Chapter 2

Royal Roads to A Utopian Economy, Wholly under the *Endogenous-Equilibrium=the Price-Equilibrium*

Foreword to Chapter 2

Aiming at full-employment in reality, this chapter sums up the whole story based on "*Earth Endogenous System* (hereafter, the *EES*)," robustly reinforcing the market principles from vertical to wholly as a system and constitutes six nature-aspects as the essence of the *EES*: Money, consumption, the relative share of capital (α), deficit, politics, and spirituality. The whole story realizes the endogenous-equilibrium = the price-equilibrium, managing the speed years by country and by sector. The whole story remains scientific in two-dimensional plane in this chapter, using the author's topology which is explained in Appendix for supplement. Statistics data cooperate with endogenous data under theory=practice, where growth and returns are controllable and, in reality attains a utopian economy, with full-employment and no more inflation/deflation and assets-bubbles.

This chapter was actually presented to *Royal Economic Society Conference*, Manchester, but rejected in Dec 2013. The author happily attended the Annual Conference, Manchester, on 7th to 9th April, 2014, to understand current stream of researchers and related literature, practically and by leaning by doing. As a result, the author could keep at hand the whole contents of the manuscript, rather fortunately. Why fortunately? This is because the whole contents include the core of the author's lifework, in particular geometrically and for future cooperation by country, with individual country's national taste, preferences, culture, and history, independent of technological progress. Underlying philosophy is one unit of the West and East, Japan civilization, under the same market principles and towards higher level of democracy. The author perceives that markets and democracy are blessed with human target, not only economically but also human history, and beyond space and time. Therefore, this chapter turned to be the first appearance of its whole contents, secretly free from intellectual property problem.

This chapter, wholly and orally with least endogenous equations, summarizes new story composed of new findings/discoveries, with topological solution. Why is it impossible for an economy to realize full-employment as a key target of economic policies? This question must be the severest problem in the world today. Even central banks have currently taken into consideration the rate of unemployment as one priority of their policies in addition to price stability. The literature generally admits a fact that full-employment is in hands under perfect competition. This fact is proved in the *Earth Endogenous System* (May 2013; hereafter the *EES*), where both full-employment and

perfect completion are simultaneous results, once 'seven endogenous parameters' in the 'discrete' Cobb-Douglas production function are measured using the KEWT database series.

In the *EES* there exist endogenous equations and, with no assumption. It implies that all the parameters and variables are simultaneously measured by endogenous equations. Then, what are obstacles laying between the current economic systems and the *EES*? We ultimately admit that there is no method to fill the gap between actual statistics data (discrete *practice*) and purely endogenous data (*theory* integrating discrete and continuous). Perhaps in the 21st century no purely theoretical data will appear except for the *EES*. Currently the *EES* satisfies all the conditions for filling the above gap. And, the *EES* has produced its database for 86 countries, 1960/90-2011 by sector (total T, government G, and private PRI), whose original data is statistics data, 10 real-assets data and 15 financial/market external data, in *International Financial Statistics Yearbook* (*IFSY*), IMF.

Seven endogenous parameters express the qualitative level of the endogenous-equilibrium by country and directly reinforce the market principles prevailing under the price-equilibrium. The above gap was born due to the market principles' full duty, where producer and consumer goods and services are priced vertically by goods and services. The absolute price holds by good and services and cannot precisely be aggregated as a whole system. The market principles are by nature vertical while the *EES* is a textile methodology and has an endogenous tool to spin vertical warp and horizontal woof. Further, A System of National Accounts (SNA) is records-oriented while the *EES* is policy-oriented, where both systems are consistently compatible.

It is impossible for one genius to set up world system-modeling, so as to integrate the supply and demand curves with absolute prices and under the market principles. The *EES* and the KEWT database are based on a gift that the relative price level p and the absolute price P perfectly overlap under $p=P=1.0000000$ by country, sector, and year and over years.

S*even endogenous parameters* (see Appendix 1 at the end) determine the level of endogenous data in the KEWT database. Once these seven endogenous parameters are measured, thousand variables, independent and dependent, are simultaneously measured accurately. However, there is a fact that policies are all reinforced by strategies and tactics and that these strategies are free from policies whose constraint policies must be completely consistent each other within the whole endogenous system. Strategies and tactics are free from any constraint and restriction and able to easily accept vertical character of the market principles. As a result, households and enterprises just before redistribution of taxes successfully work with animal-spirited and are able to boldly take

action whatever strategies. This chapter, for simplicity, focuses policies to realize full-employment based on the real assets of the SNA.

Full-employment is involved in the structural balance of payments (*BOP*) and deficit and, in consumption-neural to growth and technology simultaneously. As a result, endogenously and exogenously, full-employment is connected with stopping macro-inequality in social stratification; with the Phelps coefficient, marginal productivity of capital and marginal productivity of labor (*MPK=r* & *MPL=w*), the real rate of return= zero (*RRR*=0), and no more inflation/deflation and no assets-bubbles. All of these causes are simultaneously equal to those results and are scientifically explained under the two-dimensional Plane Hyperbola (2DPH). For simplicity, a scientific approach to topology under 2DPH is separately summed up in Appendix 2 at the end.

Appendix 2 implies that Pythagoras triangle equals the author's equilateral triangle; that the Greece golden ratio equals the author's silver ratio; or that Western culture incidentally overlaps ancient agriculture ('agri'-culture) succeeded in Japan. This fact backs up the author's consumption-neutral or, a fact-finding that consumption takes root in each country's culture. Or, national taste (preferences, culture, and history) produces sustainable consumption independently of technological progress by country and, human civilization is revival by area. Royal roads to a utopian economy is within hands of policy-makers and leaders, from fairytale to yearly execution.

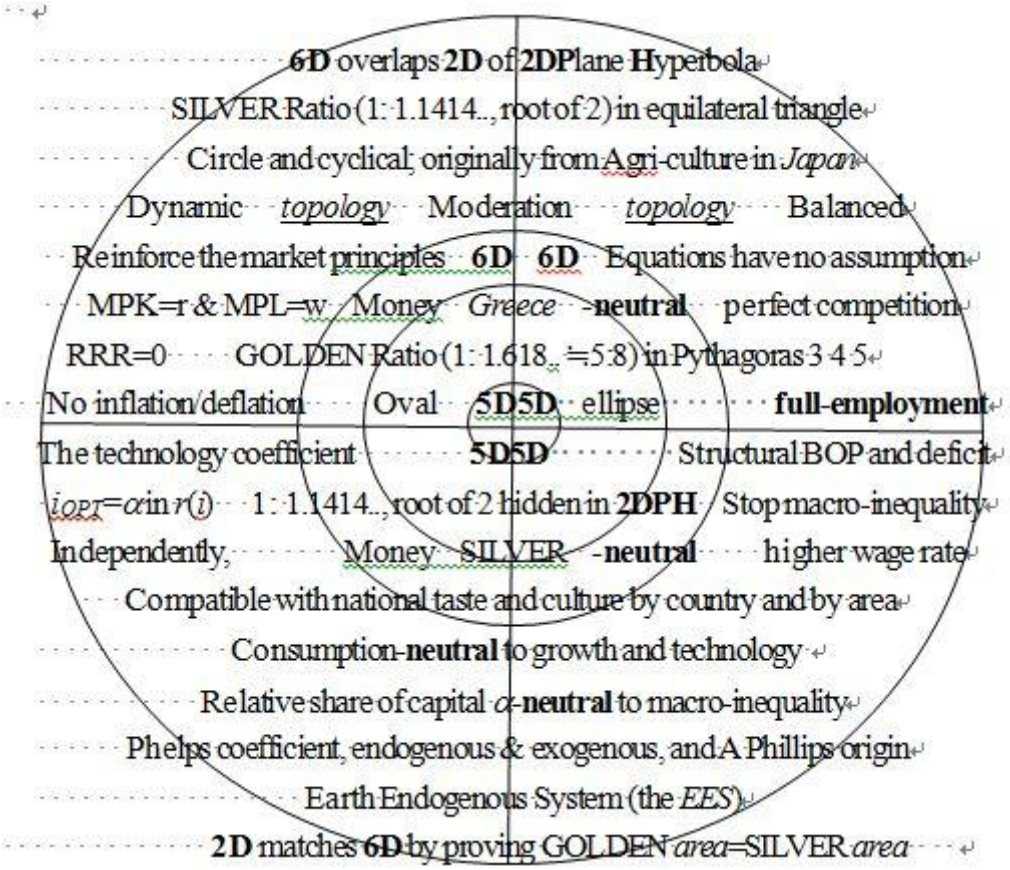
Signposts to Chapter 2: the *EES* (Earth Endogenous System); full-employment; money-neutral; the market principles; the endogenous-equilibrium; the price-equilibrium; structural *BOP* and deficit; stop macro-inequality; the relative share of capital-neutral (α-neutral); the real rate of return= zero (*RRR*=0); inflation/deflation; assets-bubbles; consumption-neutral to growth and technology; Lucas, Phelps, Phillips, the two-dimensional (2D), and the 2D plane hyperbola (2DPH). In Appendix: circle; ellipse; the golden ratio; the silver ratio; equilateral triangle; Pythagoras triangle.

1. Introduction

This chapter wholly summarizes new story and findings/discoveries we have found hitherto. New fact-findings/discoveries are composed of six nature-neutralities; money-neutral, consumption-neutral, the relative share of capital-neutral (α-neutral), deficit-neutral, politics-neutral, and spirituality-neutral, with three axioms, whose key core is a constant capital-output ratio. New findings were born incidentally soon after the publication of *Earth Endogenous System: To Answer the Current Unsolved Economic Problems* (lxviii+568, 15 May 2013; hereunder the *EES*). New findings are perfectly consistent with the *EES* and its KEWT (the Kamiryo Endogenous World Table) database. This is because endogenous equations in the *EES* are respectively reduced to topological

graphs, set under the two-dimensions (2D): New fact-findings are all simplified by corresponding functions measured in the 2D.

Further new fact-findings are numerically consistent by sector (total T, government G, and private PRI). And, concrete expressions such as the real rate of return = zero (*RRR*=0), nominal growth rate = the rate of inflation/deflation, stop macro-inequality, and full-employment are precisely measured and, by country, by the G sector, and by the PRI sector. As a result, new fact-findings are able to absorb new facts found in the literature such as Phelps E. S. (1961) and Phillips, A. W. (1958) and, further by the G sector and by the PRI sector.



Note: The remaining scientific and topological analysis of this chapter is shown in Appendix 2 for simplicity. Except for Fig. 1 and Introduction, this chapter does not step into five-dimensions (5D) and six-dimensions (6D) proposed by Shizuko Ishida.

Fig. 1 Royal roads connected with a circle of a utopian common universe economy by country

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This chapter mostly presents *cyclical* routes step by step orally, except for some key equations. Appendix 1 shows fundamental equations based on seven endogenous parameters.

