

Essence of Endogenous Model and System and Its Geometrical Philosophy

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(Received on October 20, 2011)

The endogenous system is composed of the endogenous theory and its data-sets as practice, where theory and practice is a unity. The data-sets are called Kamiryo Endogenous World Table (KEWT). KEWT is renewed by year, accumulating the data by country. The current KEWT 5.11 arranges 65 country data-sets, 1990–2009, by sector, whose original data come from *International Financial Statistics Yearbook*, IMF.

The essence of the endogenous model and system is explained using the Cobb-Douglas production function that is composed of endogenous equations and corresponding hyperbola equations. The philosophy behind is geometrically explained by applying the Positive and Negative principle to each of hyperbola equations. The author, except for this paper, stops the citation of ‘t Hooft’s (2000) conception of the holographic principle, listening to his advice that the author should be free from his principle. This paper reconstructs the author’s own theory and practice based on geographical philosophy that matches the Positive and Negative principle inheriting for the last thousands years in China. The author, even though, confesses that the Positive and Negative principle and the holographic principle have a common root and foundation to some extent when human spirit becomes close to the Nature both overlaps completely, free from the separation of natural and social sciences today.

The above paragraph shows the author’s final stance to the endogenous model and system. For memories, the author explains below the background of the above paragraph. The author decided to take the above notion fortunately when I happened to meet Gerard ‘t Hooft on 26 Sept 2011. Before that, the author had had a little different notion. This is because the author had believed that natural and social sciences have common phenomena since both sciences have a root from the Nature. The author have observed in KEWT series: the results measured at the endogenous system in equilibrium overlaps those found in quantum physics from the viewpoint of two-dimensional hyperbola and ‘space and time’ as one-dimensional. When human decision-making does not stand for human cooperation but for selfish fighting, as seen in this world, social sciences such as economics and econometrics are distinguished with quantum physics and ele-

ment chemistry. This is his notion. Then, social sciences differ from natural sciences. The vertical asymptote of a hyperbola, nevertheless, implies that the plus and minus seem to exist each at the extreme but, simultaneously integrated as one or one as three (plus, zero, and minus). This world reflects or transcripts the above result everywhere and any time, even though invisible.

This paper intends to record the notion of ‘before 26 Sept 2011’ involved in the endogenous model and system. The current situation in this world is extremely close to the polarity of selfish mind, far from original human mind. If it is so, it shows the Negative polarity, far from moderation or the golden mean in philosophy. It implies that human mind turns to the Positive or cooperative mind closest to the Nature, as shown geometrically by hyperbola. This is a reason why the author leaves this paper for a record.

This paper philosophically deepens what is the endogenous system and incorporates with (1) ‘t Hooft’s (2000) conception of the holographic principle and (2) Iyonoishi’s (2010) universe conception of ‘the zero point,’ that integrates spiritual and physical zones, with the zero point. Endogenous data for national accounts created at the endogenous system, to some extent, prove the existence of the above two conceptions. All the data of the author’s two-dimensional endogenous and hyperbola equations in the physical zone prove: 1) One-dimensional space-time is involved in the two-dimensional, 2) Partial expresses the whole, 3) All the data at one specified year are consistent with before and after the specified year consistently over years. These three phenomena universally hold at five-dimensional of the spiritual/imaginary/zone and, at six-dimensional at the physical/scientific zone by adding one-dimensional, vibrations i.e., swing or idle, to five-dimensional. Ishida Shizuko (Iyonoishi, for the last twenty years) has discovered and proved using visible materials hitherto. In this respect, ‘t Hooft (2000) and Randall (2005) stay at the physical/scientific zone, whose boundary is shown by the black hole or D-brane at the string theory, differently of Iyonoishi’s final zero point. To some extent, the holographic principle is numerically (using national currency) proved by the macroeconomic endogenous data-sets.

This paper presents a sort of base-paper for the author’s final endogenous system (Jan., 2011). First, the author explains what fundamental characters are involved in the endogenous system. Second, the author summarizes interpretations about dimensional concepts, clarifying each concept differences in relation to the endogenous system. Third, the author presents evidences of the holographic principle at the endogenous system, geometrically each by each arranging what are proved by the endogenous system. Fourth, the author picks up three favorable articles in reference to the endogenous system and interprets each contents: (1) Carmen M. Reinhart and Kenneth S. Rogoff (2011), in such that actual and endogenous data are closely

related and the differences often extinguish in the long run; (2) Franco Modigliani (1961), in such that the structure of his modeling is related to the endogenous system, starting with ‘discrete’ illustrations but constructing a ‘continuous’ market modeling; (3) Robert E. Hall (2011), based on his long experiences/insights with evidences. Fifth, ‘concluding remarks,’ broadly referring to the current aspects in the literature, convinces how important policy-methodology is, suggests what actual data should be first added to the current data-sets of KEWT 5.11, and thanks for ceaseless IMF’s efforts towards the spirit of Keynes (1944).

1. Six characters of the endogenous system

The first character of the endogenous system is ‘organic’ such that each data of all possible parameters and variables are wholly consistent with each other, organically without any assumption and towards dynamically balanced ‘moderation,’ as shown in monism, the Oriental philosophy, or the positive and negative principle. This is because each data is endogenously measured starting with the measurement of seven endogenous parameters, together with the simultaneous measure of endogenous capital and its rate of return at the endogenous-equilibrium. This leads to such that each data is a part yet a part of the whole.

The second character of the endogenous system is expressed by 24 hyperbola equations under two-dimensional. The hyperbola equation has three cases; vertical and horizontal asymptotes are; (1) both zero, (2) both not zero and, (3) either vertical or horizontal asymptote is zero. Each equation is partial yet a part of the whole, reflecting the above first character. The hyperbola equation does not directly have space and time. In the literature, space and time each constitute three- and four-dimensional. Two-dimensional of a hyperbola equation, however, expresses a whole consistency by country and year and, over years. This fact implies that the whole consistency takes in space and time as one-dimensional, as Einstein discovered.

The third character of the endogenous system is policy-oriented. Seven endogenous parameters¹⁾ wholly determine real asset policies. These policies constitute primary ‘causes.’ A

- 1) As explained step by step below, seven ‘endogenous’ parameters are: (1) Net investment, (2) Population, (3) Qualitative net investment coefficient, $beta_A^*$, (4) The capital-output ratio, (5) The relative share of capital, α , (6) The diminishing return coefficient, $\delta_0 = 1 + LN(\Omega^*) / LN((1 - \beta^*) / \beta^*)$, where $\beta^* = (\Omega^* (n(1 - \alpha) + i(1 + n))) / (i(1 - \alpha) + \Omega^* \cdot i(1 + n))$ and (7) The speed years $1 / \lambda^*$, where $\lambda^* = (1 - \alpha)n + (1 - \delta_0)g_A^*$ and the rate of technological progress $g_A^* = i(1 - \beta^*)$. Conditional parameters; δ_0 and $1/\lambda^*$, which are solely used for controllability of the endogenous system. In the endogenous-equilibrium by sector, $Y = W + \Pi = C + S$ holds with capital stock, K , and its rate of return, $r^* = \Pi/K$, under the equality of income=expenditures=output, Y .

given balance of payments and a deficit, government and private consumption, and population are given values in a sense yet these are converted to endogenous from actual. The results of causes are shown by other data simultaneously by year, without any assumption. This means that the whole data reflect the changes in policies such as revealed by Lucas, R. (19–46, 1976). It implies that mind is first as causes and body follows as results but, both simultaneously appear. Indeed, seven endogenous parameters wholly control policies and changes in policies by year and over years and, so as to turn to be a well-balanced.

The fourth character of the endogenous system is that actual statistics data do not go away from endogenous data beyond a certain limit, as long as actual data remain at the endogenous-equilibrium. Actual data are selected from *International Financial Statistics Yearbook*, IMF, and, several data such as the balance of payments, deficit, government and private consumption, and population remain given or actual before being endogenous. Endogenous taxes are measured as a size of government and compared with actual taxes when actual taxes are available in national accounts by country. Endogenous data is dynamic and balanced in equilibrium and, each data is ‘numerical energy.’ National culture/preferences are preserved by country and, the same results never happen over years by country. As a result, a concept of forecasting is not fitted for the endogenous system and its data-sets.

The fifth character of the endogenous system is that endogenous data are divided into two sectors, government and private. The division differs from national accounts classification and each component. The fifth character is deeply related to the above four characters. A system for national accounts (SNA) is supreme record-oriented and indispensable as an actual system. Policy-makers, however, need endogenous data that transform the SNA by dividing the total economy into government and private sectors and using just before final income distribution.

The sixth character of the endogenous system is the neutrality of the financial/market assets to the real assets. The KEWT data-sets have yearly proved the neutrality of the financial assets to the real assets, using money supply M2, ten year national debt yield, and the exchange rate, each by country and by year.²⁾

The above six characters have been gradually found and steadily realized for the last ten years, along with the improvements in the numerical expressions of data-sets, particularly towards

2) The literature under the price-equilibrium has to positively take advantage of financial/monetary policies to support real assets. The endogenous-equilibrium endogenously uses real asset policies (host) and financial/monetary policies remain supplemental (guest). When financial structure analysis such as Rezavi, Gibran’s (#135, July 3, 2011) uses endogenous data in parallel, the results must be much more consistent over years.

the optimum range of the endogenous-equilibrium. At the same time, the author has tackled how to justify the unique existence of the above six characters in the endogenous system.

