact-findings.

Labor productivity is originally related to the wage rate, with the relative share of capital/labor. Therefore, The Life-Time deepens the wage rate and this is the current requirement today. For example, the following two figures tell us how to numerate per capita ratios wholly and purely endogenously: Figure 1 'Individual life-time productivity,' with the Wage rate, MAX & MIN and, Figure 2 'Two weights' to be able to control average and incremental relationship. Economic analysis in the labor market remains partial since 'by market' cannot integrate the whole picture. Yet, these partial analyses serve as

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managerial *strategies* to reinforce economic *policies* and economic analyses in reality. ‘In reality’ is an expression of the substance of the real assets and supports national accounts.

(4) *AEJ* (2013d). (AEJ-D-13-00049R1, after revised). Consumption-Neutral to Growth and Technology: Actual versus Endogenous. 28p. JEL codes: B41, C61, E10, H60, O30. Abbreviated to the C-neutral, hereunder and more essentially.

Consumption spending by households-activities most severely determines future macro-economy. A. C. Ramsey (543-559, 1928) proved mathematically saving and consumption in a closed economy and, even today, we cannot overrun his proof. Why? This is because there is no general way but Hamiltonian’s undetermined multiplier (with Lagrange multipliers) for solving partial differential and integral up to date indispensably under fundamental assumptions. The C-neutral solves this problem purely endogenous. Consumption increases independently of technological progress in a whole system. An endogenous rate of technology is always above zero, which contrasts with the case setting ‘under no technological progress.’ Technology always progresses by endogenously improving three qualitative net investment coefficients by sector,  $\beta^*$ ,  $\beta_G^*$ , and  $\beta_{PRI}^*$ , independently of consumption.

It seems that the literature and the *EES* differ completely but, each roof is the same and both-sides (i.e., the literature and the *EES*) are united if micro-utility forecast/estimate is connected with a unique macro-utility of the *EES*. As a result, the ratio of the wage rate to the rate of returns is wholly measured over years, with returns to wages and the relative discount rate of consumer goods to producer goods;  $(r/w)$  and  $(\rho/r)$ . In this respect, the C-neutral is an empirical saver of both-sides.

General formulations relying on in the literature remain theories while the *EES* proves fact-findings theoretically and empirically at the same time and under no assumption. As a result, three sorts of elasticity of substitutions are mathematically formulated;  $\sigma < 1$ ,  $\sigma = 1$ , and  $\sigma > 1$ . Remarkably with tolerance, Hideyuki Adachi (1-21, *AME* 12, 2009) published ‘Unemployment and Income distribution in the medium-run growth model.’ based on O. J.

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Blanchard (1997, 2000) and using three period actual data in Japan.<sup>3</sup> H. Adachi concludes that his results show  $\sigma > 1$  instead of  $\sigma < 1$ . Theoretically,  $\sigma < 1$  is correct but, real cause is unknown in the literature. Purely endogenously, real cause is attributed to extremely high level of deficits and debts.

Finally, real cause of the above general formulations is attributed to the rate of technological progress, exogenous and external; back to R. M. Solow (1956) so that Solow supplemented using Solow (1957), which is ever consistent with the *EES*.

(5) *JFE* (2013e). (Dec 11, 2013, received). Why is An Discrete Cobb-Douglas Production Function A Numerical Core of Social and Economic Science? 33p. JEL codes: B41, E10, E 60, E 61. Abbreviated to the C-D pf.

The C-D pf is a base for the *EES*. The C-D pf sums up the essence of the *EES* in terms of measure under the market principles. There have been several sorts of equilibriums in the supply-side of neo-classical and in the demand-side of neo and new Keynesians. Equilibrium holds with assumptions required for equations by model or system. Equilibrium effectively and/or efficiently holds, regardless of whether or not model or system takes advantage of i) the Cobb-Douglas production functions, ii) the production functions, and iii) no production function. There is no priority or superiority/inferiority among and between several sorts of equilibriums formulated under the market principles, as researchers have proved theoretically and mathematically with respective underlying assumptions.

The C-D pf illuminates why a discrete Cobb-Douglas production function expresses the essence of purely endogenous system or cyclical green system by country and by sector. One key to disentangle knotted threads is the measure of the diminishing returns to capital coefficient,  $\delta_0$ . When this coefficient turns to the relative share of capital,  $\alpha = \Pi/Y$ , the years for convergence stays at the point of convergence in the transitional path using recursive programming.