Why is the whole version shown by a *circle*? The title of this chapter is Royal roads to a utopian economy. Look at **Fig. 1**. How can we enter into Royal roads? This question overlaps *round about crossroads* peculiar to the UK road system. Leaders and policy-makers are economic drivers for decision-making and its execution and, always want to select a priority among 360 degree direction in round about economic system. A driver or policy-maker cannot directly enter the center of round about system or New-scientific topology of 5 dimensions (5D). He or she stays at scientific world of 6 dimensions (6D). The 6D has social stratification. Concretely, the author's money-neutral ever prevails anywhere among 360 degree direction. The author empirically proved the money-neutral, by applying the three externals (ten year debt market yield, M2, and the exchange rate; for 86 countries, 1960/90 to 2013) to money-neutral. Money-neutral proves that the real assets and financial/market assets match consistently under perfect competition and with no assumption. We express each endogenous equation by its reduced form of hyperbola and that in the two dimensional plane hyperbola (2DPH).

Each country has maintained its economy backed up by individual utility and macro-utility of national taste, preferences, history, and culture and civilization. Consumption-neutral works in the 2DPH. Consumption is independent of growth and technology theoretically and empirically. Each country has its policy-priority always and the policy-priority changes often in the short-term. In the long-term, the priority becomes stable and, ultimate target falls into full-employment. This chapter sets full-employment the ultimate policy. Why is full-employment not within the hands of policy-makers? This chapter questions and answers full-employment throughout the text and flexibly looks at Royal roads as round about transportation system.

2. Most serious obstacle to full-employment

There must be a lot of excuses and protests to the existence of the current high rate of unemployment. First of all, we indicate a fact that the purpose of a system for national accounts (SNA, 1993, 2010) is not policy-oriented but record-oriented. Endogenously, policy-oriented is not compatible with records-oriented. A typical fact is that the SNA cannot realize three-element equality of production= expenditures= income. This is because the SNA shows final income distribution after redistribution of taxes, using households and enterprises.

The *EES* (*Earth Endogenous System*, 15 May 2013) measures all the parameters and variables conceivable just before tax-redistribution. National disposable income *Y*, instead of *GDP*, measures $Y=C+S=W+P$ consistently by country, sector, and year and over years. Why is the above three equality of national income accurately necessitated? Recall Samuelson's earliest papers (1939, 40, 41, 42; see References). Samuelson theoretically indicates that zero deficit produces stable growth. It means that the balance of payments (*BOP*) is connected with deficit (ΔD) in the real assets, as shown by Samuelson (1939-42). What is wrong with deficit?

The worst is an assumption that deficit as government saving less government net investment equals government cash flow-in less cash flow-out. This assumption misleads Royal roads and makes many irrevocable wrong paths. Decision-makers and policy-makers under the market principles must be alert in a fact that a unique deficit is measured using the real assets. The market principles may allow us to compare dual measures for deficit. Dual measures, however, dig risky pitfalls here and there in the circle of **Fig. 1** above.

One more pitfall is a notion that accountants are able to window-dressing in the balance sheet, the profit and loss (income) statement, and cash flow statement. This notion is true to some extent in accounts by adjusting or taking out some double-bookkeeping accounts. The author's new fact-finding denies this misleading notion. Why is the *EES* unable to adjust or take out some endogenous data? This is because the *EES* has no assumption and is perfectly free from window-dressing. How is this fact-finding proved? The KEWT database proves this discovery as ever true. We proved this fact-finding by analyzing KEWT database. Consistency is proved by the process to connect LONG (1960-2011) data-sets with Short (1990-2011) data-sets (121-169; 171-216, 2013). No one can make window-dressing in the *EES* and the KEWT database. Why? The *EES* holds under perfect competition and simultaneously measures the rate of unemployment= zero. Note as an experiment, that KEWT 6.12 used a rate of unemployment as the last means to adjust the endogenous-equilibrium while KEWT 7.13 deleted a rate of unemployment as the last means for attaining the endogenous-equilibrium.

Then does what condition determine qualitative levels of endogenous data under the endogenous-equilibrium? No condition is required at all. The speed years for convergence by year reflect the whole background of qualitative levels of endogenous data. The speed years are inverse number of the speed coefficient, which constitutes seven endogenous parameters (see, **Tables 1**, **2**, and **3**). *Seven endogenous parameters* (see Appendix, 1) wholly determine all the parameters and variables as many as conceivable by using a *discrete* Cobb-Douglas production function. Data are discrete while empirical analyses are continuous and/or discrete, no matter.

No one has formed such a revised Cobb-Douglas production function together with no assumption, after Cobb-Douglas invented the simple function taking almost two decades in early the 1990s. Note that some of Keynesian models, new and neo, express a similar model but, in a specific condition and, is not generalized. For example, see the AK model in Hussein Khaled and A. P. Thirwall (2000). Evidence is simple. Evidence is a litmus test for a *purely endogenous* rate of technological progress: whether or not the rate of technological progress holds generally connecting flows (net capital consumption) with stocks (capital stock). Or in another way, can you measure the capital-output ratio, the relative share of capital, and the rate of return, each endogenously with no assumption? Data change second by second while hypotheses or rules must be fixed. No genius can construct a sketch using the supply and demand curve under the market principles. Vectors, where ***AB≠BA*** holds, correlations, probabilities, differentials and integrals, expectations, and growth accounting look for blue birds in instantly changing data. Mathematics holds partially and matches the whole but, social and economic science does not. Nevertheless, we are optimistic and expects bright future in reality. Why?

3. New discoveries save decision-makers and policy-makers

The *EES* has found a fact that statistics data are always within a certain range of endogenous data. It implies that full-employment is within the hands of decision-makers and policy-makers, regardless of statistically, endogenously, exogenously, or externally. This must be a gift from the Nature or God.

$\alpha = \Omega \cdot r$ is an identity. Under a fixed relative share of capital, $\alpha = \Pi/Y$, in the KEWT database by year, a constant rate of return, $r = r^* = r_0$, prevails, corresponding with a constant capital-output ratio, $\Omega = K/Y$ (or, $\Omega = \Omega^* = \Omega_0$). These relationships hold, endogenously backed up by applying R. Sato's (1980) conservation laws to the KEWT database. The *EES* started with Samuelson's constant capital-output ratio. R. Sato (1980) ultimately proved a constancy of the capital-output ratio but, exogenously. We raise a question: Why does the literature use the capital-labor ratio, $k = K/L$, exclusively instead of $\Omega = K/Y$? We here answers this question. The literature has not expressed total factor productivity (*TFP*; technology stock) using the relationship between the capital-labor ratio and the capital-output ratio. Even Solow (1956, 57) uses the capital-labor ratio, exogenously giving the rate of technological progress (technology flow). There is no connection of $k = K/L$ to $\Omega = K/Y$ in the literature. D. Jorgenson's (1961) capital flow-approach was revolutionary at that time. Why does connecting-development not appear between capital flow and capital stock after 1961? Again, under the market principles, it is impossible to measure capital stock with no assumption and by sector. We luckily presented an equation of $A = TFP = k^{1-\alpha}/\Omega$, in PhD thesis at the University of Auckland (Note 19, p. 38, Nov 2003).

$A = TFP = k^{1-\alpha}/\Omega$ is an identity but, without this identity the *EES* never has been born.

The real rate of return= zero (*RRR*=0) is one concrete expression of six new discoveries after the *EES*. This expression is simply proved in the 2DPH using the rate of return function to net investment share, $r(i)$. This is because a rate of inflation (here, deflation is a minus inflation) equals the value of the horizontal asymptote (HA), where the vertical asymptote (VA) is zero or overlaps the *y* axis of the 2DPH. It implies that the rate of inflation equals the growth rate of output. I. Fisher's (1906, 1930) theory holds under the market principles, where nominal rate= real rate + inflation rate. These rates are all given externally in the markets. The author's money-neutral holds under the market principles and reinforces the market principles. Market data are each consistent with endogenous data.

The real rate of return= zero (*RRR*=0) is most vital expression in six new discoveries, as proved separately in this chapter. This is because this concrete expression is simultaneously related to the (endogenous) Phelps (1961) coefficient lying between the rate of return and the growth rate of output. Further, this concrete expression produces another concrete expression that the Phillips (1958) curve reduces to the Phillips point at the origin, due to full-employment. This is because the rate of unemployment= zero, under the endogenous-equilibrium, makes the Phillips curve and the NAIRU (non-accelerating-inflation rate of unemployment) of Paul De Grauwe (p. 48, 2005) to match the origin, where a rate of change in population, n_E, equals an actual growth rate of population, *n*: $n_E = n$. The real rate of return= zero drives the circle in Fig. 1 safely and presents a short-cut policy-priority to full-employment.

4. Consumption-neutral to growth and technology: macro versus micro

Consumption-neutral is one of six nature-neutrals. This new discovery is a high tree. This tree makes it possible for policy-makers to take an extensive view of obstacle to full-employment. The routes deeply and differently spread between macro and micro. We try to explain plainly as much as possible and avoiding equations (for related equations in detail, see Appendix 1).

The literature has usually been based on micro-oriented. We consent to this stream of progress. Ideally macro is based on micro data and, effects and results. Samuelson (1950) was quite in a loss how to treat individual utility. Up-to-date, for example, Hicks, J. R. (1961), Mackenzie, L. (1983), Graham, L. and Snower, D. J. (2008), and Diamond, Peter. (2011), each connects own aspect with a rate of unemployment cautiously in the circle of **Fig. 1**.

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The *EES* has invented macro-utility using the relative discount rate of consumers goods to producers goods, ρ/r, the propensity to consume, $c = C/Y$, and the relative share of capital, $\alpha = \Pi/Y$. A function of $(\rho/r)(c)$ is empirically quadratic and wholly expresses national taste, preferences, culture, and history, by country. This function is adjusted until its correlation coefficient becomes equal to 1.0000. As a result, KEWT database applies $13.301\mathrm{c}^2 - 22.608\mathrm{c} + 10.566$ commonly to almost all the countries (even to no financial-market countries such as Iran, Saudi Arabia, Oman, and United Arab Emirates). Exceptionally, $1.8638\mathrm{c}^2 - 2.4547\mathrm{c} + 1.758$ is used for several saving-oriented countries (e.g., Singapore, Malaysia, and China, occasionally for some periods). Hence, $(1-\alpha) = \frac{c}{(\rho/r)}$ and, $k = \frac{K}{L} = \frac{(\alpha/(1-\alpha)}{(r/w)}$ or $k = \frac{w \cdot \Omega}{1 - r \cdot \Omega}$ are derived endogenously.

Without these equations, policy-makers cannot raise the wage rate to stop macro-inequality. Marginal productivity of capital, *MPK*=*r*, and marginal productivity of labor, *MPL*=*w*, are measured simultaneously. $MPK = \Delta Y/\Delta K = r$ and $MPL = \Delta Y/\Delta L = w$ show that perfect competition is measured simultaneously under a constant level of prices, relative and absolute, *P*=*p*=1.000000. In short, the *EES* does not use micro-utility but macro-utility. Recall that policies are macro-oriented while strategies are micro-oriented. Micro-oriented strategies reinforce macro-oriented economic policies. In this respect, the *EES* differs from micro-oriented stream of the literature. This uniqueness accepts and numerically satisfies most severe critic presented by Lucas R. E. (1976).