The endogenous system has followed and absorbed all the performances and gifts preserved in the literature. In particular, the author has confirmed the stand points of methodologies in the literature, using Paul Samuelson's articles in his life time. It is a fact that Keynesians have not used the continuous Cobb-Douglas production function while neo-classicists have pursued this function. The author had kept in mind a 'discrete' Cobb-Douglas production function soon after the author was nominated for the Brooks Prize Award to Master thesis, MIT, June 1974. The author began to challenge for a unique discrete Cobb-Douglas production function when the author became a candidate for PhD at the University of Auckland, New Zealand, Nov 1995. The author's PhD Nov 2003, nevertheless, completed a unique recursive programming for the transitional path, without using endogenous equations. The author proved that non-linear was solely solved by recursive programming. The author could not complete a full set of endogenous equations by the time limit, i.e., within eight years, although three of seven endogenous parameters were insufficiently settled. Samuelson (1956, 90–93) and Samuelson and Solow (1968, 537–562) proved that linear was solved mathematically, related to Euler-Lagrange, Lagrange-Hamilton, maximizing and minimizing, based on matrix, and without relying on recursive programming. It was Feb 2004 when the author formulated equations for β^* , the capital-output ratio, relative share, the growth rate of population, and the ratio of net investment to output in equilibrium, but still having a few hidden parameters such as δ and λ unsolved.

Seven endogenous parameters and each equation were revealed in the discrete Cobb-Douglas production function. These parameters determine real-based policies and all the results by year. The author presented KEWT 1.07 in 2007, using nine countries, 1960–2005, simultaneously measuring endogenous capital stock and its rate of return in equilibrium. The current KEWT is 5.11 in Jan 2011, for 65 countries, 1990–2009. During these years, the author has experimentally accumulated methods to measure the endogenous-equilibrium or the speed years by country and sector. These methods improved a universe measurement of the moderate range of the speed years. The price-equilibrium is immeasurable and does not present real-based causes. The endogenous-equilibrium is a surrogate for the price-equilibrium. The author now dedicates the current KEWT 5.11 to Dr. Paul; if KEWT 5.11 were available when he was living his performances were endogenously proved step by step. The above story clearly shows that the endogenous system owes its existence to the literature, without shifting the current paradigm such as Kuhn's (1962, 1970) to a revolutionary paradigm.

2. Contact with the holographic principle in physics

The above story, however, remains description and does not justify the existence of the endogenous system. The endogenous system needs a universal theory. What conditions does the universal theory need? There are three conditions³⁾ for theory to be universal: (1) People of the world consent the theory; (2) The theory is common to the world; (3) No change eternally. No one justifies the existence of the endogenous system without the above three universal conditions prevailing in the world.

2.1 Contact with the holographic principle in physics

Is there a universal theory to satisfy the above three conditions in the literature? The author asserts that holographic memories in quantum physics are a universal theory. Dennis Gabor summarizes “Holography, 1948–1971”⁴⁾ in IEEE Xplore. And, Gerard ‘t Hooft⁵⁾ (June 2000) summarizes “The Holographic Principle: Opening Lecture,” (see <http://www.phys.uu.nl/~thoof/>). The holographic principle requires a ‘two-dimensional function’ in the vicinity of the black hole, where this concept is difficult to prove, except for observations and experiments. The endogenous system data, however, are most congenial with holographic principle, from the viewpoint of dimensionality.

For important reasons, the author here cites the following five statements (Italic is the author’s) in Lisa Randall (2005), famous for best explanations without using any equation. (1) Randall (ibid., 418, Chap. 22) states that there is only a single brane—the Gravity brane as an infinite *fifth* dimension. (2) Randall (ibid., 434, Chap. 23) states that ‘We’ll see that not only could space appear to be *four*-dimensional when there are truly *five* dimensions, but we might be living in an isolated pocket with *four*-dimensional gravity inside a *five*-dimensional universe.’ (3) Randall (ibid., 451–452, Chap. 24) states that ‘T-duality applies when a dimension is rolled up into a *circle*’ and that ‘mirror symmetry says that *six* dimension can be curled up into two very

3) Miyako Udatsu (2008) “Introduction of the Positive and Negative Principles,” p. 7.

4) Gabor, Dennis, “Holography, 1948–1971,” see Proceedings of the IEEE; Vol. 60 (6): 655–668, June 1972; for previous papers, see References at the end.

5) For the original literature, the following Note 26 is added: “G. ‘t Hooft, “Dimensional Reduction in Quantum Gravity,” Essay dedicated to Abdus Salam, Utrecht preprint THU-93/26 (gr-qc/9310026); id., “Black holes and the dimensionality of space-time,” in Proceedings of the Symposium “*The Oskar Klein Centenary*,” 19–21 Sept. 1994, Stockholm, Sweden. Ed. U. Lindström, World Scientific 1995, p. 122.

different Calabi-Yau manifolds, yet the resulting *four*-dimensional long-distance theory can be the same.’ (4) Randall (ibid., 21–28) explains *holography* under the title of ‘Three from Two, referring to ‘t Hooft on page 232. (5) Randall (ibid., 173–174, Chap. 7) explains, most suggestively to the endogenous system, ‘The Friedman-Kendall-Taylor deep inelastic scattering experiment,’ Nobel for physics, 1990. Their physics experiment differs from macroeconomics yet, the author has all the evidences at the KEWT data-sets that thousand elasticity experiments by value/ratio scatter and, never repeat over years by country. The author indicates that physics and macroeconomics have a common character in terms of dimensional phenomena. A decisive reason is a condition that national accounts are expressed using money/currency all over the world.

Now, the holographic principle stated by ‘t Hooft (ibid., 13), to the author’s understanding, is summarized as follows: The holographic principle appears in the relationship between the black hole and the dimensionality of space and time. This principle expresses ‘one-dimensional reduction’ in quantum gravity. Suppose that four-dimensional exists here. Then, three-dimensional, instead of four-dimensional, expresses the whole picture of four-dimensional, as originated by Gabor (1972). As a result, a related discovery is derived; a particle includes information of the whole, though the whole may not be clear at the particle. It implies that a part is inherently connected with the whole. Further, this connection leads to a discovery that quantum information may have the past and future information. Takeo Oku⁶⁾ (Feb 2009, 62, in Japanese) indicates that these conceptual discoveries still remain concepts. Are these concepts proved practically? The author advocates that any concept is proved only when the concept overlaps its practice or action; practice is essential to proof and justification. In section 2 hereunder, the author continues to put in order the above concepts in the case of four-dimensional. And in section 3, the author will list up the evidences for the unity between theory and practice that prevails over the endogenous system.

2.2 Contact with the relationship between the physical zone and the spiritual zone

For the relationship between the two zones, the endogenous system absorbs the idea of Iyonoishi (“Words of Life,” Feb, 2010, 20–33, 51–53; in Japanese). Iyonoishi universally inte-

6) Takeo Oku (Feb 2009) “Is success rule proved scientifically?,” p. 60–62 and 66–76 (in Japanese). He does not use holography but use hologram. The author puts ‘holographic’ in the endogenous system. Dennis Gabor uses ‘holography’ and ‘t Hooft uses ‘holographic photograph’ although each stresses the same differently.

grated the whole relationship between the spiritual zone and the physical zone by using curved geometry and element-chemistry. And, Iyonoishi, using visible material, proves that the space-time constitutes one-dimensional as its character, although the counting of space and time is physically two-dimensional. The spiritual zone is composed of five-dimensional; two-dimensional for the plane (the x and y axis), two-dimensional for space and time, and one-dimensional for 'spiral' rotation, as the 5th-dimensional. The physical zone is composed of the above five-dimensional plus one-dimensional for vibrations (swing or idle), which are required for the existence of physical zone so as to jump over the spiritual zone. The 'zero point' prevails everywhere at the boundary lying between the two zones. At the spiritual zone the above 'spiral' rotates from right to left while at the physical zone the 'spiral' rotates from left to right; always reverse depending on footing.

The physical zone is the object of social sciences, where dialectic is used for proof. Iyonoishi's conception seems, to some extent, overlapped to the current findings at natural sciences. Nevertheless, her conception differs essentially based on a universe philosophy, to the author's understanding.

2.3 Iyonoishi's zero point as a boundary versus holographic principle's black hole

Now the author clarifies essential differences of concepts lying between Iyonoishi and 't Hooft, in particular the zero point versus the black hole. First of all, 't Hooft (ibid., 13) indicates that the particle states require *a two-dimensional function* in the vicinity of a black hole. The two-dimensional function is really a marvelous concept, yet this function stays only at the physical zone, differently from Iyonoishi. Iyonoishi has the zero point as the boundary between the spiritual and physical zone, with one-dimensional space-time.

Each characteristic essentially differs at four conceptual aspects as follows: (1) Iyonoishi sets the zero point at the boundary of the two zones, where the five-dimensional spiritual zone turns to six-dimensional physical zone, helped by one-dimensional, swing or idle. The holographic principle stays at the physical zone and sets the black hole. (2) Iyonoishi's zero point exists everywhere at the boundary of the two zones. The black hole of the holographic principle does not refer to the spiritual zone, naturally due to a limit of sciences in the literature. (3) Iyonoishi's space-time implies that space and time constitutes one-dimensional inseparably and Iyonoishi proved it at the physical zone. The holographic principle has its three-dimensional (the plane and the space) at the physical zone, but time enters into the physical zone by applying the holographic principle; the space-time is resultantly visible within the physical/scientific zone.