In another words, empirical existence of  $\delta_0$  finally guarantees the

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<sup>3</sup> Adachi's Table 1 shows macroeconomic data for the three periods: i) High growth period, 1956-1973, ii) Stable growth period, 1974-1990, and iii) Low growth period, 1991-2005, where five actual statistics data are summarized. 1) the GDP growth rate, 2) the Capital coefficient, 3) the Unemployment rate, 4) the Labor share, and 5) the Saving rate.

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constant returns to scale (CRS) destined in the Cobb-Douglas production function. Further  $\delta_0$  proves the existence of Say's (1803) law of supply=demand and, the measure of this law. Of course, continuous Cobb-Douglas production functions are formulated in the literature yet, with presumed state of the CRS. Formulated  $\delta_0$  empirically allows us to control a unique macro-equilibrium in any case, static and dynamic and, discrete and continuous; wholly as a complete social and economic system.

In short, the C-D pf is a collection of our writing mathematically and perceives that main academic schools are alive, up to date, historically, and anywhere in this world.

Lastly, the C-D pf is organic and endowed with insight and intuition towards economic cyclical sustainability and, surprisingly within scientific and mathematical range of the two-dimensional plane. Thus, the C-D pf will contribute to a progress of scientific analyses when researchers accept a new wave of economic analyses stepping into five/six dimensions beyond the two-dimensions. Social and economic system delicately differs from natural sciences, but natural scientists have boldly experimented learning by doing in physics and elemental chemistry, nano and universe, on this earth, as (2) the Utopian Economy touched this reality in Appendix.

(6) *IAES*, Madrid, presented. (2013f). Stop macro-inequality and full-employment in reality: Starting with  $\alpha$ -neutral. 19p. JEL codes: E44, E31, E43. Abbreviated to the  $\alpha$ -neutral.

The  $\alpha$ -neutral advocates that the relative share of capital,  $\alpha = \Pi/Y$ , is independent of macro-inequality or the change in the wage rate at the macro level. Macro-inequality is defined such that differences of the wage rate per person become enlarged extremely; e.g., the ratio of the rich to the poor income per person, to one thousand from one hundred times. How can leaders and policy-makers fairly stop this extreme result over years? The  $\alpha$ -neutral proves that stop macro-inequality is in reality with full-employment. In the KEWT database, no tradeoff between the wage rate and full-employment exists always by country. Typically, this hopeful fact-finding is verified by comparing  $(r/w)$  with  $(\rho/r)$  by year and over years. The relative discount rate of consumer goods to producer goods,  $(\rho/r)$ , is tied up with consumption per

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person, as clarified in the above (4), the C-neutral of consumption to technology.

The  $\alpha$ -neutral guarantees that the relation lying between  $(r/w)$  and  $(\rho/r)$  definitely determines the increase in the wage rate and, under full-employment. This is because the *EES* measures marginal productivity of capital equals the rate of return and, marginal productivity of labor equals the wage rate by year;  $MPK = r$  &  $MPL = w$ . And, this measure marches with other measures of full-employment, no inflation, perfect competition, and others unsolved, where the elasticity of substitutions  $\sigma = 1.00000$  and the price levels of  $p = P = 1.00000$  are precisely measured. In short, the *EES* measures whatever we hit in mind and, its base is perfect competition and full-employment.

A separate paper shows a figure of  $(r/w)$  and  $(\rho/r)$  by country, in 1960/80 to 2010/2011, for 68 countries and, by area such as Asia, Euro, and EU, East and Near East Europe, Latin America, and Africa. Trends of  $(r/w)$  and  $(\rho/r)$  differ significantly by country, reflecting unique national taste/preferences. When  $(r/w)$  decreases relatively compared with  $(\rho/r)$ , stop macro-inequality is weak and, vice versa.  $(r/w)$  reflects actual movements, where endogenous and actual data completely overlap. This is a new fact-finding. When the movements of  $(r/w)$  is similar to those of  $(\rho/r)$ , macro-inequality remains unchanged. The  $\alpha$ -neutral is tied up with macro-technology, macro-utility, macro-equilibrium, and macro-economy.