Consumption-neutral guarantees growth and technology. Consumption is free from the growth rate of output and the Phelps, endogenous and exogenous, coefficient. A fact-finding in the *EES* shows that the more negative the rate of change in population, the higher the rate of technological progress is. The Phelps coefficient, $x = (\alpha/i \cdot \beta^*)$, neutralizes an influence of the relative share of capital on macro-inequality. Suppose that net investment equals returns/profits, $\alpha = i$. Then, the Phelps coefficient reduces to $x = 1/\beta^*$. It implies that the relationship between the rate of return and the growth rate of output is controlled by the technology coefficient. Further, under $1/\beta^* = const.$, the following three relationships hold.

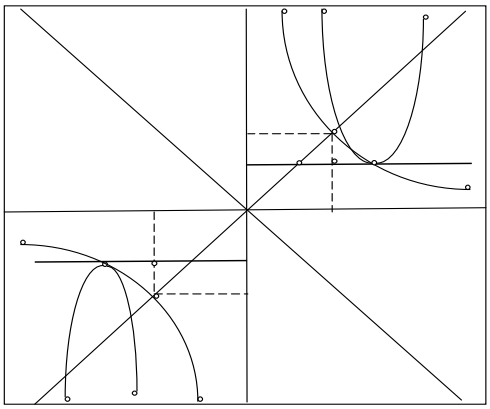
i. If $\alpha > i,\ r > g_Y^*$ holds.
ii. If $\alpha = i,\ r = g_Y^*$ holds.
iii. If $\alpha < i,\ r < g_Y^*$ holds.

The relative share of capital is tightly related to $1/\beta^*$ and accordingly, the rate of technological progress. Thus, the relative share of capital cannot determine macro-inequality.[1]

[1] New discover here rejected the following view that the lower the α the higher the *w* is.
Using $w \equiv W/L$, $w = (1-\alpha)y$, $\pi_{\Pi/L} \equiv \Pi/L$, $\pi_{\Pi/L} = \alpha \cdot y$, $y = w + \pi_{\Pi/L}$, $Y = S + C = \Pi + W$, and $1 = s_{S/Y} + c_{C/Y} = \pi_{\Pi/Y} + w_{W/Y}$, an equation of $g_A =$

Further, recall new discovery that the real rate of return= zero (*RRR*=0). Then, the above three equations each loses its meaning, where the rate of inflation equals the nominal growth rate of output. Nevertheless, it follows that if $\alpha = i$, $r = g_Y^* = 0$ holds. A condition of returns= net investment (after capital consumption) is vividly alive. It implies that the relative share of capital, $\alpha = \Pi/Y$, is a key element of new discoveries and that the optimum point of returns/profits maximized is given by at $\alpha = i$ on the *x* axis, $i = I/Y$.

Fig. 2 justifies the relationship between hyperbola and parabola.[2] Parabola is able to seek its original address in topology. Hyperbola and parabola are consistently united in geometric topology. The graphical show-up expresses a finding that the endogenous-equilibrium overlaps the price-equilibrium (recall Fig.1 for the whole version and under money-neutral). Hyperbola holds under the endogenous-equilibrium, which reinforces the market principles under the price-equilibrium.



Samuelson's Parabola maximized is united with profits maximized with net investment minimized in 2D Plane Hyperbola (2DPH)

Fig. 2 Hyperbola real assets optimum principle and Parabola-maximized profits principle

$\alpha \cdot g_r + (1-\alpha)g_w$ is derived. This equation implies that the lower the α the higher the *w* is.

Here attention to the expression of $\alpha = \Pi/Y$: Π shows <u>profits</u> in microeconomics and, Π shows <u>profits</u> even in macroeconomics if the framework follows 'just after tax redistribution of national disposable income,' where households and enterprises appear. The Π in the *EES* shows <u>returns</u>, which follows 'just before tax redistribution of national disposable income.' For simplicity, the author uses the relative share of <u>capital</u>, $\alpha = \Pi/Y$, for any case.

[2] The author visited several university libraries of the US in Oct 2013 and, thankfully confirmed that Fig.2 is the first appearance in the literature, with other topological findings in this chapter. This trip is the third one after National Library, Athens, March 2012. Note hyperbola and parabola are usually shown using cone.

5. Conclusions

This chapter summed up the whole version of new findings/discoveries in the *EES*, with Figures 1 and 2. New discoveries for decision-makers and policy-makers directly express nature-neutrals, money-neutral, consumption-neutral, the relative share of capital-neutral (α-neutral) and deficit-neutral. The *EES* is always policy-oriented by country and by sector. New discoveries are based on macro-oriented specific mechanics. New discoveries have common background yet, micro strategies are welcome to steadily reinforce and realize vital policy-priority. Statistics data are always within a certain range of endogenous data. The market principles are reinforced by the endogenous-equilibrium.

Nature-neutrals in this chapter are further extended to politics-neutral and spirituality-neutral. This is because politics-neutral realizes optimum range of effectiveness and efficiency in statistics data and because spirituality-neutral is able to avoid arbitrary judgments by behavioral decision-making. As a result, nature-aspects are composed of six aspects. Besides, six nature-aspects hold simultaneously under the endogenous-equilibrium=the price-equilibrium directly measurable by seven endogenous parameters. As a result, three axioms appear whose core is a constant capital-output ratio. The constant capital-output ratio solely holds in the *EES* and KEWT database. Two other axioms are: 'no window-dressing in accounts allowed' and 'the negative and positive principle as topological philosophy numerically united with the *EES*.' In short, six nature-aspects and three axioms are short-cut of the essence of the *EES*, expressed shorter and simpler. The short-cut is only available when the whole system expresses simultaneously theory=practice under no assumption and accordingly, under perfect competition.

Royal roads are everlasting and its results depend on leaders/decision-makers and policy-makers. Full-employment exists in reality. Full-employment is related to the whole version yet, fill-employment basically starts with structural balance of payments and deficit. We have many balanced steady signposts flexibly and dynamically by country, sector, and year and over years towards a utopian economy. Fairytale story is in reality, as proved by new discoveries on economic policies.

Democracy has its signposts so as not to have failures in the 21st century. The 21st century is people-oriented; by people, of people, and for people, justified by *RRR*=0. Human experiences, back and forth, have found royal roads towards a utopian economy. Historically there is no waste and no useless. The level of democracy depends on the level of spirituality-neutral. Everything processes with learning by doing. No more inflation/deflation and assets-bubbles are repeated. Anything is right on his/her side, although the other side apparently seems to be adverse. Truth exists under the negative and positive principle simultaneously and always, since balanced dynamics holds second by second. Numerical topology is always bright and relaxed. Democracy will turn from the second best to the best through leaning by doing.

Table 1 the US, the UK, Sweden, and Japan: The speed years for convergence by country (1)

	$1/\lambda^*$	$1/\lambda_G^*$	$1/\lambda_{PRI}^*$	$1/\lambda^*$	$1/\lambda_G^*$	$1/\lambda_{PRI}^*$	$1/\lambda^*$	$1/\lambda_G^*$	$1/\lambda_{PRI}^*$	$1/\lambda^*$	$1/\lambda_G^*$	$1/\lambda_{PRI}^*$
	the US			**the UK**			**Sweden**			**Japan**		
1960	47.18	51.84	48.49	48.09	23.77	61.83	26.37	219.94	31.15	3.59	99.63	4.17
1961	47.34	40.86	50.41	49.61	29.03	59.44	27.80	176.06	25.19	0.60	42.54	1.20
1962	43.97	35.20	47.67	61.97	71.17	61.33	27.92	1057.89	26.89	21.53	62.32	9.21
1963	44.73	46.39	46.19	62.26	70.77	63.86	27.48	55.57	27.40	112.55	34.37	860.48
1964	44.97	38.86	48.02	38.91	30.25	42.70	25.47	41.45	24.91	41.01	21.57	46.63
1965	37.87	53.12	37.52	42.34	27.36	48.80	23.98	38.29	24.05	31.54	13.61	40.13
1966	36.02	66.92	34.84	44.16	38.31	47.17	25.53	56.79	23.45	25.61	11.69	32.46
1967	39.11	87.44	36.63	40.23	22.47	47.93	26.61	44.52	25.46	21.15	13.71	25.22
1968	39.03	36.44	42.51	35.77	38.78	36.68	27.37	92.29	22.60	19.96	14.79	22.99
1969	38.54	110.11	35.54	38.52	61.75	34.12	27.06	54.94	24.41	19.20	16.70	21.46
1970	43.79	99.70	42.83	39.50	74.39	34.06	24.27	22.81	27.10	18.56	18.27	19.78
1971	39.92	54.98	43.79	44.15	66.19	42.06	30.93	36.97	30.67	19.99	19.24	21.24
1972	36.66	48.14	40.05	47.65	18.81	62.89	31.12	34.72	31.15	19.49	16.25	21.93
1973	33.59	52.00	35.55	37.23	13.46	54.06	34.25	31.38	36.46	17.94	16.20	19.56
1974	35.50	95.66	33.89	38.01	9.22	63.76	26.36	18.79	29.95	18.01	16.82	19.09
1975	45.52	34.67	50.48	131.10	5.18	49.87	27.02	62.22	25.95	20.74	10.62	29.17
1976	37.29	18.26	42.96	3.03	2	4.48	28.03	2658.56	26.39	21.72	10.80	33.55
1977	31.94	55.03	31.61	3.18	9.26	5.73	38.86	329.30	37.01	23.17	10.71	41.73
1978	28.35	37.84	28.86	4.79	1.84	4.27	59.92	18.28	80.58	23.63	10.62	50.61
1979	27.75	73.21	26.38	5.71	3.58	3.81	40.00	8.22	56.79	22.16	11.50	42.91
1980	32.28	54.81	32.76	9.64	12.95	10.28	38.04	11.86	55.31	29.79	12.17	51.91
1981	29.52	83.76	29.50	19.74	30.81	31.25	98.43	24.43	14.17	30.22	41.91	30.93
1982	37.28	24.19	41.89	22.31	236.92	14.87	1.40	38.40	5.20	33.80	50.99	33.53
1983	37.08	7.09	56.30	15.84	140.93	10.20	8.17	44.42	0.68	40.11	78.51	36.95
1984	27.95	10.53	34.29	9.32	29.62	5.80	8.40	186.65	2.37	39.34	32.09	44.31
1985	30.84	10.61	39.12	7.25	27.78	5.00	2.64	65.15	3.07	39.57	46.05	39.19
1986	36.54	12.92	45.92	1.42	24.44	3.42	0.08	25.24	8.57	33.82	100.23	29.67
1987	37.46	38.30	38.41	5.06	18.07	1.67	22.78	117.48	163.60	31.03	189.23	25.60
1988	40.32	28.85	43.26	4.94	20.59	1.21	58.85	0.84	40.78	27.39	123.67	21.87
1989	41.45	41.34	42.37	1.35	18.01	4.54	149.02	5.45	18.97	25.30	162.04	19.96
1990	81.69	55.88	91.89	2.12	34.59	18.39	49.07	3.38	21.59	25.71	11.78	32.74
1991	73.23	46.57	82.00	27.91	20.37	166.25	46.52	0.52	34.94	27.46	12.37	38.06
1992	76.25	46.47	86.23	110.99	60.42	287.41	37.47	118.42	35.45	34.24	13.95	51.22
1993	62.84	26.27	74.61	127.61	71.93	3058	44.80	2.25	111.97	38.03	15.41	59.68
1994	56.28	26.41	66.20	76.26	116.48	1215	39.47	5.48	76.14	40.73	16.93	63.88
1995	60.42	28.49	71.48	11.59	0.40	38.63	38.25	10.00	59.42	41.03	18.67	59.45
1996	55.24	37.30	59.97	12.25	13.20	11.13	36.03	32.46	37.30	42.76	20.34	60.49
1997	47.62	38.81	50.07	11.94	29.81	2.65	42.68	37.59	48.16	44.73	25.01	57.09
1998	41.14	33.60	44.17	5.94	124.30	3.64	41.11	80.20	35.59	72.89	9.51	233.01
1999	34.23	37.23	33.83	35.77	350.28	15.83	39.82	107.20	35.77	107.50	24.52	218.95
2000	31.79	57.60	27.80	84.78	1966	63.19	38.38	597.17	27.65	83.12	17.93	267.38
2001	41.55	49.15	39.98	388.52	1011	482.35	43.60	182.66	33.65	134.71	45.70	212.96
2002	55.05	34.54	61.05	1619	106.10	627.22	49.93	53.27	53.39	451.76	24.92	165.82
2003	61.99	17.98	87.71	1784	29.98	33804	70.00	53.66	90.43	571.76	18.38	73.51
2004	57.54	17.11	82.32	382.90	33.51	1907	58.64	75.78	57.64	402.45	102.54	352.95
2005	59.56	39.62	66.12	217.80	19.05	406.85	60.45	131.17	49.31	588.73	94.08	59.33
2006	46.57	44.90	47.71	159.31	96.79	308.11	58.77	226.02	43.39	1326.15	114.62	802.43
2007	55.17	50.64	57.47	150.55	55.85	232.48	56.19	214.44	39.48	882.61	560.66	1040.21
2008	74.74	37.36	88.35	162.01	28.92	223.17	64.46	122.39	56.39	292.78	84.69	759.23
2009	137.92	18.08	239.29	186.82	49.94	256.83	89.74	88.84	98.21	205.41	15.47	106.92
2010	133.01	21.40	171.94	153.61	17.41	236.53	64.67	98.89	59.89	129.73	18.31	209.98
2011	74.63	21.02	116.79	94.58	49.97	114.49	53.23	68.31	48.81	146.23	18.82	115.31
2012	72.67	21.75	91.64	103.12	31.99	128.80	56.97	68.61	54.74	311.77	17.61	115.31