(4) Iyonoishi's 'zero point' is seemingly immeasurable and 'close-to-zero' is measurable; the two simultaneously immeasurable and measurable; and each the same at the three (two zones and the zero point). The black hole is a physical but immeasurable hole and, seemingly larger than the zero point. The zero point exists everywhere each in the three. The black hole must be a surrogate for the zero point at the physical zone. The black hole may or may not be applicable to the plain at the physical zone.

Dialectic shifting to Iyonoishi from 't Hooft: 't Hooft (*ibid.*, 13) does not clarify that the black hole connects five-dimensional at the spiritual zone with six-dimensional at the physical zone, while Iyonoishi clarifies the existence of the two zones; five-dimensional spiritual zone and six-dimensional physical zone, with additional one-dimensional, 'swing or idle,' required at the physical zone. The scientists have to stay at the physical zone since the dialectic must be naturally proved in the physical zone. Then, the black hole may exist at the boundary of the two zones set between space and time (i.e., between three- and four-dimensional). This concept has been commonly accepted in scientific approaches.

On the other hand, Iyonoishi (*ibid.*, 20–33, 51–53) historically clarifies the zero point-existence at the boundary of the two zones and, anywhere at the physical zone similarly to the cases of current sciences. This zero point is not countable and measurable but distinguished with the black hole conceivable at the physical zone. And, the existence of one-dimensional, swing or idle, is indispensable to the shift of the spiritual zone to the physical zone, always jumping over the zero point. The 5th-dimension of spiral rotation at the two zones everywhere expresses the form of the ellipse or oval. The author's two-dimensional 'hyperbolic' discussed at the physical zone simply enjoys the circle (instead of the ellipse or oval), without taking into account the 5th-dimensional 'spiral rotation' and the 6th-dimensional 'swing or idle.' The circle attributed to endogenous hyperbola, however, is the same as ellipse or oval. The difference is only caused by the difference of the footing or which side; the author confirmed the fact of no difference from Iyonoishi.

2.4 Geometrically further, touching upon sociology and economics

Are sociology and economics able to geometrically absorb Iyonoishi's conception staying at the physical zone? One typical affirmative object is the endogenous system that wholly wraps the holographic principle in Iyonoishi's universe conception. In this respect, it is historically difficult to have an affirmative reply derived from sociology and economics.

The endogenous system uses the plane as two-dimensional, the x and y axis. The author

proposes, in the case of macroeconomics, that dialectic holds comfortably at the physical zone when the above hybrid is taken into consideration. Macroeconomics data or currency data are surprisingly fitted for the proof of holography at the physical zone any more than other sciences and fields. Dialectic shows the logic to grasp the motion and momentum not partially but wholly.⁷⁾ The motion and momentum are expressed by accounts, numerical/currency information, energy, light, ray, and universe. It is much easier for macroeconomics to approach the above dialectic or logic than other fields such as sociology⁸⁾ and ecological/agricultural technology. Two unique reasons are: (1) Macroeconomics is expressed by national currency accounts at the physical zone. (2) Hyperbola has a secret understanding with the above dialectic. It is much difficult for other fields to measure causes and results numerically.

Nevertheless, there is only one field in economics that takes ‘hyperbola’ concept into consideration. This is Drazen Prelec (1989) and its revival (2004, 511–532), whose title is ‘Decreasing Impatience: A Criterion for Non-stationary Time Preference and “Hyperbolic” Discounting.’ The recent paper for hyperbolic discounting is Tarek Coury and Chetan Dave (2010). These discounting rates are shown by hyperbolic instead of horizontal by year at models or over years at the transitional path. On the contrary, the endogenous system (2005, 2006, 2009) uses the relative discounting rate of consumer goods to capital goods as a surrogate for aggregate individual utility and in relation to the system (see section 3 below). This relative discounting rate is estimated empirically and strictly as a function to distinguish national culture and preferences by country, yet geographically related to all the hyperbola equations that support the whole endogenous system.

Geometrically, the spiritual and the physical zone constitute one unity and are perfect, where the Pythagoras right rectangle is shown by $x^n + y^n = z^n$, with the golden ratio; 3, 4, 5, each at both zones and due to the 5th dimensional, spiral rotation. The hyperbola equation in the endogenous system is shown by $x^2 + y^2 = z^2$; not by 3, 4, 5 (i.e., the golden ratio) but by 1, 1, $\sqrt{2}$ (see Figure 1 at the end). The right rectangular and accordingly, the inherent circle are related to a hyperbola equation at two-dimensional. Space and time are simultaneously involved in the hyperbola equation, due to the two applications of the holographic principle and Iyonoishi’s one-dimensional space-time over Einstein’s discovery. And, the two applications are justified by the evi-

7) Haruhisa Ogawa, “Baïen Miura’s space and nature philosophy.” (1989; Baïen’s 200 year anniversary publication). Baïen (1723–1789) was called Orient Aristotelian.

8) The author investigated the space and time or the space-time using Web of Science (available after 1970) at the Library of HSU. The author found 22 title for sociology and 59 for economics, where there was no article to inseparably and numerically treat the concept of the space-time.

dences of the endogenous equation and its hyperbola at the endogenous system. The decisive condition to the evidence is the unity of theory and practice. The endogenous system is universally qualified with that condition of the unity of theory and practice, equipped by the 24 hyperbola equations.

Geometrically, the hyperbola has the diagonal and the circle that touches the cross point of the diagonal and the hyperbola curve, where the hypotenuse of the right rectangle is the distance between the above cross point and the origin, when vertical and horizontal asymptotes are each zero. The circle seemingly differs from the ellipse of Iyonoishi, yet both are the same, as confirmed above.

2.5 'Theory and Realism' and monism versus dualism

Let the author first feedback the conceptual differences lying between theory and practice. This section is divided into two parts: (1) Samuelson's 'Theory and Realism' still unsolved and (2) monism versus dualism existed with mankind history. There must be common human aspects behind. Samuelson (1963, 1964, 1965) discussed 'Theory and Realism' repeatedly with several commentators in *American Economic Review*, conferring to economics, mathematics, and physics/atoms (see References at the end). It was fifty years ago and then, quantum physics progressed much so far. Yet, regardless of the stage of developments in sciences, 'Theory and Realism' have remained unsolved, the author stresses. 'Theory and Realism' come from the relationship between methodology, assumptions, propositions, theory, empirical data, consequences, and practice. As a result, there were two opposite discussions by Friz Machlup and Paul Samuelson. 'Theory and Realism' have been essentially inevitable not only in economics but also in other sciences. How are the above opposite debates mitigated towards solution at any science? Are opposite debates inevitable, without shifting the physical zone to the spiritual zone or Nature and Universe? There yet exists a solution at the physical zone if assumptions are deleted and if theory and practice are united into one as the methodology. One typical example is the endogenous system by country at macroeconomics, where no assumption exists and the endogenous system (theory) and its data-sets such as KEWT 5.11 (practice) are united by year and over years. The zero point surprisingly overlaps the origin of two-dimensional at the endogenous system. Mind (decision-making) and body (practice) are invisibly tied up with the two zones even if the spiritual zone is neglected.

Second, let the author summarize monism (united mind and body) versus dualism (separated mind and body) or the difference between the Orient monism and the Western dualism, referring

to Thomas Kuhn. Thomas Kuhn's (1st Ed., 1962; 3rd Ed., 1996) 'Scientific Revolution' stresses the importance of his 'paradigm shift'. The author agrees to the opinion that historically there been revolutionary shifts of old paradigms in areas such as astronomy after Newtonians, physics, and element-chemistry. But, the author opposes an application of his paradigm shift to the endogenous system. And, the existence of the unity of both zones appeals to human sensitivity as a fact. For example, according to Kuhn (ibid., p.171), 'We are all deeply accustomed to seeing science as the one enterprise that draws constantly nearer to some goal set by nature in advance.' The author, instead, advocates that new discovery and inventions become complete and modest if human integrates mind and body completely even when we live in the physical zone.

This is a monism, apart from duality lying between mind and body. The monism implies that nature prevails everywhere regardless whether or not the two zones exist. Nature integrates mind and body completely when human understand nature completely. The author advocates the essence of the monism. The monism is most easy to approach the zero point through the unity of mind and body and essentially directs the dynamic balance towards moderation. Balanced and moderate are key words in the monism. Note that duality today naturally aims at the dynamic balances.

In the fields of social sciences such as sociology, management, and economics, it may be necessary for human to modestly respect nature, seemingly more than other natural sciences. But, remember that human treats and studies all the sciences. Social sciences in particular treat the relationship between human mind and body at the physical zone, where it is possible for human not to step into the spiritual zone. Apart from human choice, the zero point exists everywhere in the physical zone. A typical case is the endogenous system that uses the hyperbola equation. The zero point always connects the physical zone with the spiritual zone or decisions with results. The zero point always related to the origin of the plane.

2.6 Geometrical inevitability from parabola to hyperbola

One will find two different geometrical illustrations using the endogenous system: Parabola and hyperbola have similar attributes mathematically. Is the similarity true? This is the purpose of this section. What is the difference between the parabola and hyperbola in the physical zone? Parabola's origin is able to express the zero point commonly to the physical and spiritual zones. The parabola, however, stays at the 1st quadrant. The maximum or minimum of the parabola seldom corresponds with the origin of two-dimensional. Therefore, the maximum or minimum of the parabola seldom has the connection with the zero point and the spiritual

zone. Or, the parabola no doubt treats the 1st quadrant apart from the origin when the parabola calculates maximum or minimum using actual data for economics and econometrics.