(7) *IAES*, Savannah, presented. (2013g). From the Break-Even Point to the Net Sales and Returns Equations: Commonly Macro and Micro. 14p. JEL codes: B41, C61, D13. Abbreviated to the *BEP* and externals, to combine macro and micro.

How to unite macro and micro data? This is a big problem in the literature. Most economists are based on micro and extend micro to macro partly due to everlasting individual utility function. The *EES* is based on the macro-level and looks for how to unite micro households and enterprises with macro-economy by sector. Two sister papers are (7) the *BEP* and externals and (9) The United-Measure System between Macro and Micro presented to *RIW*, as will be explained below. The *BEP* and externals sums up macro and micro from the viewpoint of mathematics, accounting, and financing. The United-Measure System sums up macro and micro from the viewpoint of geometry.

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The *BEP* and externals clarifies relations among/between value added  $Y$  and externals  $E$  such as materials, purchases, and processing costs to sub-contractors, supposing net sales  $X$  are composed of  $Y$  and  $E$ . We are not sensitive to magnitudes of amounts by item but the level of the break-even point (*BEP*). This is because accounting textbooks only show that the  $BEP=1.0000$  in its equation by company, where  $f = 1 - v$  holds, where fixed expenses to net sales  $f=F/X$  is composed of  $Y$  and, variable expenses to net sales  $v=V/X$  is composed of  $E$ . Fixed and variable wages are deeply involved in life-time and part-time employment systems. At the macro-level, if net sales  $X=Y+E$  are introduced into national accounts, corresponding equation and its results surprisingly change, distinguishing and numerating the level of *BEP*.

This is a new fact-finding and gives a new knowledge to employment systems. Recall, Peter Drucker (1909, Wien, to Nov, 2005) never give up to life-time system particularly for Japan. However, the *BEP* and externals generally proves that the life-time employment system is most effective and efficient among all employment systems in the world.

Thus, the *BEP* and externals has its own meaning and implication. Firstly, profits by company and actual wages by household are accurately connected with returns and endogenous wages aggregated at the macro-level. Aggregated amounts lying in national accounts have long been discussed as an unsolved problem. Thus secondly, the quality of aggregated amounts is now measured by the level of *BEP*. Wages and the wage rate are most important for stop macro-inequality and, wage problems are now wholly investigated by supplementing the level of *BEP* with  $(r/w)$  in (6) the  $\alpha$ -neutral.

We respect economic data and databases accumulated in the world, as shown in *International Financial Statistics Yearbook*, IMF, and the World Bank analytical data, over continuous trial and error efforts, using statistics tools and serving developing country governments and/or central banks. When macro data are ever consistent with micro data, the quality of data are ideal. Data's precise disclosure will progress social and economic science as a base.

- (8) CMI via a suitable Journal (2014h). Foundation of social/economic science proved by two-dimensional plane hyperbolas (2DPH) and by government and private sector, differently from mathematics and statistics. The first

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version was directly presented on 1 Sep 2013 but, at the responsibility of the author's misprocessing.

The paper to CMI will be rewritten in the near future after reconfirming the first appearances in each of ten new fact-finding papers. Then, the rewritten paper will be presented to an authoritative mathematical Journal. Behind mathematics, the Western and Orient civilization have preserved each own characteristics. Nevertheless, both civilizations have the same root intuitively. Globalization and national taste, preferences, and culture by country apparently coexist harmoniously by nature. This is, in reality and here geometrically proved by using the two-dimensional plane, as some of these proofs have been published in a few papers (i.e., (2), (9), and (10)) of this digest paper, *Journal of Economic perspectives*, presented in Feb 13, 2014.

(9) *Review of Income and Wealth*. (Jan 10, 2014, received). (2014i). The United-Measure System between Macro and Micro: the Prices-Parabolas, Concave, Convex, versus the Amounts-Hyperbolas. 20p. JEL codes: B41, C61, D13, I31, J30, N01. Abbreviated to the United-Measure here below.

The United-Measure sums up endogenous measures wholly as an economic system. We were inspired by Avner Offer's (450-476, 1997) the bottom figure on page 470, 'Between the gift and the market: the economy of regard,' calculating gift market price under the market principles, as the first appearance. When we had calculated the relation between average and its marginal or incremental, macro and micro, we hit an idea that we might find a new fact. Really, this idea resulted in a new fact-finding here in the United-Measure.