Data source: KEWT 9.15LONG, by country and sector, 1960-2012, whose original data are from *International Financial Statistics Yearbook*, IMF.

Table 2 France, Germany, Italy, and Spain: The speed years for convergence by country (2)

	$1/\lambda^*$	$1/\lambda_G^*$	$1/\lambda_{PRI}^*$	$1/\lambda^*$	$1/\lambda_G^*$	$1/\lambda_{PRI}^*$	$1/\lambda^*$	$1/\lambda_G^*$	$1/\lambda_{PRI}^*$	$1/\lambda^*$	$1/\lambda_G^*$	$1/\lambda_{PRI}^*$
	France			**Germany**			**Italy**			**Spain**		
1960	56.91	17.56	73.53	51.85	28.84	56.82	24.04	15.16	32.70	9.60	1.50	216.10
1961	58.87	18.26	82.61	50.81	57.89	51.35	22.87	15.90	29.13	7.69	82.62	21.75
1962	49.08	17.71	61.15	47.84	37.11	50.34	22.68	14.99	30.23	6.80	22.14	14.31
1963	49.13	17.03	63.46	49.63	48.83	51.19	22.21	15.62	27.36	6.64	18.23	11.96
1964	48.75	23.83	59.45	46.70	44.08	48.45	26.77	16.77	35.35	6.79	18.55	27.98
1965	40.13	25.85	44.71	40.48	46.51	41.24	35.30	13.30	72.15	5.38	18.87	18.88
1966	37.74	22.93	43.27	37.85	43.41	38.90	37.09	15.89	69.63	3.84	18.82	18.32
1967	36.79	19.85	44.80	42.16	36.07	44.28	33.24	16.47	60.39	0.23	19.61	17.97
1968	35.58	19.48	43.00	37.56	28.33	39.91	34.24	13.52	89.01	8.13	20.27	20.28
1969	33.69	20.28	42.04	35.26	35.93	36.22	30.37	14.74	84.07	45.68	22.48	16.28
1970	31.11	29.11	31.66	34.03	49.67	33.60	28.20	12.04	148.45	83.67	24.93	16.29
1971	29.52	23.90	31.27	32.76	35.04	33.97	25.96	10.71	2742.13	61.18	23.26	24.02
1972	27.96	46.54	25.62	31.10	29.87	33.11	27.03	10.50	1319.20	63.17	25.74	19.12
1973	27.96	34.43	27.08	31.60	44.82	31.45	21.83	9.73	15.22	65.31	25.85	13.90
1974	26.83	40.90	25.31	31.14	27.27	33.16	18.83	10.42	3.61	47.35	22.79	9.93
1975	30.24	27.60	31.21	39.78	13.29	50.24	25.36	7.43	209.98	35.41	20.90	8.50
1976	26.31	24.67	26.88	30.30	14.61	33.15	22.61	9.41	8.65	42.00	22.94	9.03
1977	24.59	25.71	24.62	29.44	27.52	30.01	29.42	7.74	20.31	253.25	24.61	9.83
1978	24.17	26.39	24.06	28.39	28.84	28.76	32.79	6.42	367.12	52.99	16.60	17.03
1979	24.31	24.87	24.49	29.55	26.74	30.83	38.42	8.42	21.29	34.13	14.31	21.56
1980	26.45	116.90	23.30	32.31	37.19	32.73	39.74	8.27	13.28	220.17	13.75	8.92
1981	30.38	26.52	31.85	36.06	35.45	37.30	43.24	6.84	19.50	12147	12.13	14.27
1982	32.23	18.79	37.01	33.45	30.90	34.13	47.76	6.06	43.88	229.87	11.56	14.96
1983	30.31	17.72	34.43	27.35	19.26	28.20	67.35	6.05	1122.04	141.56	10.76	18.87
1984	27.39	21.27	29.40	22.56	18.36	23.10	49.28	6.66	48.92	164.00	8.86	3068
1985	27.39	24.76	28.23	22.65	26.24	22.38	37.04	6.64	222.31	137.14	10.79	25.60
1986	26.99	17.77	29.83	22.51	36.94	21.97	35.26	8.67	133.46	189.64	16.07	15.92
1987	28.24	60.81	26.11	23.45	36.94	23.01	36.01	9.79	74.50	84.97	16.99	11.68
1988	28.14	26.01	28.92	23.76	19.27	24.89	31.52	10.27	40.97	37.65	16.88	9.10
1989	28.38	42.35	26.75	7.35	5.82	7.51	28.31	10.60	31.09	21.89	17.60	3.40
1990	40.61	20.02	54.91	37.80	23.51	42.82	27.98	24.57	7.90	21.39	21.55	2.13
1991	48.03	29.35	57.05	34.08	26.74	36.65	4.27	6.45	11.60	19.51	21.08	17.89
1992	63.05	24.81	81.98	35.66	29.95	37.94	34.02	28.55	10.08	24.98	23.74	60.78
1993	118.41	15.13	295.41	42.40	28.14	47.26	49.24	59.58	10.63	36.29	28.52	81.48
1994	94.23	14.49	254.58	36.69	38.06	37.31	45.80	49.68	9.71	40.09	28.81	79.81
1995	105.51	18.59	228.41	35.65	31.70	37.16	31.04	30.83	4.05	34.10	27.39	57.29
1996	168.14	21.72	187.08	40.72	31.91	43.42	39.58	21.79	2.47	35.88	28.51	55.21
1997	188.26	30.44	243.69	40.69	41.13	41.46	26.71	39.37	17.83	34.71	42.43	40.02
1998	106.57	33.81	205.78	38.11	30.79	40.40	36.15	44.38	7.47	32.93	94.68	31.10
1999	91.97	40.69	180.23	27.15	93.80	27.44	49.44	216.32	48.52	34.18	56.64	32.78
2000	62.22	57.42	78.78	21.56	31.97	21.00	42.73	9.47	50.40	34.98	560.36	30.78
2001	47.88	84.33	53.95	32.17	22.96	35.12	46.84	11.41	64.56	41.35	136.17	36.84
2002	56.72	42.02	73.05	37.91	19.69	43.47	46.58	31.71	52.69	40.42	78.96	33.41
2003	57.61	32.27	78.29	40.69	18.71	48.00	49.78	59.08	51.06	41.31	97.82	36.76
2004	76.91	52.39	93.55	60.27	25.55	72.67	11.27	22.03	7.18	37.70	194.12	33.43
2005	74.73	54.16	91.63	63.48	32.18	73.19	25.76	19.22	28.11	30.76	94.86	23.47
2006	56.48	55.20	63.05	59.15	37.17	64.87	42.15	40.23	43.79	24.99	110.56	17.76
2007	41.80	34.69	48.72	48.72	39.43	51.00	43.28	28.20	50.13	24.21	91.88	17.39
2008	42.05	31.66	50.48	45.26	33.87	48.47	47.72	22.39	61.63	32.62	107.44	31.93
2009	72.01	19.88	147.66	82.06	29.20	98.81	82.93	15.48	193.97	53.34	4.15	82.15
2010	69.44	30.83	104.92	67.88	23.89	85.03	60.46	18.00	99.50	68.24	13.65	95.45
2011	52.02	32.55	104.92	49.55	29.80	85.03	69.24	18.69	120.96	65.01	7.72	191.49
2012	57.37	39.23	69.64	60.52	42.62	63.23	106.72	23.64	207.20	92.53	4.14	40.47

Data source: KEWT 9.15LONG, by country and sector, 1960-2012, whose original data are from *International Financial Statistics Yearbook*, IMF.