On the other hand, the hyperbola is complicated since it is always connected with the zero point that overlaps its origin when the vertical and/or horizontal zones are equal to zero. It is impossible to measure the zero point in the spiritual and physical zones. The hyperbola of the endogenous system is expressed by the plane as two-dimensional of the physical zone. Even the cross-point of the vertical and horizontal asymptotes differs from the origin, the origin is primarily tied up with the zero point (not the cross point). The closer to the origin the more difficult to measure the hyperbola values of both the x and y axis. When the vertical and horizontal asymptotes are not zero, the cross point of the hyperbola differs from the origin of the plane. The cross point and the origin must be carefully interpreted for the endogenous system (see section 4 later).

Suppose that the hyperbola has its optimum equilibrium range. This range must stay at an appropriate value of the x axis; not too low but not too high. This range is primarily measured by the speed years (the y axis) to the net investment to output (x axis) and also to the rate of change in population (x axis) both in equilibrium. The preferable optimum range is coherent in momentum; more strictly than consistently. In a sense, the maximum or minimum of the parabola is replaced by the optimum range of the hyperbola. A great merit of the hyperbola is the connection of the zero points. Since space and time constitute one-dimensional, two-dimensional (the x and y axis) embrace space and time at the same time, regardless of whether the zone is physical or spiritual.

In short, when the endogenous system is based not on the duality of the two zones but on the monism, the mind/decision-making (causes) and the body/practice (results) are integrated simultaneously in this world. Then, the shift of parabola to hyperbola is endogenously inevitable.

3. Some evidences reflecting the holographic principle at the endogenous system

The author finds five evidences below each as a fact at the data-sets of KEWT 5.11 by country. Five evidences in turn partially justify the existence of the holographic principle itself:

- 1) The holographic- and policy-oriented causes and results: The balance of payments and deficit, government and private consumption, and population are given causes before measuring

seven endogenous parameters. Then, endogenous net investment by sector and also endogenous taxes showing the size of government are simultaneously measured by year, with seven endogenous parameters, the population in equilibrium (which mostly equals the above actual population, under full employment) and the relative discount rate of consumer goods to capital goods. As a result, capital (stock) and its rate of return are measured simultaneously by year and, over years (see, related figures at Appendix D). Data-sets such as Pen World Table (PWT) 5.6, 6.1, 6.2, and 7.0 today do not measure capital consistently by year and over years, perhaps due to econometrics use of market and financial data. The PWT and KEWT each have its own philosophy.

- 2) Simultaneously, all the other parameters and all the variables such as the growth rates of ‘output’ and ‘per capita output’ are measured consistently as a whole, where output equals income, as Meade and Stone (1969) pursued. Note that the growth rate of output equals the product of the rate of return and the author’s ‘endogenous Phelps coefficient’ measured by some of seven endogenous parameters. Of course, the growth rate of per capita output is more close to the rate of technological progress and occupies a center of fundamental variables, with the capital-labor ratio (see figures in Appendix D).
- 3) The relative share of capital equals the product of the capital-output ratio and the rate of return: $\alpha = \Omega^* \cdot r^*$. The three elements in $\alpha = \Omega^* \cdot r^*$ each formulate a hyperbola equation. For $\alpha = \Omega^* \cdot r^*$, the author sets one indispensable presumption. The endogenous system has no assumption, other than this presumption. This presumption is such that the initial/current capital-output ratio equals the capital-output ratio at the convergence point of time in the transitional path. As a result, the initial/current rate of return becomes equal to the rate of return at the convergence point of time in the transitional path. The presumption is required for stopping tautology. Under this presumption, the endogenous system and the recursive programming each are completely consistent by year and over years. The unity of theory and practice at the endogenous system is guaranteed when all the assumption are replaced by equations each by each, except for this presumption.
- 4) Let the author explain the characteristics of the above three hyperbolas in detail. First, for the capital-output ratio: The literature in general uses the capital-labor ratio when it is estimated, but independently with the capital-output ratio. The capital-output ratio and its hyperbola equation constitute a primary core of parameters and are directly related to the ranges of the endogenous-equilibrium measured by the speed years, technological progress, and the economic stages by country and sector. The capital-output ratio is inherently

related to all the seven endogenous parameters. If the ratio of capital-output ratio is controllable, the endogenous-equilibrium is stably maintained and, the transition of the economic stages, from poor and young-developing to stable-developing and developed, is smoothened. The horizontal asymptote of the capital-output ratio shows an upper limit of economic stage, influenced by each country's national taste, culture, and preferences.

Second, for the rate of return: Its hyperbola equation is a supplemental core at the endogenous system and explains endogenously the change from inflation to deflation. The endogenous inflation stays at the 1st quadrant, where nominal rate > real rate holds. When a plus rate of return goes to an extreme due to excessive deficit, the quadrant rotates from the 1st to the 4th, by 270 degree counterclockwise, where a minus rate of return appears with a rate of deflation. At the 4th quadrant, nominal rate = real rate + (-inflation rate) holds, resulting in real rate > nominal rate. However, the growth rate of output, whose main element is the rate of technological progress, must be always plus in the endogenous system. This is because the net investment must be plus. If net investment approaches depreciation, the growth rate shrinks closer to zero (until just before zero) at the 4th quadrant. The endogenous Phelps coefficient is endogenous returns divided by endogenous quantitative net investment, where net investment is the sum of quantitative and qualitative net investments. This implies that the cost of capital as the rate of return less the growth rate of output must be closer to zero, where the difference between the rate of return and the cost of capital is tiny, as seen in Japan data-sets. Now, when the above deflation goes to the extreme, the deflation turns to serious inflation, suddenly returning to the 1st from the 4th quadrant. These phenomena are explained using the characteristics of the hyperbola equation.

Third, for the relative share of capital: This relative share is responsible for stop-macro inequality, apart from social policies to poor individuals. To balance growth and stop-inequality, the relative share of capital hyperbola equation must stay at a certain range measured by the horizontal asymptote. Dynamic balances lying between/among parameters and variables are essential to sustainability.

Dynamic balances differ from efficiency and conveniences. The space-time as one dimensional concept in physics is involved in the above three hyperbolas. The space-time prevails everywhere at the endogenous system. For example, the 'endogenous' multipliers based on Samuelson's (1939 a, b) are consistently measured by taking into several years before and after a specified year.

5) The methodology of the endogenous system has no assumption, as stated above. National

taste/culture is macro-based by country and differs from the aggregation of individuals' utility that is difficult to estimate at the macro level. The same combination of all the parameters and variables never happens by year and over years at KEWT data-sets series. The literature sets a theory and examines it using actual statistical data, which are independent of the theory. In this case, various correlation analyses such as the Granger causal Test based on Granger (1969) and the Sims-Test based on Sims (1972, 1980) are indispensable to the verification of the theory, since theory and data are separated. On the other hand, in the case of the endogenous system, it is meaningless to calculate endogenous correlations between and among parameters and variables. There is no need to calculate the correlation coefficients if the endogenous system only uses endogenous data. The endogenous system, nevertheless, sets endogenous=actual for such data as the balance of payments, deficit, and government and private consumption. These settings are required for first connecting actual with endogenous and second guaranteeing 'policy-oriented.' As a result, 'endogenous saving less actual saving=actual net investment less endogenous net investment' becomes a useful key to real-assets policy makers.

4. Common symptoms lying between the literature and the endogenous system

The author finds some symptoms in the literature common to the characters of the endogenous system. The author takes and interprets three articles, collating each with the endogenous system: The first is Reinhart and Rogoff (May 2011), with respect to mitigated differences between actual and endogenous data in the long-term. The second is Modigliani (Dec 1961), with respect to delicate limitations of 'continuous' modeling formulated after starting with illustrations of discrete national accounts-data. The third is Robert Hall (April 2011), with respect to his long experiences and insights towards unseen causes based on actual data phenomena.

4.1 Carmen M. Reinhart and Kenneth S. Rogoff, "The Forgotten History of Domestic Debt," *The Economic Journal* 121 (May, 2011): 319–350

As a preparatory data to Reinhart and Rogoff (2011), the author paid much attention to Carmen M. Reinhart, "This Time is Different Chartbook: Country Histories on Debt, Deficit, and Financial Crisis," Working Paper 15815, *NBER*, March 2010. Then, the author interprets the above Reinhart and Rogoff (2011). Preparatory, Chartbook (2010) distinguishes highlight

events using five colors: (1) Years in default or restructuring external debt (pale shading); (2) Years in default or restructuring domestic debt (dark shading); (3) Near default, as defined in test (bright shading); (4) First year of banking crisis; (5) Hyperinflation, annual inflation > 500% (medium shading), broadly between 1800–2009, depending on each event. Highlight events are composed of three defaults and two financial extremes, banking crisis and hyperinflation. The data-sets of KEWT series, 1.07 to 5.11, are measured between 1960–2009 and 1990–2009. There are much period-differences between the above preliminary Chartbook and the figures/charts in the KEWT series. Yet, the comparisons between the two data sources suggest common phenomena despite of the differences existing between ‘actual’ data and ‘endogenous’ data. The author interprets common phenomena as follows:

- 1) The above WP 15815 precisely shows some of the three defaults with two financial extremes for seventy countries; poor, young-developing, developing, and developed. These events are the results of the real asset changes as the causes, where actual causes and actual results are illustrated.
- 2) In the long-term, the actual data and the endogenous are not separated beyond a certain limit by item of national accounts. When the price-equilibrium or the endogenous-equilibrium as a surrogate for the price-equilibrium is moderately maintained, there occurs no default and the neutrality of the financial/market assets to the real assets holds without bubbles and hyperinflation.
- 3) Banking crisis and hyperinflation are results of default. These occur only when the price-equilibrium or the endogenous-equilibrium becomes unbalanced or gets into close-to-disequilibrium or disequilibrium. It is a fact that many countries have fallen into default historically in the long run. Is there any character difference between the price-equilibrium and the endogenous-equilibrium? Yes, the price-equilibrium does not measure its causes while the endogenous-equilibrium wholly measures the causes to close-to-disequilibrium and disequilibrium. Further, it apparently seems that the processes changing from the price-equilibrium to price-disequilibrium are shown by unskillful manipulation of financial policies related to money supply, official interest rate, and other direct means. But, financial manipulation remains supplement to the real assets and cannot essentially solve disequilibrium.