How can we integrate a ratio (for price and quantity in a plane) with cost=amount as the product of price and quantity, in the same plane? No one can correctly answer how to integrate price, quantity, and cost, in the same plane when these should be measured, apart from an illustration. We distinguish 'For an amount and amounts' with 'For a ratio and ratios,' inventing the two-weights,  $W_1$  and  $W_2$ . Upstream was Kamiryo (1965, 1974 for MS, MIT).

The United-Measure has uniqueness in that all the measures are expressed geometrically. Typical case is 'The prices-parabolas, concave, convex, versus the amounts-hyperbolas,' designed and drawn in section 4. Geometrical researches are more deeply succeeded in (10) the OPT-functions and the Curvature and (11) the Democracy Levels with 8 linear functions, following this (9), the United-Measure.

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Partly due to the marketing principles, it was difficult for us to complete the United-Measure. We are much obliged to accumulations of the literature since A. Marshall and Adam Smith and also; C. E. Kneoppel (1933), J. W. Vatter (1947), Meade, J. E. (1945, 1957, 1962) and, Meade, J. E., and Stone, J. R. N. (1969); ‘The Construction of Tables of National Income.’

(10) *Review of Economic Studies* (Feb 2, 2014, presented to John Wiley & Sons, Ltd.). (2014j). Optimum functions-measure numerated by using the curvature in the two-dimensional plane. 14p. JEL codes: B41, C10, C51, E10. Abbreviated to the OPT-functions and the Curvature.

The OPT-functions and the Curvature discovers a new fact that five attributes of hyperbola are now simply measured by the curvature, just like a contour map in this world. There has been no difference between optimum (OPT), maximum (MAX), and Minimum (MIN), using parabola and mathematical tools invented by Hamilton function and Lagrange’s method, as shown in (2) the Utopian Economy, (3) the Life-Time, (4) the C-neutral and, here (10). The *EES* and new fact-findings have the two-dimensional plane with hyperbola.

Hyperbola has five attributes, the vertical and horizontal asymptotes (VA and HA), the Width, and the Sharpe, where the *EES* expresses qualitative differences using these five attributes. The OPT-functions and the Curvature receives the last Pandora’s Box and this is a simple feature of the Curvature living in a Sea of the Utopian economy clarified in (2).

The Curvature is calculated on the two-weights,  $W_1$  and  $W_2$  invented in (9) the United-Measure. In this respect, (9) and (10) are sister papers. What is the implication of a measurable qualitative curvature? Yes, numerical replies to immeasurable values, ratios, and wholly within the range of the *EES* or an economic system. When some ranges of social science and behavior science are not formulated using endogenous equations under no assumption or under perfect competition, there is no room or way to apply the measurable qualitative curvature.

The Curvature is measured qualitatively in the OPT-functions and the Curvature. We were happy to be able to publish Appendices ‘Hyperbolas:

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Formulation, Types, Attributes, Calculations, and Graphs,' in the *EES* (476-523, 2013). We confess that if we could watch and inspect the Appendices day and night, the curvature-measure was not born here in (10). The curvature-measure is useful to interpret valleys between statistics and endogenous data and analyses, as exemplified using  $(r/w)$  in (6) and (7). Numeric must be the first, middle, and last processes towards cyclical green economy in reality.

- (11) *Review of Economic Studies* (Feb 2, 2014, presented to John Wiley & Sons, Ltd.). (2014k). Qualitative Democracy levels-measure by the curvature, towards moderation= the origin in the plane. 20p. JEL codes: B1, C8, C9, D4, D5, E1. Abbreviated to the Democracy Levels with 8 linear functions.

The Democracy Levels with 8 linear functions measures whatever democracy evaluating qualitative levels of democracy geometrically by country. The Democracy Levels with 8 linear functions is worthy of an ultimate goal for researchers and economists to understand the whole new fact-findings. A linear function is a reduced form of corresponding hyperbola function, where the curvature is replaced by a simple line. Line function is fitted for our new finding of symmetry between/among countries.