Table 3 Greece, Ireland, Russia, and Turkey: The speed years for convergence by country (3)

	$1/\lambda^*$	$1/\lambda_G^*$	$1/\lambda_{PRI}^*$	$1/\lambda^*$	$1/\lambda_G^*$	$1/\lambda_{PRI}^*$	$1/\lambda^*$	$1/\lambda_G^*$	$1/\lambda_{PRI}^*$	$1/\lambda^*$	$1/\lambda_G^*$	$1/\lambda_{PRI}^*$
	Greece			**Ireland**			**Russia**			**Turkey**		
1960	23.15	11.56	15.81	106.50	10.37	177.24				74.68	29.24	61.87
1961	12.06	5.12	22.24	59.32	6.50	96.30				122.92	19.50	601.85
1962	12.29	26.64	28.88	53.31	7.28	81.08				84.87	18.44	78.27
1963	9.80	18.44	25.13	46.40	10.09	60.33				140.01	18.25	306.74
1964	7.50	14.76	16.55	37.22	8.01	61.75				78.23	20.94	140.40
1965	5.61	14.64	11.06	33.14	6.49	46.68				46.67	22.15	78.12
1966	3.50	15.97	15.11	42.20	9.63	71.96				55.22	19.75	900.55
1967	13.53	16.55	11.48	47.27	18.03	59.86				16.44	15.24	43.89
1968	3.49	15.62	15.31	36.84	11.00	50.31				17.26	15.11	122.42
1969	17.51	15.74	12.76	25.10	7.34	35.30				33.48	14.39	94.72
1970	274.47	16.23	14.47	27.54	8.77	37.71				14.76	15.43	91.82
1971	35.36	16.69	11.23	28.92	9.57	39.75				46.72	13.61	98.66
1972	24.23	15.73	8.03	26.92	8.48	42.28				8.03	15.69	104.49
1973	19.74	15.88	5.15	22.29	8.10	35.17				0.39	15.70	191.29
1974	26.12	14.40	10.02	19.42	4.51	29.66				6.92	15.06	114.60
1975	32.54	13.82	3.23	30.39	2.81	237.70				5.83	16.89	10.17
1976	38.01	14.31	2.88	27.35	4.79	646.59				6.39	16.24	9.59
1977	42.97	15.34	2.78	21.41	5.45	331.90				5.41	8.40	10.68
1978	58.76	14.85	4.15	16.86	4.41	1331.82				5.78	10.45	8.80
1979	84.30	15.86	3.44	13.84	4.71	45.16				5.52	7.57	9.20
1980	72.10	18.38	6.74	17.14	4.61	73.51				11.42	12.07	32.39
1981	85.82	8.39	0.25	16.56	3.77	90.87				7.88	20.55	9.62
1982	6.40	8.89	5.19	13.61	4.40	44.10				8.92	11.97	25.84
1983	6.96	5.79	3.64	14.78	5.99	32.99				8.81	10.21	25.37
1984	2.32	5.56	3.62	14.78	7.31	24.68				9.29	6.25	11.58
1985	8.48	34.09	8.68	15.29	8.04	26.71				7.37	7.39	79.63
1986	3.78	0.60	2.73	18.56	99.02	9.30				4.54	11.38	8.62
1987	1.37	1.95	1.16	19.37	150.30	10.79				5.17	13.44	10.79
1988	1.01	0.48	0.35	20.02	29.30	19.49				5.59	13.86	12.10
1989	0.06	0.33	7.96	15.26	35.02	14.24				4.33	11.48	8.50
1990	4.30	0.97	0.23	16.66	30.34	15.49				81.69	10.18	56.71
1991	6.99	0.20	3.14	20.40	43.14	18.02				51.85	8.61	27.32
1992	10.72	3.63	6.41	24.08	49.95	22.16				88.22	10.72	48.95
1993	8.10	1.53	7.11	26.00	47.90	23.74				2747	91.90	286.13
1994	11.94	0.26	13.44	25.79	39.30	24.06				311.11	17.80	111.91
1995	11.42	4.68	17.21	24.61	29.74	23.89	8.59	6.55	9.47	75.74	6.84	128.08
1996	14.10	5.64	22.94	24.64	34	23.48	9.76	9.22	10.05	44.66	2.49	60.42
1997	5.77	8.15	8.16	25.45	31.94	24.99	14.03	17.15	13.39	32.07	5.32	53.66
1998	4.69	10.38	7.09	24.26	36.04	22.99	57.84	56.39	59.52	31.82	24.09	86.79
1999	3.86	12.37	5.83	24.19	91.46	20.56	70.93	42.04	84.16	74.22	17.00	143.23
2000	6.15	8.78	8.85	26.25	103.54	22.60	14.58	28.01	12.85	3.37	16.80	10.86
2001	13.22	16.52	13.08	25.93	59.19	24.78	10.67	15.11	9.84	11.67	10.04	214.00
2002	15.49	51.68	15.13	26.47	49.52	26.87	12.44	17.49	11.43	11.93	11.29	199.25
2003	14.21	12.81	14.55	28.05	55.09	28.44	9.72	10.24	9.57	11.46	7.14	21.12
2004	40.71	9.44	53.29	27.95	61.50	28.01	9.29	16.43	8.31	9.64	19.37	16.01
2005	44.50	184.61	46.97	26.94	73.38	27.43	10.16	16.50	9.57	8.09	20.12	13.59
2006	31.14	10.50	38.69	26.20	82.68	25.84	8.57	21.63	8.29	6.61	15.59	11.55
2007	25.97	10.12	31.30	23.83	102.43	23.52	6.75	5.74	9.79	5.21	14.44	13.35
2008	32.37	5.94	51.44	23.93	20.28	26.51	5.66	28.07	6.16	4.21	10.31	20.47
2009	53.78	3.20	273.80	30.98	27.38	38.17	9.57	21.27	0.66	18.62	16.23	92.57
2010	56.49	6.27	65.31	40.77	0.00	109.75	1.92	45.03	18.98	1.63	25.19	10.00
2011	69.29	7.79	116.48	37.29	8.60	49.78	1.58	7.22	16.02	89.22	1432.37	11.02
2012	265.07	7.80	945.84	44.61	24.07	55.24	2.89	6.86	23.16	64.30	24.15	13.35

Data source: KEWT 9.15LONG, by country and sector, 1960-2012, whose original data are from *International Financial Statistics Yearbook*, IMF.

References

1. Arrow, K. J. and Debreu, G. (1954). Existence of an Equilibrium for a Competitive Economy. *Econometrica* 22 (July, 3): 265-290.
2. Balassone Fabrizio, and Franco, Daniele. (2000). Public Investment, the Stability Pact and the Golden Rule. *Fiscal Studies* 21 (2): 207-229; 220-222, including a proposal by Modigliani et al, Manifesto contro la disoccupazione nell, Monetae Credito 51: 375-412.
3. Blinder, Alan, S., and Solow, Robert, M. (1973). Does Fiscal Policy Matter? *Journal of Public Economics* 2 (Nov, 4): 319-337.
4. Champernowne, D. G. (1945-46). A Note on J. v. Neumann's Article on "A Model of Economic Equilibrium." *Review of Economic Studies* 13: 10-18.
5. Diamond, Peter. (2011). Unemployment, Vacancies, Wages. *American Economic Review* 101 (June, 3): 1045-1072.
6. Du Grauwe, Paul. (2005). *Economics of Monetary Union*. Oxford: Oxford University Press (6^{th} Ed), (220-245, 253-260).
7. Fisher, Irving. (1907). *The Rate of Interest*, 87-116. New York: Macmillan, 442p.
8. Fisher, Irving. (1930). *Theory of Interest*. London and Vermont: Pickering & Chatto Ltd. (1996, reprinted), 566p.
9. Fisher, Irving. (1933). The Debt-Deflation Theory of Great Depressions. *Econometrica* 1: 337-357.
10. Graham, Liam, and Snower, Dennis, J. (2008). Hyperbolic Discounting and the Phillips Curve. *Journal of Money, Credit and Banking* 40 (Mar-Apr, 2-3): 427-448 .
11. Du Grauwe, Paul. (2005). *Economics of Monetary Union*. Oxford: Oxford University Press (6^{th} Ed), (220-245, 253-260).
12. Harberger, Arnold, C. (1998). A Version of the Growth Process. *American Economic Review* 88 (March,1): 1-32.
13. Harrod, R. F. (1939). An Essay in Dynamic Theory, *The Economic Journal*: 49 (March): 14-33.
14. Harrod, R. F. (1947). Mr. Keynes and Traditional Theory. *Econometrics* 5 (June, 1): 74-86.
15. Harrod, R. F. (1948). Towards a Dynamic Economics, London: Macmillan, 168p.
16. Harrod, R. F. (1960). Second Essay in Dynamic Theory, *The Economic Journal*: 70 (June): 277-293.
17. Hayek, Friedrich. (1960). *The Constitutions of Liberty*. The University of Chicago. 576p.
18. Henry, George. (1898). *The Land Question: What It Involves, and How Alone It Can Be Settled*. New York: Doubleday & McClure Co. 109 (The land Question) +74 (Property in Land) +151 (The Condition of Labor)=334.
19. Hicks J. R. (1932). *The Theory of Wages*. London, Macmillan. 248p., (2^{nd} ed.; 1963, 384p.)
20. Hicks J. R. (1936). Distribution and Economic Progress: A Revised Version. *Review of Economic Studies* 4 (Oct, 1): 1-12, (the first appearance of the idea of the elasticity of substitution, *sigma*).
21. Hicks, J. R. (1961). The Story of a Mare's Nest. *Review of Economic Studies* 28: 77-88.

22. Houthakker, H. S. (1965). A Note on Self-Dual Preferences. *Econometrica* 33 (Oct, 4): 797-801.
23. Hume, David. (1752). Of Money. file:///C:/Users/H5811~1.KAM/AppData/Local/Temp/CHXPAZFS.html (2013/06/25).
24. Hussein Khaled and A. P. Thirwall. (2000). The AK Model of "New" Growth Theory is Harrod-Domar Growth Equation: Investment and Growth Revisited. *Journal of Post Keynesian Economics* 22 (Spring, 3): 427-435.
25. International Monetary Fund (IMF). *International Financial Statistics Yearbook*, by year, IMF. http://imf.org ; World Bank: http://data.worldbank.org .
26. KEWT (Kamiryo Endogenous World Table) database series (Versions 1.07 to 9.15) by year. Its original data come from 10 real-assets data and 15 financial/market external data, in *International Financial Statistics Yearbook* (*IFSY*), IMF (for exclusive donation of the Excel key points to BEA, IMF, the World Bank, and the BEA, see Kamiryo Hideyuki (*PRSEC* 54: 121-169; *JES* 17: 171-216; 2013).
Information about Kamiryo is available from different sources:
Home Page: http://www.magaegg.ne.jp/~kamiryo
With RePEc: http://ideas.repec.org/i/b.html
The author's book: http://www.bapress.ca/ees.php
Papers of Kamiryo (available after 1980) at National Institute of Informatics: http://ci.nii.ac.jp
27. Kamiryo, Hideyuki. (1974). *A comparison of Financial Objectives and Behavior in Japanese and American Firms*. Master of Science in Management, Sloan School of Management, MIT. 426p. (nominated for the Brooks Prize Award, 1974).
28. Kamiryo, Hideyuki. (1984). *The Integrated Method to Measuring Profitability and Productivity with Special References to the Comparison of Agriculture and Manufacturing Within and Between Countries*. PhD in agricultural economics, Lincoln College, Univ. of Canterbury, nz. 461p. (after Master of Applied Science).
29. Kamiryo, Hideyuki. (1995). *The Structural Theory of Flows, Assets, Debt, and Equity in Accounting for Business Enterprises*. PhD in commercial science, Hiroshima Shudo University. 558p. (additional supplement, 393p.).
30. Kamiryo, Hideyuki. (2003). *Furthering the Role of Corporate Finance in Economic Growth*. PhD in economics, the University of Auckland, nz. 129p.
31. Kamiryo, Hideyuki. (2010). Endogenous I-S and External L-M Diagram in Equilibrium towards Policy-Making. *International Advances in Economic Research*, 16 (Aug, 3): 282-296.
32. Kamiryo, Hideyuki. (2013a). *Earth Endogenous System*: *To Answer the Current Unsolved Economic Problems*. Toronto, Canada: Better Advances Press. lxviii+568.
33. Kamiryo, Hideyuki. (2013b). Consumption-neutral to Growth and Technology: Actual versus Endogenous. (AEJ-D-13-00049R1).
34. Kamiryo, Hideyuki. (2013c). Technological Policy and Dynamic Results to Government and Private: Empirically Using 65 Countries and Based on Sato's (1981) Conservation Laws (presented at the 10th Rim Conference of WEAI, Tokyo/Kyoto, Keio Univ., 16 March 2013).