Turning to Reinhart and Rogoff (2011), this article uses actual data, 1810–2010 and 1900–2010, based on WP 15815. The conclusions (*ibid.*, 337–339) indicates that historical data to some extent show the results similarly to the endogenous system, although the results remain

vague, without room for the cause-result analysis.

The author interprets the above results such that partials are related to the whole, as shown in physics and such that the difference between actual and endogenous data reduces considerably when 'the period covered' becomes long enough. This implies that actual data for the long-term becomes a surrogate for the endogenous data. Actual data for the long-term have points of contact with the data-sets of the endogenous system. The author compared actual data with endogenous data at KEWT 5.11–7, using fourteen countries and proved: When the difference rises up beyond a certain level, the room for selectable policies becomes narrowed and finally gets into disequilibrium. The author admits that Reinhart and Rogoff presents a challenge for the limit of actual data. Reinhart and Rogoff (*ibid.*, 338–339) states, 'Without a long dated historical data set, how can one meaningfully think about what debt levels are associated with elevated risk of default and financial crisis?...But, as our historical data set on domestic debt underscores with surprising forces, nothing could be further from the truth.' The author, of course, highly evaluates and respects ceaseless efforts of international organizations against default by country. A problem is that people of default countries do not easily understand essential defects caused by deficit and debt. The endogenous system is able to answer to this problem since all the variables are measured, simultaneously with policy-changes by year.

4.2 Franco Modigliani, "Long-run Implications of Alternative Fiscal Policies and the Burden of the National Debt," *The Economic Journal* 71 (Dec, 1961): 730–755

Differential and elasticity methods give power to modeling. The relationship between continuous and discrete, however, conveys everlasting questions. Keeping in mind the endogenous system, first, suppose that the continuous C-D production function, consistently over years, holds using consecutive actual data. The conditions necessary for this continuous function are; (1) time interval of the data is close-to-zero and (2) total differential equals partial differential for wholly consistency. These conditions are not realizable since given data are discrete in statistics. Next, suppose that the discrete C-D production function, consistently over years, holds using discrete actual data. The conditions necessary for this discrete function are; (1) without any assumption and (2) the equality of income=expenditures=output holds as a base for national accounts. These conditions are not realizable since actual data in statistics are not directly related to these conditions. Essentially, a function of $y(x)$ itself stands at the reverse and against the above conditions. Nevertheless, the literature often formulates continuous models, starting the sketch at discrete cases and expanding models in various continuous ways under linear. A

typical case is the above Modigliani (1961).

The market modeling derived by Modigliani (1961), nevertheless, is close to endogenous modeling at the endogenous system, both starting from the balance of payments and debt. Modigliani's model assumes that taxes are constant while the endogenous system measures endogenous taxes (instead of constant). Modigliani's model uses the market interest rate to justify the assumption that the marginal productivity of capital equals the rate of return in the market equilibrium, while the endogenous system measures a fact that the marginal productivity of capital equals the rate of return in the endogenous-equilibrium (released from assumption). Besides, his model (ibid., 755) sets up two concepts of (1) full-employment saving and (2) capital formation consistent with feasible monetary policy. The endogenous system, instead, full-employment is the last condition to guarantee the endogenous-equilibrium, where once saving and net investment are endogenously measured, full-employment holds, usually satisfying a condition of actual population growth = endogenous population growth, and the endogenous-equilibrium stays at a moderate range.

Conclusively, Modigliani's model, instead of using endogenous data, relies on the work of the financial market. His approach is consistent with the endogenous system that the neutrality of the financial/market assets to the real assets is tested and justified by using the KEWT data-sets. His rule to 'government deficit,' however, shows a severe condition that the balance of payments must be plus in the price-equilibrium. His conclusion differs from endogenous results that the balance of payments should be plus and minus 3 percent when an economy maintains stable growth over years. His conclusion sacrifices the balance of payment for the increase in deficit, which lowers sustainable growth in the long run. His model is one of the best approaches under the price-equilibrium without directly using 'actual capital' while the endogenous system is based on the endogenous-equilibrium with the use of 'endogenous capital' by sector. Note that his model starts with discrete calculations as shown in his Table I but for logic his model has to step into differentials to formulate variables while the endogenous system measures all the variables endogenously in the discrete time by year. The endogenous system measures so to speak his Table I, by using the whole data-sets by country, sector, and year.

4.3 Robert E. Hall, "The Long Slump," *American Economic Review* 101 (April, 2011): 431–469

The issues of Robert E. Hall (2011, 467) do not contradict those of the endogenous system. For both, Samuelson's "neo-classical synthesis" is vividly alive in macroeconomics. Why

does Hall have critical mind rather commonly to the endogenous system? This is because Hall's article is based not on the financial assets but on the real assets, where monetary policy is short-sighted as shown at the last paragraph of page 467. The author proves the existence of the neutrality of the financial assets to the real assets in the long-term (see, *IAER*, 2010). The author indicates that the above neutrality was figured out at the positive theory as advocated by Milton Friedman (1977). Even if monetary policy is well managed, Paul Krugman's (1998) proposal will immediately settle the situation, but never fundamentally.

In particular, Hall's last statement to unemployment and inflation matches one phenomenon derived by the endogenous system. Hall (*ibid.*, 468) states:

The analysis and calculations in this article assume that the gradual price adjustment described by the Phillips curve does not occur. Inflation remains at the same rate. If inflation declines and turns into growing deflation, the slump will worsen, as the real interest rate rises. So far in the current slump, notwithstanding episodes of grave concern, no slide into deflation has occurred.

The endogenous system measures the causes and results as stated in the above statement. Why does 'the Great Slump that began after the end of 2007' show a symptom against the Phillips curve⁹⁾? The author, in the endogenous system, converted the non-accelerating-inflation rate of unemployment (NAIRU) to the 'endogenous' NAIRU. Both NAIRUs each have a common key word of 'the vertical line' defined as the natural or endogenous rate of unemployment. The vertical line is indifferent of the rate of inflation. The difference between the NAIRU and the endogenous NAIRU is that the NAIRU uses actual unemployment and an external rate of inflation, while the endogenous NAIRU measures both endogenously. The difference between actual and endogenous data exist yet, actual data stay within a certain range of endogenous data in a moderate equilibrium, as the author stressed repeatedly.

The author, using the KEWT 5.11 (generally, see Figure 1), interprets 'the Great Slump that began after the end of 2007' as follows: The vertical line defined as the 'endogenous' rate of unemployment overlaps the y axis, where the endogenous full employment is independent of the 'endogenous' rate of inflation. This means that full-employment always holds under any rate of return at a moderate endogenous-equilibrium and that the condition of this equilibrium does not necessitate unemployment as the last condition to a moderate equilibrium. However, when the condition to obtain the endogenous-equilibrium requires unemployment as the last condition,

9) For the Phillips curve, see Paul De Grauwe, "*Economics of Monetary Union*," (34–53), where several figures are shown by developed country, 1970–2000.

unemployment occurs but rarely in equilibrium. Actual data reflect these circumstances.

On the other hand, the higher the endogenous growth rate of output the higher the endogenous rate of endogenous inflation as the horizontal asymptote is. When the dynamic balances between all the parameters and variables were broken, far from moderation, both the growth rate of output and the rate of return shrink to close-to-zero in the endogenous-equilibrium. In this case, 'the nominal rate of return > the real rate of return' still holds, as the case of the current US. When the circumstance conversely falls into close-to-disequilibrium or disequilibrium, 'the nominal rate of return < the real rate of return' appears, which rises the real rate. When government saving shows an extreme minus by year and over years, it results in deflation as the total economy, as the case of Japan. Actual data will reflect these circumstances and the market catches these circumstances. Hall's 'actual unemployment at the same level of inflation' is traced back to unbalanced policies at seven endogenous parameters.