Thousand experiments rarely produce an axiom. 'A constant capital-output ratio' is one of an axioms proved in the *EES*. For example, let us compare the capital-output ratio of 68 countries in the KEWT database, 2011: Based on the data of **Table A1** in (11), **Fig. A1** shows the gradient and the intercept by country, 2011, for linear functions of  $c(\Omega)$ ,  $\Omega(c)$ ,  $\Omega(k)$ , and  $k(\Omega)$ . We excitingly find that the gradient is *symmetric* to the intercept. , as drawn in **Fig. A1**,

In principle, all the academic schools, clubs, and societies are correct, standing at each side. This correctness, all of research members perceive. This correctness, all of research members are able to prove geometrically. Our moderation axiom was born in old Japan. Moderation has its point in the origin of the two-dimensional plane. The origin, however, is an immeasurable tiny point constituting moderation. 'The Negative and Positive Principle' is proved by hyperbola function and stays at four quadrants. 'The Moon and Sun natural law' and 'the Yin and Yang principle' in old China are similar, except for independent philosophy and free from equations and measurements.

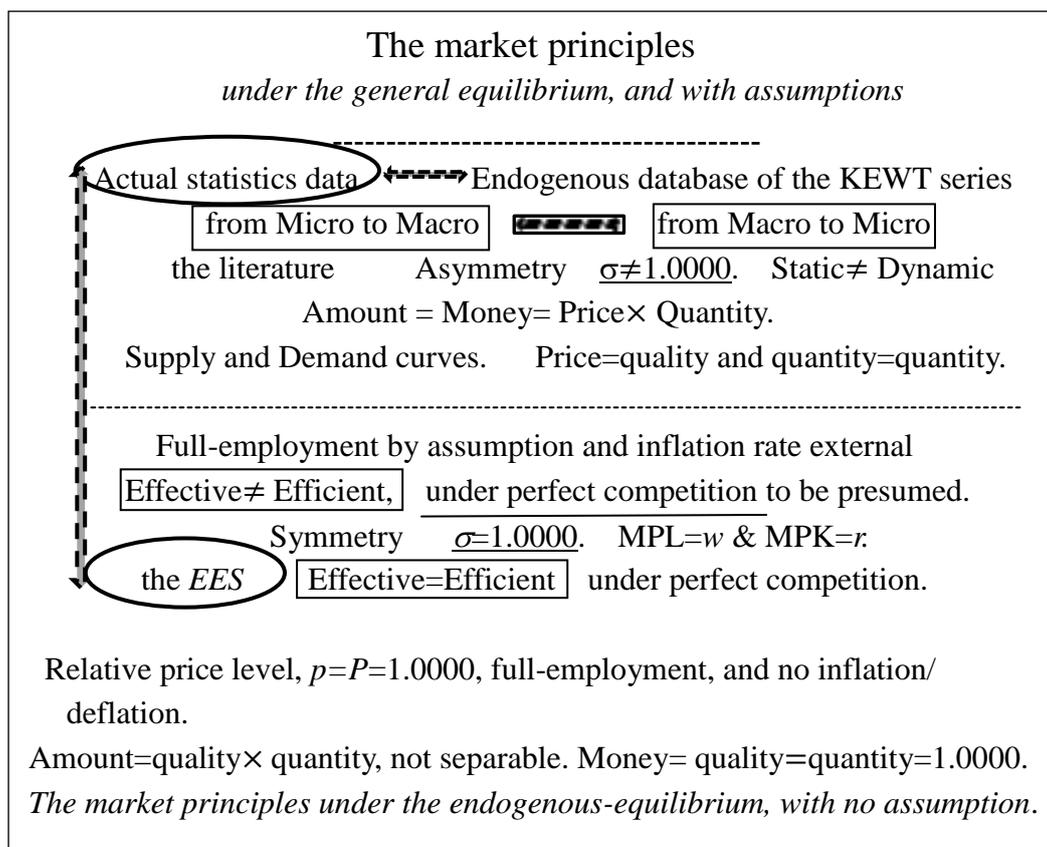
## **Are the New Fact-findings in the Endogenous-Equilibrium Ever Consistent with Roles and Hypotheses in Economic Analyses Using Statistics Data?**

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When a state is unstable, it is unbalanced and out of endogenous equilibrium. Recovery shocks immediately happen and cure unstable, dynamic and static circumstances. This process certainly results in the real assets-oriented business cycle. William D. Nordhaus (1975, pp.169-190) challenged for investigating relations between democracy and business cycle empirically using the UN by country and, national accounts and OECD data. William D. Nordhaus (ibid.), for the first time, solved difficulties in differential and integral calculus, together with 25 equations and eight geometrical graphs, his Figure 1 to Figure 8. We understand that this research may be the first and last verification for democracy, votes, and business cycle for three long periods since 1947. We confess that it was fortunate for us to stare a word of *symmetry* in his verification using actual data. We have proved in the *EES* that actual data are always within a certain range of endogenous data hitherto. Yes, his research and ours are really consistent or even coherent.