35. Kamiryo, Hideyuki. (2013d). The Real Rate of Profits/Returns Equals Ever Zero, Actually and Endogenously: With Money-Neutral of the Financial/Market Assets to the Real Assets. (under review).
36. Kamiryo, Hideyuki. (2013e). Note: Proof of General Data-Consistency Connecting LONG (1960-2011) with Short (1990-2011) Database by Country, Using KEWT 7.13-1, 13-2, 13-3, 13-4 for Eight Countries. *Papers of the Research Society of Commerce and Economics* 54 (Sep, 1): 121-169.
37. Kamiryo, Hideyuki. (2013f). Note: Proof of Specific Data-Consistency Connecting LONG (1960-2011) with Short (1990-2011) Database for Japan and the US, Using KEWT 7.13-6. *Journal of Economic Sciences* 17 (Sep, 1): 171-216.
38. Krugman, Paul. (1998). *The Accidental Theorist And Other Dispatches from the Dismal Science*. London: Penguin Group, 204p.
39. Krugman, P, A. (2008). Home page 2008, http://web.mit.edu/krugman/www/japtrap2.html
40. Krugman, P. A. and Obstfeld, M. (2005). *International Economics: Theory and Policy, 418-442*. Boston, N. Y., and London: Pearson Addison Wesley. 680p.
41. Lucas Robert, E. (1976). Economic Policy Evaluation: A Critique,19-46. In: Brunner Karl, and Allan H., Meltzer, *The Phillips Curve and Labor Market*. Amsterdam: North-Holland.
42. Lucas, R. E., Jr., and Rapping, L. A. (1969). Price Expectations and the Phillips Curve. *American Economic Review* 59 (Dec, 5): 342-350.
43. Mackenzie, L. (1983). Turnpike Theory, Discounted Utility, and von Neumann Facet. *Journal of Economic Theory* 30 (Aug, 2): 330-352.
44. Mankiw, Gregory N. (2006). The Macroeconomist as Scientist and Engineer. Harvard University (May 2006). NBER Working Paper No. 12349, 26p.
45. McManus, M. (1954-55). The Geometry of Point Rationing. *Review of Economic Studies* 22 (1): 1-14.
46. Meade, J. E. (1960, 1962 Revised). *A Neo-Classical Theory of Economic Growth.*, 1-9. London: Unwin University Books. 185p. (1st Ed., 146p.; no revision to assumptions).
47. Meade, J. E., and J. R. N., Stone. (1969). The Construction of Tables of National Income, Expenditures, Savings and Investment, 320-346. In: Parker, R. H. and Harcourt, G. C. (Eds.), *Readings in the Concept and Measurement of Income*. Cambridge: Cambridge University Press.
48. Minkowski, Hermann. (1918). Criticisms and Discussions: Time and Space. *The Monist* 28 (April, 2): 288-302.
49. Mino, Kazuo, and Tsutsui, Shunich (Translated to Japanese; Edited by Nouno, Takayuki). (1984). *Theory of Technical Change and Economic Invariance: Application of Lie Groups*. Tokyo: Keiso Shoho. xiv, 466p.
50. Morishima, M. (1961). Proof of a Turnpike Theorem: The "No Joint Production" Case. *Review of Economic Studies* 28(2): 89-97.
51. Negishi, Takashi, Ramachandran, Rama, V., and Mino Kazuo (edited). (2001). *Economic Theory, Dynamics and Markets: Essays in honor of Ryuzo Sato*. Boston: Kluwer Academic Publishers. xix, 571p.

52. Neumann, J. V. (1945-46). A Model of General Economic Equilibrium. *Review of Economic Studies* 13(1): 1-9.
53. Nishimura, Kiyohiko, and Yano, Makoto. (2007). *Macroeconomic Dynamics* (in Japanese), 179, 186-187. Tokyo: Iwanami Shoten. xi, 319.
54. Phelps, Edmund, S. (1961). The Golden Rule of Accumulation. *American Economic Review*, 51 (Sep, 4): 638-643.
55. Phelps, Edmund, S. (1965). Second Essay on the Golden Rule of Accumulation. *American Economic Review*, 55 (Sep, 4): 793-814.
56. Phelps, Edmund, S. (1966). Models of Technical Progress and the golden Rule of Research. *Review of Economic Studies* 33 (April, 2): 133-145.
57. Phillips, A. W. (1958). The Relation between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861-1957. *Econometrica* (Nov9: 283-299.
58. Posner, Richard, A. (2010). *The Crisis of Capitalist Democracy*. Harvard Univ. Press. 402p.
59. Radner, Roy. (1961). III. Paths of Economic Growth that are Optimal with Regard only to Final States: A Turnpike Theorem. *Review of Economic Studies* 28: 98-104.
60. Salant, Walter, S. (1942). The Inflation Gap I: Meaning and Significance for Policy Making. *American Economic Review* 32 (June, 2, Part 1): 308-314.
61. Salant, Walter, S. (1975). Introduction to William A. Salant's "Taxes, the Multiplier and the Inflationary Gap." *History of Political Economy* 7 (Spring, 1): 3-18.
62. Salant, Walter, S. (1975). Taxes, the Multiplier, and the Inflationary Gap. *History of Political Economy* 7 (Spring, 1): 19-27.
63. Samuelson, Paul, A. (1939a). A Synthesis of the Principle of Acceleration and the Multiplier. *Journal of Political Economy* 47 (Dec, 6): 786-797.
64. Samuelson, Paul, A. (1939b). Interactions between the Multiplier analysis and the Principle of Acceleration. *Review of Economic Statistics* 21 (May, 2): 75-78.
65. Samuelson, Paul, A. (1940). Theory of Pump Priming Reexamined. *American Economic Review* 30 (Sep 4): 492-506.
66. Samuelson, P. A. (1941). The Stability of Equilibrium: Comparative Statics and Dynamics. *Econometrica* 9 (April, 2): 97-120.
67. Samuelson, P. A. (1942). Fiscal Policy and Income Determination. *Quarterly Journal of Economics* 56 (Aug, 4): 575-605.
68. Samuelson, P. A. (1950). The Problem of Integrability in Utility Theory. *Economica* 17 (Nov): 355-385.
69. Samuelson, Paul, A. (1952). Spatial Price Equilibrium and Linear Programming. *American Economic Review* 42 (June, 3): 283-303.
70. Samuelson, Paul, A. (1953). Prices Factors and Goods in General Equilibrium. *Review of Economic Studies* 21 (Feb, 1): 1-20.
71. Samuelson, P. A. (1965a). A Catenary Turnpike Theorem Involving Consumption and the Golden Rule. *American Economic Review* 55 (June, 3): 486-496.

72. Samuelson, P. A. (1965b). Using Full Duality to Show that Simultaneously Additive Direct and Indirect Utilities Implies Unitary Price Elasticity of Demand. *Econometrica* 33 (Oct, 4): 781-796.
73. Samuelson Paul A. (1970). Law of the Conservation of the Capital-output ratio, Proceedings of the National Academy of Sciences, *Applied Mathematical Science* 67: 1477-79.
74. Samuelson, P. A. (1975). The Balanced-Budget Multiplier: A Case Study in the Sociology and Psychology of Scientific Discovery. *History of Political Economy* 7 (Spring, 1): 43-55.
75. Samuelson, Paul, A. and Sato, Ryuzo (1984). Unattainability of Integrability and Definiteness Conditions in the General Case of Demand for Money and Goods. *American Economic Review* 74 (Sep, 4): 588-604.
76. Sato, Ryuzo. (1963). Fiscal Policy in a Neo-Classical Growth Model: An Analysis of Time Required for Equilibrating Adjustment. *Review of Economic Studies* 30 (Feb, 1): 16-23.
77. Sato, Ryuzo. (1981). *Theory of Technical Change and Economic Invariance: Application of Lie Groups*. New York: Academic Press. Xv, 439p.
78. Sato, Ryuzo, and Davis, Eric, G. (1971). Optimal Savings Policy When Labor Grows Endogenously. *Econometrica* 39 (Nov, 6): 877-897.
79. Shiller, Robert, J., and Virginia, M. Shiller. (2011). Economists as Worldly Philosophers. *American Economic Review* 101 (May, 3): 171-175.
80. Smith, Vernon, L. (1963). Minimization of Economic Rent in Spatial Price Equilibrium. *Review of Economic Studies* 30 (Feb, 1): 24-31. *Measurement, Income and Wealth Series*, 64-68. Princeton, NJ: Princeton Univ. Press.
81. Solow, Robert, M. (1956). A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics* 70 (Feb, 1): 65-94. (For four corrections, see the same page 94 below: In Ed., Stiglitz, Joseph, E., and Uzawa, Hirofumi, (1969). *Readings in the Modern Theory of Economic Growth*, Cambridge. Mass: MIT, viii, 497p.).
82. Solow, Robert, M. (1957). Technical Change and the Aggregate Production Function. *Review of Economic Studies* 34 (Aug, 3): 312-320.
83. Solow, Robert, M. (1961). Comment on Stigler. In: *Output, Input, and Productivity.*
84. Stigler, G. J. (1961). Economic Problems in Measuring Changes in Productivity. In *Output, Input, and Productivity Measurement, Income and Wealth Series*, 47-63. Princeton, NJ: Princeton Univ. Press.
85. Takayama, Akira. (1974). *Mathematical Economics*. Hinsdale, Illinois: The Dryden Press. xxiii, 744.
86. UN: http://unstats.un.org/unsd/snaama/selectionbasicFact.asp .
87. Wicksell, K. 1936 (1962). *Interest and Prices*, trans. Kahn, R. F. New York: Augustus M. Kelly. 239+xxxi p.
88. Wicksteed, Philip, H. (1894). *An Essay on the Co-ordination of the laws of Distribution*. London: Macmillan & Co. 43p.
89. Wicksteed, Philip, H. (1938). *The Common Sense of Political Economy and Selected papers and Reviews on Economic Theory* (II), 734-753 for review of Jevons's theory. London: George Routledge & Sons, Ltd. 401-871.
90. Wold, H. (1954). Causality and Econometrics. *Econometrica* 22 (July, 3): 162-177.
91. Yano, Kentaro. (1968). *A Life of Einstein* (Japanese). Tokyo: Shinchosha. 259 p.