5. Concluding remarks

This paper shows the essence of endogenous system as one unity of theory and practice at macroeconomics. The endogenous system has six fundamental characters as summarized first at section 1. Numerical/currency information at the endogenous system partially reflects the finding of the holographic principle, which has remained as conception. Behind the holographic principle, Iyonoishi's universe conception exists. Iyonoishi's conception was summarized at section 2, compared with 't Hooft's holographic principle. The author indicates that if human becomes more modest and obeys to nature, social sciences and economics approach more to natural sciences. This is because the Positive and the Negative principle exists with mankind history for thousands years. This fact is shown geometrically by the author's hyperbola equations. The Positive and the Negative face at the vertical asymptote of hyperbola equation, as discussed in section 4, with parabola versus hyperbola and maximum versus optimum. Geometrically and philosophically, one will understand the implications of KEWT 5.11 as a unity of theory and practice, and will confirm the existence of numerical evidences.

For suggestive evidences in the literature, the author selected three favorable articles by Carmen M. Reinhart and Kenneth S. Rogoff (2011), Franco Modigliani (1961), and Robert E. Hall (2011). These articles appeal some points of contact between actual and endogenous data and, even actual results clarify the results close to the endogenous system, though actual data never clarify the cause-result analysis.

For the cause-result analysis: Policy-makers by country now keep in mind the endogenous-equilibrium directed to dynamic moderate balances among data by country, taking advantage of its own national history, culture, and preferences and, controlling seven endogenous policy-oriented parameters. The endogenous-equilibrium is endowed with holographic-oriented causes and results. Direct causes are seven policy-oriented endogenous parameters and results are all the other parameters and all the variables. The author has indicated that accounting, financing, management, and economies constitute one unity, not to be partial divided by field. The author finds that Dual Motive Theory (DMT) led by Gerald Cory (1974¹⁰) has the same root as the Orient philosophy; e.g., dynamic balance changes of Ego (demand) and Empathy (supply) based on the positive and negative principle. DMT strengthens the base of behavioral economics, whose accumulation for strategies and tactics will support endogenous policies at universe macroeconomics.

For system difference: The ‘mixed’ economy has been discussed first by Samuelson (1964; 1970, 1973, 1980, in his long seller, ‘Economics’; *Challenge*, 1988). Farrant, Andrew, and McPhail, Edward (2009) historically summarized the logic of mixed economy, comparing Hayek with Samuelson. Certainly, the logic is related to controllability of an economic system. The endogenous system aiming at balanced moderation between sectors (government and private) guarantees the controllability, with higher spiritual humanity leadership by country; not by any particular system but by relaxed sensitivity, free from democratic, dictatorial, or communistic rigid classification.

Forecast is replaced by the results determined by the changes in seven policy-oriented endogenous parameters. Yet, in the future, the author expects to have new forecasting developed by cooperative use of actual and endogenous data if a few more original data are added to actual statistics. Note that the SNA statistics is a unique actual statistic records and this is a great fact.

The author presents thankfulness to the efforts of the IMF members that have improved actual data for almost all the countries more accurately by year and over years. Without the *International Financial Statistics Yearbook (IFS)*, IMF, the author could not have accumulated the KEWT series, 1.07 to 5.11 up to date. For more pertinent fiscal policy-making and the reduction of the differences between actual and endogenous data, the author hopes that the *IFS*

10) We enjoyed discussions with DMT group at Session # 266, WEAI, San Diego, on July 3, 2011, with Gerald Cory and Liz Li, thanking for sympathetic synchronized time to listening to “Dual Motive Theory and the Economics of Social Networking,” by Liz Q. Li and Yan-Gen Chan, with eighteen citations on page 18.

would include actual data such as total taxes and subsidies, government and private investment (similarly to consumption of 96f.c and 91f.c), foreign direct investment in and out, depreciation, and most importantly, ‘wages/compensation.’ By joint cooperation of actual and endogenous, the difference between the endogenous-equilibrium and the price-equilibrium will be numerically vanishing, and peaceful cooperative world economies will be at hands as Keynes expected earlier in 1944.

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Appendixes

Appendix A Before and after advice from Dr. Gerard 't Hooft dated on 26 Sept 2011

Before the discussion at Dept. of Physics of Utrecht University: The holographic principle is applicable to macroeconomics. A reason is that currency magnitude of national accounts data may be most fitted for the holographic principle.

After the discussion: The holographic principle should not be applied to macroeconomics. A reason is that a part of the whole is consistent with the whole, where the whole of quantum physics differs from the whole of macroeconomics. Partially, the principle is applied to the endogenous system but not wholly since natural sciences differ from social sciences. The author still believes that the holographic principle is partially applicable to macroeconomics; not by 'holographic principle' but by 'the principle,' deleting the word of 'holographic.' But, this use does not follow his advice. The wholly is more important than partially, it is a true fact. This fact oozes out from the holographic principle itself. The author was wrong.

He believes that social sciences are involved in human's mind and body. Assume that mind and body are integrated into one and completely close to nature or controllable. Then, both sciences are the same, he may say. However, this does not hold in the human world. He stresses that human cheats each other to get money. If human always thinks of others, then human spirit becomes close to the Nature spirit, where human respects nature modestly. The author thinks that it is not modest for human mind to conquest the Nature or challenge for the Nature.

The author accepted his thoughtful advice. The author sets 'the endogenous model and its system' defined as a whole unity of theory and practice, and stops the application of *holographic* principle to macroeconomics after 26 Oct 2011: The theory is composed of the 'discrete' Cobb-Douglas production function by country, year, and sector (government and private sectors). The practice is composed of Kamiryo Endogenous World Table (KEWT) 5.11, 1990–2009, by sector, where endogenous data-sets by fiscal year and recursive programming by fiscal year are measured consistently or endogenously. The endogenous system is unique in that the *discrete* Cobb-Douglas production function was strictly established as the first appearance in the literature and that the endogenous system as KEWT series is applied commonly to countries, starting with original actual statistics data at International Financial Statistics Yearbook, IMF.

The *foundation* of the endogenous system is 'perfectly endogenous,' where all the data are endogenously measured using endogenous equations by year and over years without later correc-

tion. And, the endogenous system is geometrically strengthened by corresponding two-dimensional hyperbola equations each as reduced form of endogenous equation. Actual data and endogenous data march together. Actual data fall into a certain range of endogenous data when the endogenous-equilibrium is moderate by country and by sector, as a measurable surrogate for the price-equilibrium prevailing in the literature. When national leaders make policy-decisions (causes) to approach endogenous data as targets, hopeful results are realized by year, directly clarifying causes-results relationships. For example, full-employment turns to a normal fact from an unrealizable dream, with a low inflation by country, under a moderate endogenous-equilibrium. Policies taken at the endogenous system are based on the real-assets and start with the structure of the balance of payments, $(S-I) = (S_G - I_G) + (S_{PRI} - I_{PRI})$, where $(S - I)$ is the balance of payments, $(S_G - I_G)$ is deficit, and $(S_{PRI} - I_{PRI})$ is the remainder at the private sector. Money and financial-assets policies are neutral to the real-assets policies.

The discrete Cobb-Douglas production function does not hold without discovering *seven* endogenous parameters that expresses changes in policies by year, where capital and labor are rival item. And, endogenous policies absorb ‘strategies and tactics’ supported by non-rival items such as human capital, education, R & D, and learning by doing. The endogenous system simultaneously measures all the parameters and variables, starting with capital and its rate of return and with national taste and culture by country as measurable macro-utility.

The characteristics of the endogenous model and system are: 1) Endogenous data do not repeat the same results, similarly to actual statistics data by year and over years. 2) A part is the part of the whole; part and whole are always consistent each other as long as within the endogenous system. 3) Geometrically, two-dimensional hyperbola equations are commonly consistent with space (any country and sector) and time (by year and over years). One-dimensional reduction holds similarly to a principle at quantum physics. However, this whole holds only at social sciences and differs from the whole at natural sciences. The author, in this respect, corrected the past wrong notion that ‘holographic principle’ was applicable to that at social sciences, once after hearing Gerard ‘t Hooft’s advice. At the same time, the author reconfirms that mind and body are inseparably one in this world or, philosophy, decision-making, and results, are inseparably one. The Orient philosophy calls it the positive and negative or, cosmic dual forces, yin and yang, sun and moon. The higher the philosophy the more hopeful the endogenous data results are.

It apparently seems that the endogenous model and system completely differ from the literature. The fact differs. The base of the endogenous model has succeeded the accumulation

of Keynesian and neoclassical models and erases all the assumptions (e.g., nine assumptions; Meade, J. E., 1962) necessitated by model. More fundamental is national accounts consensus that wages are attributed to households so that no returns are natural at the government sector. Accordingly, deficit has been treated as the difference between cash flow-in and -out at the government sector and without measuring the rate of return at the government sector. There is no methodology to measure the rate of return at the government sector. Furthermore, the rate of technological progress has been given externally in the continuous Cobb-Douglas production function. As a result, the endogenous model and system first of all measures the rate of technological progress endogenously. Fundamental difference is traced back to exogenous or endogenous technology. When the rate of technological progress is endogenously measured, the exogenous golden rule proposed by Phelps, E. (1960, 61) turns to the endogenous golden rule between the rate of return and the growth rate of output.

What is the aim of the endogenous model and system? The aim is the moderate and robust maintenance of the endogenous-equilibrium. This is measured by the speed years by country and by sector. The speed years are one divided by the speed coefficient as a growth rate in equilibrium, $(1-\alpha)(1-\delta_0)g_A^*$, where the rate of technological progress $g_A^* = i(1-\beta^*)$, δ_0 is diminishing returns to capital coefficient, $i = I/Y$, and β^* is net investment qualitative coefficient. Seven endogenous parameters to determine all the parameters and variable are involved in the speed years. An economy is robust when the situation is dynamically and modestly balanced.