Empirically by country, the Democracy Levels with 8 linear functions discovers that eight *symmetric* linear functions are each a surrogate function for measuring the qualitative levels of democracy by country, using the KEWT database for 68 countries, and leading to a few new-facts on eight linear functions; closer to *asymmetric* researches found in the literature and, at a point of convergence in the transitional path.

The same never happens again in our economic world, always changing and steadily recovering towards a correct direction by nature. This is because human delicately differs from other animals and mammals. We live with the Nature and money. Money=quality=quantity=1.00000 by nature. We look for social roles rather easily but it was extremely difficult for us to formulate and geometrically prove an axiom of a constant capital-output ratio by country, as mathematically derived by Paul A. Samuelson (1970, pp.1477-79).

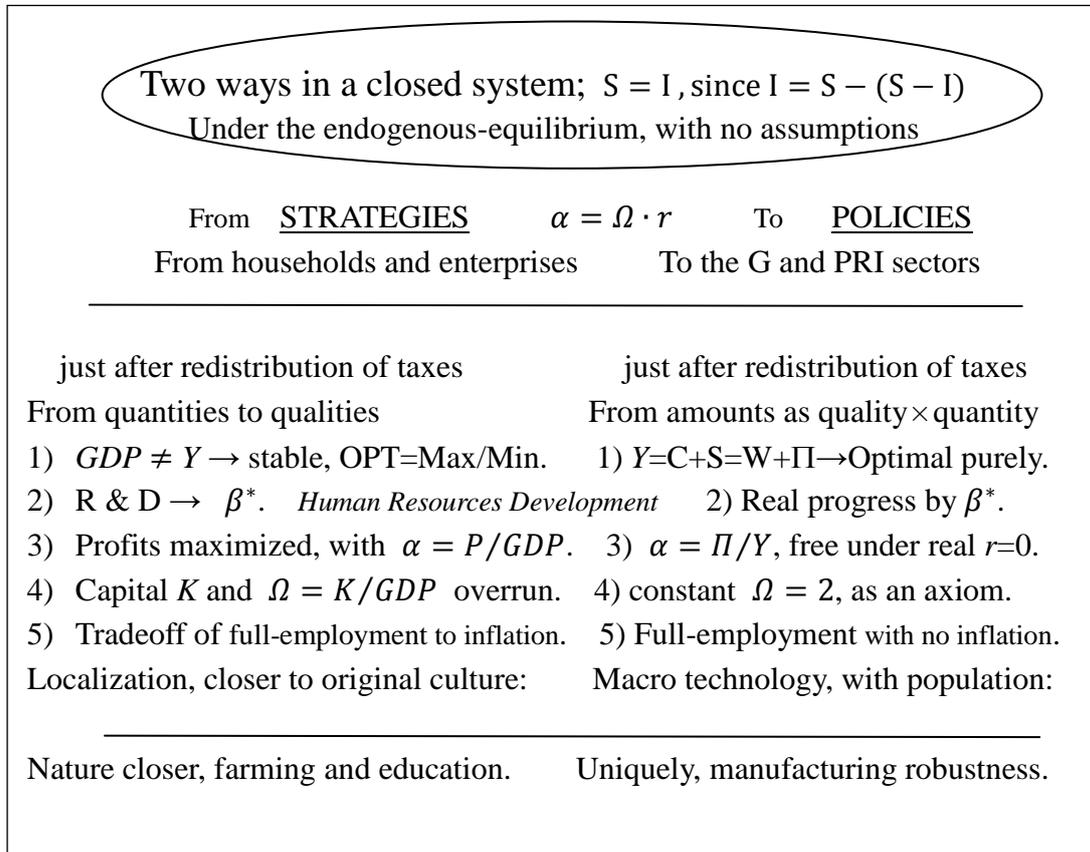


**Note:** The *EES* is “*Earth Endogenous System*,” (lxviii + 568p., 15 May 2013).

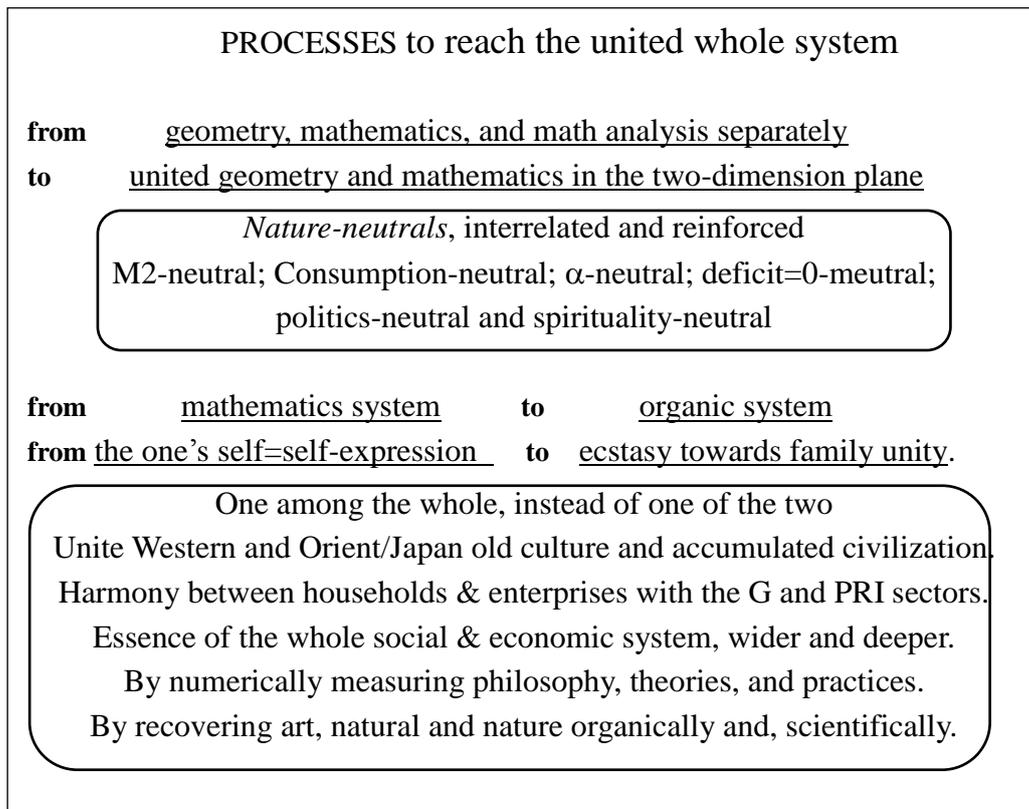
**Fig. 1** Whole design: from the literature to purely endogenous system

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**Fig. 2** Strategies of enterprises united into macro-equilibrium aggregated system



**Note:** Eleven papers for new fact-findings based on hyperbola functions are involved in this figure.

However, the order of 1st, 2nd, and 3rd of the eleven papers summarized in the text differs from the above order.

**Fig. 3** Processes reaching the united whole system in the two-dimensional plane

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What differ between Strategies **S** and Policies **P**?

- 1) Fundamentally, **S** uses actual statistics data widely and freely, while **P** is based on the KEWT database and endogenous data.
- 2) From the point of measure, **S** relies on double-entry bookkeeping and account by title so that the qualitative technology coefficient at the end, while **P** starts with the measure of this coefficient first; completely reversed.
- 3) **S** remains partial, vertical, and asymmetric under the market principles and with indispensable assumptions of perfect competition and divisional, while **P** is able to measure even perfect competition endogenously.
- 4) **S** is management-oriented while **P** is economics-oriented by country.
- 5) **S** reinforces **P** while **P** leads national economy to better whole consistently.
- 6) **S** is yearly and discrete while **P** is dynamic, balanced, flexible, and presents how to restore situations correctly once organic goal is given by researchers.

**Fig. 4** Strategies with actual statistics data and Policies based on endogenous database

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