Appendixes

Appendix 1: Basic endogenous equations in the discrete time

(Source: Notations of the *EES* (pp. xxxi-xlii)).

A Cobb-Douglas production function works similarly in the discrete and continuous time. This is because statistics data are always within a certain range of endogenous data by year and over years. The discrete Cobb-Douglas production function in the *EES* solely uses seven endogenous parameters under no assumption and accordingly under perfect competition. The basic endogenous equations are all measured by seven endogenous parameters, $i=I/Y$, $n_E = n$, $\alpha = \Pi/Y$, $\Omega = K/Y$, β^*, δ_0, and λ^*.

1. The capital-output ratio, $\Omega = K/Y$ and $\Omega = \Omega^* = \Omega_0$: $\Omega^* = \frac{\beta^* \cdot i(1-\alpha)}{i(1-\beta^*)(1+n)+n(1-\alpha)}$.
2. The technology coefficient: $\beta^* = \frac{\Omega^*(n(1-\alpha)+i(1+n))}{i(1-\alpha)+\Omega^* \cdot i(1+n)}$.
3. The DRC coefficient, delta$_0$: $\delta_0 = 1 + \frac{LN(\Omega^*)}{LN(B^*)}$ and $B^* = (1-\beta^*)/\beta^*$.
4. The level of technology (stock): $A = TFP = k^{1-\alpha}/\Omega$.
5. The relative price level, p: p=1 always holds using $p \cdot Y = w \cdot L + r \cdot K$ in the KEWT database. In recursive programming for the transitional path by year, $W \cdot L = \Pi \cdot K$ holds at convergence of the speed year time, $t^* = t$.
6. The relative discount rate of consumers goods to producers goods, ρ/r, and $(\rho/r)(c)$.
7. The elasticity of substitutions, $\sigma = \frac{-\Delta k/k}{\left(\Delta\left(\frac{r}{w}\right)\right)/\frac{r}{w}}$. At the KEWT database by country, the σ sharply fluctuates by year and over years. In the transitional path by year, however, the σ is exactly equal to 1.0000000.
8. The rate of return, $r = \Pi/K$ and $r = r^* = r_0$: $r = \alpha/\Omega$. If deficit is zero, this endogenous rate of return corresponds with the rate of profits in the literature.
9. The rate of technological progress and the growth rate of per capita output: $g_A^* = i(1-\beta^*)$ and $g_y^* = g_A^*/(1-\alpha)$.
10. The growth rate of output, $g_Y^* = (g_A^*(1+n)/(1-\alpha)) + n$. For full-employment, the speed years, $1/\lambda^*$, must be adjusted for moderate equilibrium, under $n_E = n$.
11. The endogenous Phelps coefficient, $x = r^*/g_Y^*$ and $x = \alpha/(i \cdot \beta^*)$: $r^* = (\alpha/\cdot \beta^*)g_Y^*$. This endogenous coefficient corresponds with the exogenous Phelps coefficient. If this coefficient is 1.00, it shows $r^* = g_Y^*$ and the cost of capital turns to zero, where $\mathrm{CofC}_{r^*-g_Y^*} = r^* - g_Y^* = 0$. In other words, a result that returns equals net investment multiplied by the technology coefficient, β^*, does not hold at KEWT database, differently from the case of exogenous Phelps coefficient.
12. The endogenous valuation ratio, $v^* = V^*/K = r^*/r^* - g_Y^*$. When the range of the endogenous-equilibrium is unstable and/or bubble-oriented, the valuation ratio

fluctuates sharply beyond moderate range, i.e., 1.50 to 3.00. Reversely, if the rate of return become close to zero, deflation spreads and it is difficult to get rid of deflation.

Note that if deficits and debts are huge, the rate of government becomes extremely minus, which results in close-to-zero rate of return at the total economy. As a result, the rate of return at the private sector may rise up, which spreads inequality of the endogenous wage rate among people/workers, as suggested by Paul, Krugman (repeatedly in Column, *NY Times*, 2012). Huge deficits and debts are results of selfishness against the next generations but, turning back to the current generation definitely. We need fair democracy and openness with a receptacle for policy-making such as the endogenous system and its database. Spiritual awaking and policy-making march together towards moderate democracy.

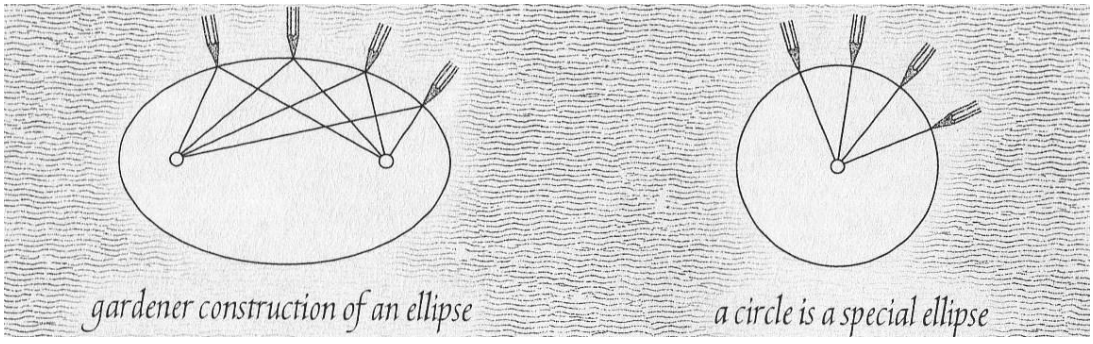
Appendix 2: Scientific approach to topology under two-dimensions

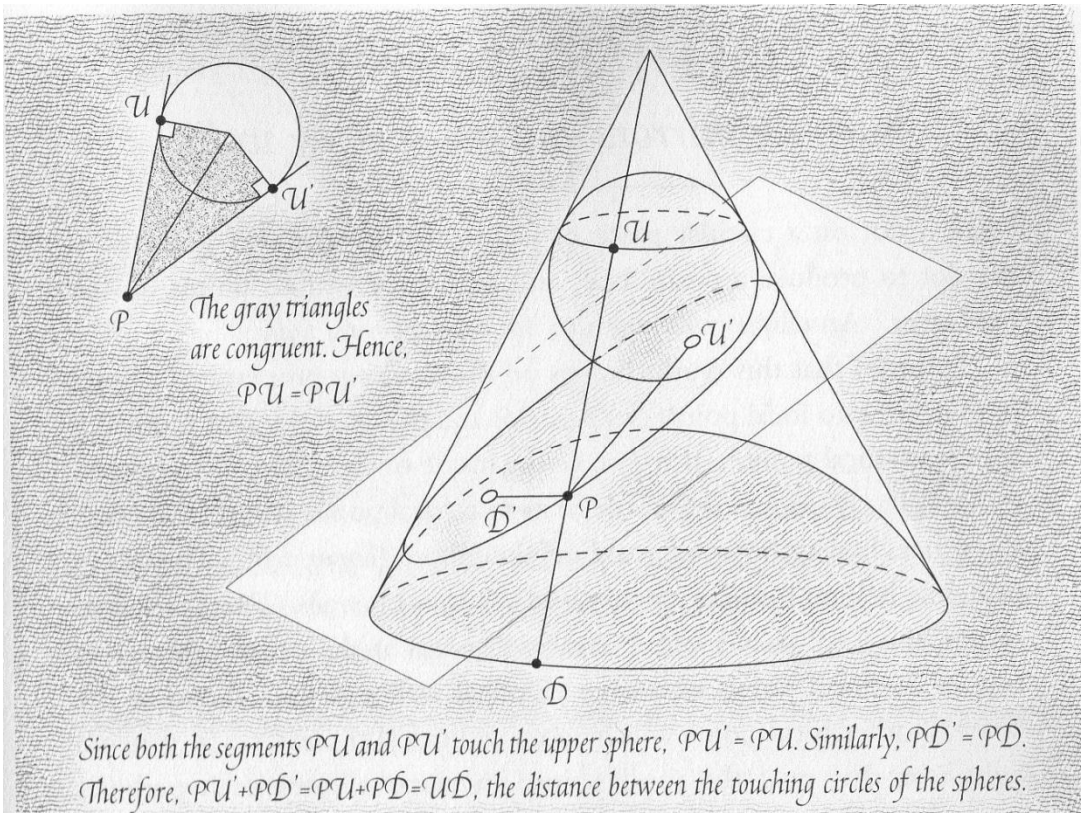
Appendix 2 shows (1) development of the relationship between circle and ellipse, (2) the corrected bliss point of diagonal and circle and, (3) the author's own proof for overlapping the Greece Golden ratio with the author's Japan Silver ratio (as the first appearance in the literature). Civilization may differ by continent yet, various civilizations are historically united as a whole in this world.

Three new findings are explained using Figs. 3, 4, and 5 with related References.
Fig. 3 Development of the relationship between circle and ellipse.
Fig. 4 Corrected bliss point of diagonal and circle.
Fig. 5 First proofs in plane topology: The Golden ratio equal to the Silver ratio.

A2-1 Development of the relationship between circle and ellipse

Fig. 3 is a citation of Burkard Polster's "*Q. E. D.*" (2004, p. 26 and 27). The author supplements the relationship between circle and ellipse, based on the first panel of Fig. 3. What is a new development in this relationship? First, we completely accept his two figures on page 26 that compares an ellipse with a circle. Based on this comparison, we examine the curve on the ellipse that has two origins and the curve on the circumference that has one origin.





Data-source: Q. E. D. by Burkard Polster, 2004, N.Y.: Walker & Co., pages 26- 27.

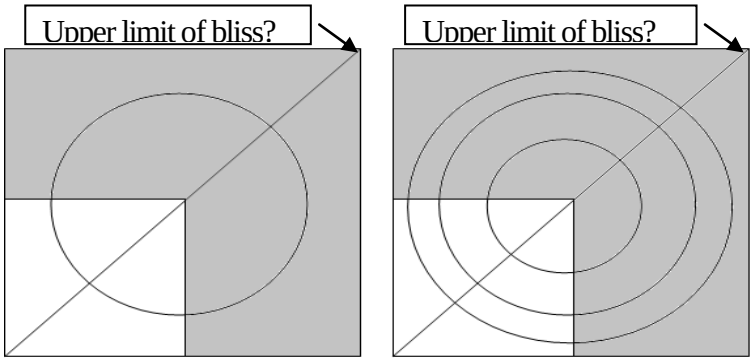
Fig. 3 Development of the relationship between circle and ellipse

We here propose a fact that the surface of the cone has numerous origins. Fig. 3 shows two line sentences orally. Yet, Fig. 3 for the ellipse by origin (on the LHS) does not clarify a fact that the two edges of the horizontal line cannot be measured and a fact that the two edges of the vertical line cannot be measured. Similarly, Fig. 3 for the circle having one origin (on the RHS) does not clarify a fact that the two edges of the horizontal line cannot be measured and a fact that the two edges of the vertical line cannot be measured. We stress that these edges each show a logic and are immeasurable. Further, we deny Burkard Polster's explanation that all the results are *sphere trick*. We indicate that diagonal forms circle and, other lines crossing the origin form ellipse. The author's indications here are consistent with immeasurable origins in the structure of the *EES* and its topology as reduced form of each endogenous equation.