Appendix B Gerard 't Hooft 先生 on 26 (Mon) 2011 との討論結果を記録に

誠に貴重な時間を割いてくださった 't Hooft 先生に感謝を申し上げつつ、今後への温かいアドバイスを決して忘れないように、これからの心構えと内生モデル・システムのあらましをつぎのように、まとめました。

Gerard 't Hooft 先生（以下、H 先生）が2000年に公にされた“holographic principle”には、内生モデル・システムの actual currency 数値の結果が正に適切に仕上がっています。H 先生は、部分的にはそうかもしれないとしても、しかし、natural sciences の発見した事実を心の介在する social sciences に適用することには、強く反対です。H 先生からのアドバイスは、自らの枠組みとメカを自由に構築してくださいということでありました。開口一番の質問は、内生モデルの foundation はなんですか？でありました。Endogenous system です。Endogenous とは、なんですか？その定義は、a) caused by factors inside the organism or system; b) produced or synthesized within に仕上がるとうあります。外から $15 + 10 = 25$ の actual statistical data (at *International Financial Statistics yearbook*, IMF, by country) が与えられと、すべてがシステム内部で内

生データに変換されて、国毎のシステム全体として、すべての国に（採用の国に同じシステムが共通的に）また、年数が20年間でも、50年間でも、すべての年度にわたって整合的に（データ数がいくら増えても、後からの修正はなしで済むように）統合を果たしております。そのようなデータ・セットの最新の更新（Jan 2011）は、65カ国を対象に、Kamiryō Endogenous World Table (KEWT) 5.11, 1990–2009, by sector として、公にしております。Jan 2011 には、KEWT 6.12 に更新予定です。アフリカの国々は、IMF staff の不断の努力にもかかわらず、統計が落ち着いた水準に達するのになお数年かかるように思っております。KEWT series が年毎に内生データの国の数を増やすことは容易ではありません。

文献との違いはなんですか？内生モデル・システムでは、理論がモデル、実際がシステムとして一体化しております。国毎の個性、national taste, preferences, culture, and history を万国共通になるように工夫して、内生の測定過程で取りこんでおります。今日までの文献の蓄積が存在しなければ、内生モデル・システムも、存在していません。文献を大きく分けると、Keynesians と Neoclassical です。その異同は、the continuous Cobb-Douglas production function をベースに置くか否かです。内生モデル・システムは、the discrete Cobb-Douglas production function を基礎に置きます。内生モデル・システムは、continuousをdiscrete に変換できたためになんとか生まれ得たものです。完全な内生という本質を満足するような the discrete Cobb-Douglas production function は、内生モデル・システムにおいて、今日までの文献上、存在してきておりません。

部分的な内生モデルは、Human capital, R & D, education, learning by doing 等を対象に、1980年代後半から文献に出始めました。しかし、non-rivalなこれらの研究数値は、rival capital や rival labor と異なり、年毎の割り振りを捨象しております。内生モデル・システムは、non-rival 数値をすべて戦略・戦術として、政策を支える立ち位置におきました。Real-assets 政策は、すべて内生政策の変動として、the discrete Cobb-Douglas production function と recursive programming のなかで non-linear を解決し、seven endogenous parameters に吸収できます（Appendix D の figures 参照）。seven endogenous parameters は、同時に、すべての戦略・戦術を具体化して表現します。Real-assets 政策は、すべての原因・結果を出し切り、すべてのマネー・金融・財務・為替・中央銀行の政策ではあやふやな原因・結果を明らかにします。real-assets 政策は、金融等の financial-assets 政策を長期には、完全に中立化しております。失業やインフレは、real-assets 政策によってのみ内生的に制御できます。内生均衡が価格均衡の代役を務め得るためです。理念の高いリーダーがバランスある制御機能を維持するときには、経済は平和裡に安定します。

Appendix C: 内生モデルとシステムの基礎（解説）

内生モデルの核心となる部分を中心に式を用いずにまとめると、つぎのとおりです。まず、第

一に、内生モデル(理論)と新古典派成長理論とは、理論と実際との融合へのスタンスがちがうために、継ぎ木ができません。ただし、新古典派がベースに置く実際データや予測結果と内生データの結果とを比較することは、政策の推進にきわめて重要であると考えております。端的には、外生技術進歩率(技術進歩率自体は、external であっても、新古典派モデルとしては exogenous となります)は、内生技術進歩率と相入れません。それこそが決定的な異同をもたらします(Appendix Dのfigures 参照)。たとえば、新古典派の収束係数は、一般に、資本-労働比率を用具に使用しますが、その収束年数は相当おそくなるように推測されます。国民経済計算体系において、人件費が最終的に家計に、また、利潤が最終的に企業に帰属するとしているために、実際データの数が限られており、かつ政府と民間部門別には、それぞれのestimateができないためです。内生モデルの収束係数は、それに対して、収束に求められる年成長率のベースが内生技術進歩率を母体としていますので、数値的に厳密に測定できます。会計の恒等式、 $1.0 = \text{収束年数} \times \text{年成長率}$ 、を使って(単利と複利の関係を敢えて無視して)、システムの循環を断ち、同時に、市場(たとえば、10年もの国債利回り)との同期的接続や金融資産の実体(固定)資産への中立性確保ほかに正当化の論拠を求めます。

新古典派は、データを統計に求めます。統計の目的は記録にありますので、そのまま政策目的には使えません。モデルと理論とは、別べつです。それに対して、内生モデルは、歴史・理論・政策を一体化するシステムとして存立します。モデルとデータとは、一つとなり、政策決定の変化に対する plan-do-see を年毎に実現します。内生モデルにイニシアルに必要な実際データは、システムのなかで、すべて内生データに変換されます。その結果、宇宙・量子物理、化学に先行している、多次元解決の問題を、two-dimensional 平面で解決していきます。内生モデルでは、すべてのデータが式に示され、式がいくら増えても、採用期間がたとえば50年と長くなっても、相互に矛盾が出ません。統計や実際データには、本来前提がありませんが、内生データ相互にも、最終的に一切の前提が不要になって測定されます。たとえば、限界資本生産性は、利潤率に一致し、限界労働生産性は、賃金率に一致します。その結果、完全競争は前提でなくなり、収束年数では、その moderate な範囲まで双曲線に対応して幾何的に測定されます。Meade (1962)のあげた新古典派成長モデルの前提は、九つでしたが、内生データの前提はゼロ、つまり、二度と同じことがおきないという現実を反映しています。

平面における次元のもつ implications は、幾何的に可能となりました。内生モデルに形成された24の式はすべて、双曲線式に転換できます。そのうち、基本的な12の双曲線式をグラフに並べると、政策重点の適否が一目瞭然に判断できます。2次元であっても、もともと3次元と4次元に示されるであろう、時・空という一体は、2次元に投射されております。石田静子女史の超統一式でも、すでに、相当以前から確認されています。物理・化学分野では、目に見えるような検証はなお難しい現状ですが、超統一式の場合には、身近な物体を使って証明がどなたにもわかるよ

うになされています。国民経済計算データを用いる内生モデルとその体系化した内生システムは、そのデータが通貨です。数量的に、計算が容易です。そのために、内生システムに内在する多くの事実は、Geard 't Hoof (2000) の principle の内容の一部に整合しておりますが、全体の性格が natural sciences と心・身をもつ social sciences では異なるため、比較自体は許されないと見るのが自然でしょう。H 先生のご意向を受け入れても、それでも、科学はすべてに繋がっております。自然に人間に近いほど自然であるためであり、科学が自然を征服するという間違った考えは決して長く続かないためです。陰陽の摂理のとおりです。双曲線の漸近線の示すとおりです。マクロ経済のシステムは、理念を高めた内面奥において、宇宙・量子科学と整合性を維持している態様の一端を示しているように理解します。

上記に関連した研究は、修道大学定年退職後も、多くの恩師・先輩諸先生に縁あって助けられた結果少しずつ纏まってきたものです。また、Papers for Research Society of Commerce and Economics 並びに Journal of Economic Sciences の有難い公刊なくして、決して存続できませんでした。厚く心からのお礼を申し上げます。

謝辞：2011年10月以降になって、光より早い何かが存在するというホット・ニュースが流れました。アインシュタインの法則が塗り替えられるのではないかという主張とアインシュタインの法則を維持したまま、光より早い何かを説明可能という主張とが報道されております。石田静子女史は、その何か物質から光に向かう場合には、常温のもと、 $x^2 + y^2 = z^2$ のままに可能であることを、黄金比の三角形からなる20面体をベースに身近に論証されました。松山地方法務局に認証 (Notarial Certification #89 on Dec 7, 2011) 済みです。その何か光から物質に向かう場合には、逆に、これまでのように、高温の原子転換でしょう。内生システムにおける2次元の幾何学的な双曲線の位置づけは、上記論証のおかげを通して、全体 universe と繋がる円・球関係を確かにできました。ここに、心から感謝を申し上げます (解説は、『修経』第二号に掲載)。

Appendix D Figures: Key ratios in (1) KEWT data-sets and (2) recursive programming

Fig. 1. Convergence years, the rate of change in the capital-output ratio, and the rate of technological progress, flow and stock, compared with the stock by M & W method, in equilibrium, in 4 Asia countries: 1990–2009

Fig. 2. Convergence years, the rate of change in the capital-output ratio, and the rate of technological progress, follow and stock, compared with the stock by M & W method, in equilibrium: 4 Euro countries, 1990–2009