A2-2 Corrected bliss point of diagonal and circle

Fig. 4 clarifies the essence of circle, which is required for the silver ratio's justification. It is a known fact that relationships between circle, ellipse, parabola, and hyperbola are formed each by slicing a cone with a different angle, as first shown by Germinal Dandelin (1974-1847), according to Burkard Polster (ibid., p.26). The circle and hyperbola are here indispensable twines. We earlier defined a bliss point such that existed at the right

corner of the diagonal. However, we here set this bliss not as a perfect but as a fancy point. This is because on the diagonal numerous circles are drawn countlessly. Circle, diagonal, and hyperbola are united.



Note: The *y* axis shows individual or macro utility, while the *x* axis individual value or macro output. For simplicity, this figure does not show the hyperbola curve. The hyperbola curve each crosses the point of intersection of the circle on the diagonal.

Fig. 4 Corrected bliss point of diagonal and circle

A2-3 Proof for overlapping the Greece Golden ratio with the author's Japan Silver ratio

Fig. 5 proves the author's new discovery that the golden ratio area equals the silver ratio area, under the author's two-dimensional plane. Fig. 5 uses the rate of return function to the ratio of net investment to output, $r(i)$, as one of hyperbolas reduced from corresponding endogenous equations. The *EES* (p. 506, 2013 [3]) has this function, $r(i)$, with vital related equations such as the vertical asymptote (VA) and the horizontal asymptote (HA) in Appendix at the end of the *EES*.

The VA=0 in $r(i)$. The VA overlaps the *y* axis. Fig. 5 shows two sorts of the HA, HA_{GOLD} and HA_{MODEST}. Suppose that the magnitude of silver ratio is 1.0000. Then, the magnitude of the golden ratio is 0.8586. The silver ratio is originated from the equilateral triangle (1 1 1.4142 as the square root of 2; see the RHS of Fig.4, a right triangle

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[3] $r^*(i) = \frac{\alpha \cdot i\,(1-\beta^*)(1+n)+\alpha \cdot n(1-\alpha)}{\beta^*(1-\alpha)i}$, which is derived from $r^* = \frac{\alpha}{\Omega^*}$ and $\Omega^* = \left(\frac{i \cdot \beta^*(1-\alpha)}{i\,(1-\beta^*)(1+n)+n(1-\alpha)}\right)$.

$y = \frac{c}{a} + \frac{d}{ax} = \frac{cx+d}{ax}$, where $a = \beta^*(1-\alpha),\ b = 0,\ \mathrm{c} = \alpha(1-\beta^*)(1+n),\ \mathrm{f} = \mathrm{d} = \alpha \cdot n(1-\alpha),\ \mathrm{e} = \frac{\mathrm{c}}{\mathrm{a}}$, and $\frac{\mathrm{f}}{\mathrm{a}} = \frac{\alpha \cdot n}{\beta^*} = \frac{\alpha \cdot n(1-\alpha)}{\beta^*(1-\alpha)}$.

$r^*(i) = \frac{\alpha(1-\beta^*)(1+n)}{\beta^*(1-\alpha)} + \frac{\alpha \cdot n(1-\alpha)}{\beta^*(1-\alpha) \cdot i}$: $\quad VA_{r^*(i)} = 0 = -\frac{b}{a}$. $\quad HA_{r^*(i)} = \frac{\alpha(1-\beta^*)(1+n)}{\beta^*(1-\alpha)}$.

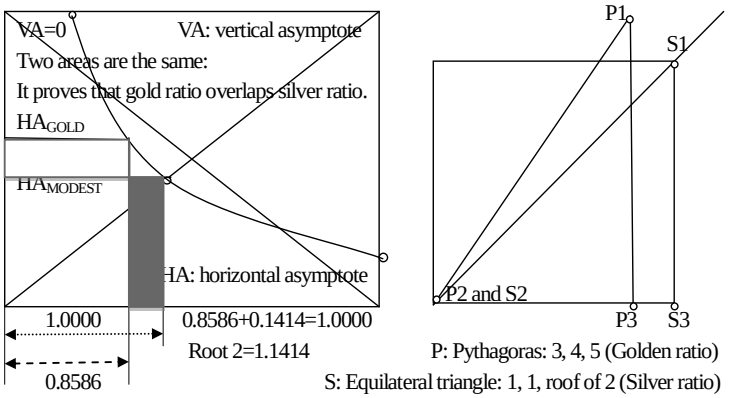
$Width_{r^*(i)} = \sqrt{\left|\frac{\alpha \cdot n}{\beta^*}\right|} = \sqrt{\left|\frac{f}{a}\right|}$. $\quad Shape_{r^*(i)} = \sqrt{2\left|\frac{\alpha \cdot n}{\beta^*}\right|}$. $\quad Curvature_{r^*(i)} = 1/\sqrt{2\left|\frac{\alpha \cdot n}{\beta^*}\right|}$.

$\left(y - \frac{c}{a}\right)\left(x + \frac{b}{a}\right) = \frac{f}{a}$. $\quad$ For $r^*(i), (y - 0.0516375)(x + 0) = 0.00168776$.

of S1 S2 and S3). The golden ratio is originated from Pythagoras triangle (3 4 5; see the RHS of Fig.5, a right triangle of P1 P2 and P3). New discovery is a fact that the silver triangle overlaps the golden triangle. For proof, there are two ways: (i) the silver triangle area is equal to the golden triangle area (or each is formed as rectangle, just two times large) and ii) one difference between the two triangle areas is equal to another difference (one shadowed area is equal to another shadowed area in Fig. 5). This new discovery is precisely proved, graphically as well as mathematically.

Then, what is the implication of proof? This was concretely shown in Introduction. First of all, Greece civilization matches ancient agriculture brought up in Japan. Two civilizations by continents are united topologically. Two-dimensions (2D) express six-dimensions (6D) in this world, developing *scientific*.[4]

Finally, how policy-makers determine an optimum point of $i = I/Y$ on the *x* axis of the 2D Plane Hyperbola (2DPH)? Is an optimum point of $i = I/Y$ selected effectively? Yes, it is. There are three candidates: i) a point of hyperbola that crosses its diagonal, ii) a point of hyperbola that crosses the HA of golden ratio, and iii) a point of hyperbola that crosses the vertical line of $i = I/Y$ equal to the relative share of capital, $\alpha = \Pi/Y$, where returns/profits equals net investment. The answer is iii) or a point of $i = \alpha$.



Note: A brief proof of Fig. 5: Start with the silver ratio, whose length is 1.0000. Then length of the golden ratio must be 1.0000−0.1414=0.8586. As a result, each area is the same, and also each increased area. Therefore, Fig. 5 proves the equality between the silver ratio area and the golden ratio area in the two-dimensional plain hyperbola (2DPH).

Fig. 5 First proofs in plane topology: The Golden ratio equal to the Silver ratio

[4] In a separate chapter, the author introduces Shizuko Ishida's theory=practice, which is under review. Ishida newly finds Super Universe Integration Theory (SUIT) and proves all the phenomena by using family-like tests and proofs (typically hundreds photos and pictures in her books and chapters published in Japan). The author always looks at Ishida's experiments and, confirms all of these unique proofs, with family-like tools at home.

The author presented a manuscript to *Annals of Mathematics* in August 2014. The manuscript included some new facts and related illustrations shown in this chapter, in particular, Appendix 2 'Scientific approach to topology under two-dimensions.' As the author previously pointed out in 'Foreword to Chapter 2,' this chapter remains unpublished. Also, the author sent a co-authored paper directly to Clay Mathematics Institute (CMI), Cambridge, when the author carelessly did not know CMI's rule.[5]

References to Appendix 2

1. Burkard Polster. (2004). *Q. E. D: Beauty in Mathematical Proof.* New York: Walker & Co. 58p.
2. James Buchan. (2009). *Easy as Pi* : *The Countless Ways We Use Numbers Every Day.* Pleasantville, NY; Montreal: Reader's Digest. 174p.
3. Nicholas Lobachevski (translated by George Bruce Halsted). (1840, 1914). *Geometrical Researches on the Theory of Parallels*. Chicago and London: Open Court Publishing Co. 50p.
4. Nicholas Lobachevski (translated by John Bolyai). (1906,1911). *Non-Euclidean Geometry: A Critical and Historical Study of Its Developments by Roberto Bonola* (starting with 1667-1733; 1728-1777; 1752-1833; 1775-1856; 1792-1817; 1776-1832; 1777-1855; 1780-1859; 1794-1874; 1802-1860). The author of *HEU* fortunately finds this invaluable book at Georgetown University. 219p.
5. Ziauddin Sardar, Jerry Ravetz & Borin van Loon. (1999). *Introducing **Mathematics***. Malta: Gutenberg Press. 176p.

[5] The title of the co-authored paper to Clay Mathematics Institute was 'Proofs: Riemann Hypothesis with Yang-Mills,' by Shizuko Ishida and Hideyuki Kamiryo, dated on 23 Aug 2013, where Fig. 5 above was cited.

Acknowledgements in Appendix 2:

The author's trip to Philadelphia and Washington, D. C., on 9th to 24th Oct 2013, was endowed with two indispensable targets and records. One is to confirm facts such that the author's new findings are the first appearance in the literature and, the other is to read through the original and the first appearance books and papers and, to get parts of these originals, focusing on graphs, illustrations, and equations, following the copy-right law in the U.S.. These originals were excitingly found in historical libraries; Univ. of Penn, Georgetown University, CUA University, and Univ. of Hawaii. Historical records in libraries are safely reserved in separated/specified places and sometimes we need magnet for direction in dark large underground rooms.

Sincerely, I am thankful to Founder of *International Atlantic Economic Society*, late John Virgo and his Katherine, *IAE* Conference, Philadelphia. The Conference was the last time when we could see and discuss in this world. During this trip, the author's friend, Kazuhiro Miyamae, and his family took care of Hide, taking Hide to above libraries and whatever places.

Further, the author cannot forget fortunate meetings in rooms of IMF, the World Bank, (whose given names are Nobuya, Carole, Will, Cristina) and shaking hands with Steve Landefeld, *Bureau of Economic Activity* (*BEA*), guided by Endo Shigeru's direct contacts several times before schedules. At that time, US government was during government shutdown but, his secretary, Vicki, helped Hide to see and shake hands at the entrance, next door to Lowes Madison Hotel stay. I cannot forget one day when we enjoyed by Steve's arrangement and useful discussions of capital stock calculation in accounting, in a room of the *BEA* in Oct. 2007. This chapter was thankfully rewritten by the above warm friendships towards harmonious cooperation to connect one with the other.