Fig. 3. Convergence years, the rate of change in the capital-output ratio, and the rate of technological progress, follow and stock, compared with the stock by M & W method, in equilibrium:

4 Non-Euro Europe countries, 1990–2009

Fig. 4A. Parameters and variables in the transitional path using recursive programming: 4 Asian countries, 1990–2009

Fig. 4B. Parameters and variables in the transitional path using recursive programming: 4 Asian countries, 1990–2009

Fig. 4C. Parameters and variables in the transitional path using recursive programming: 4 Asian countries, 1990–2009

Fig. 4D. Parameters and variables in the transitional path using recursive programming: 4 Asian countries, 1990–2009

Fig. 5A. Parameters and variables in the transitional path using recursive programming: 4 Euro countries, 1990–2009

Fig. 5B. Parameters and variables in the transitional path using recursive programming: 4 Euro countries, 1990–2009

Fig. 5C. Parameters and variables in the transitional path using recursive programming: 4 Euro countries, 1990–2009

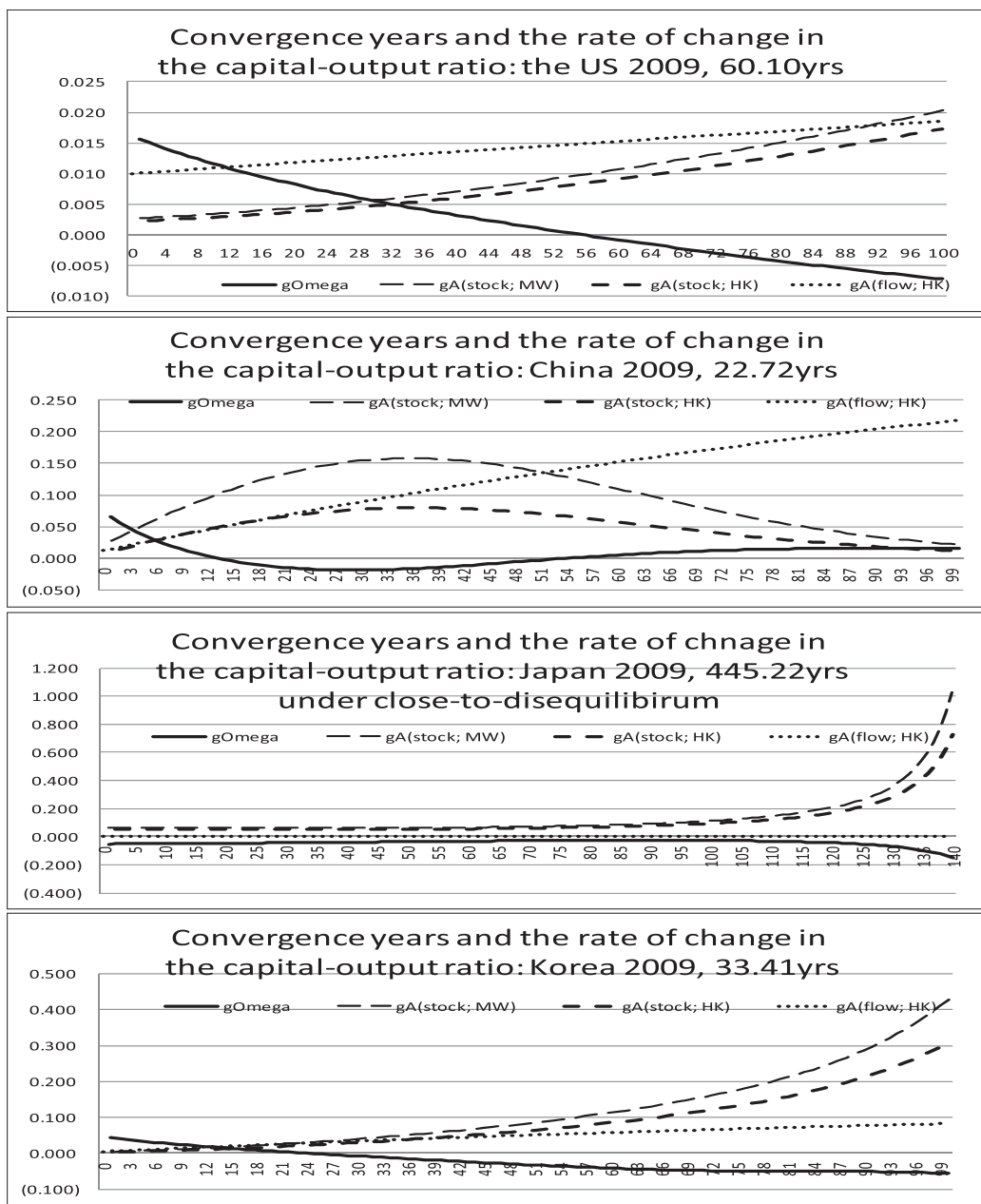
Fig. 5D. Parameters and variables in the transitional path using recursive programming: 4 Euro countries, 1990–2009

Fig. 6A. Parameters and variables in the transitional path using recursive programming: 4 Non-Euro Europe countries, 1990–2009

Fig. 6B. Parameters and variables in the transitional path using recursive programming: 4 Non-Euro Europe countries, 1990–2009

Fig. 6C. Parameters and variables in the transitional path using recursive programming: 4 Non-Euro Europe countries, 1990–2009

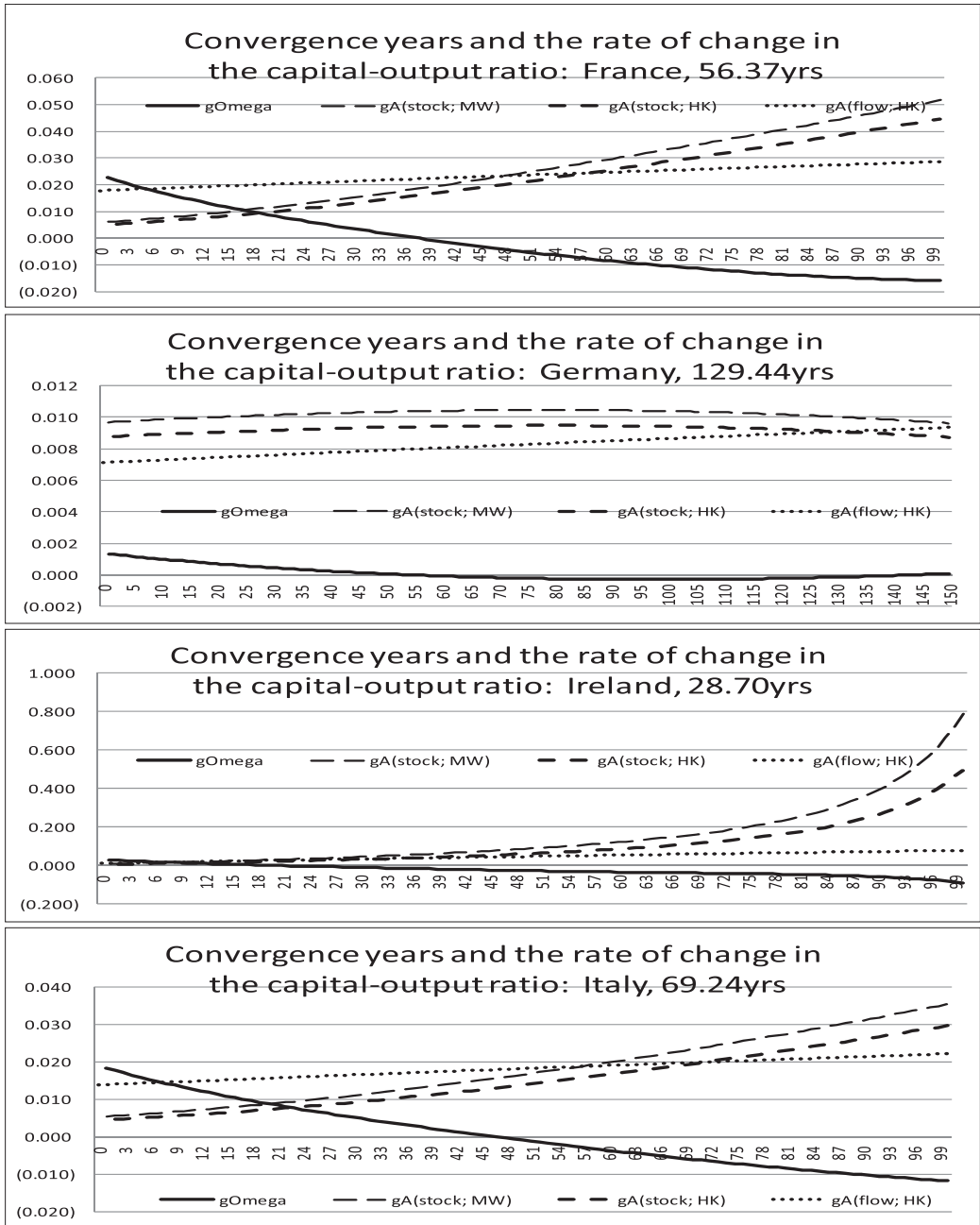
Fig. 6D. Parameters and variables in the transitional path using recursive programming: 4 Non-Euro Europe countries, 1990–2009



Note: When the rate of change in the capita-output ratio becomes zero, the convergence years are measured precisely (hereunder the same).

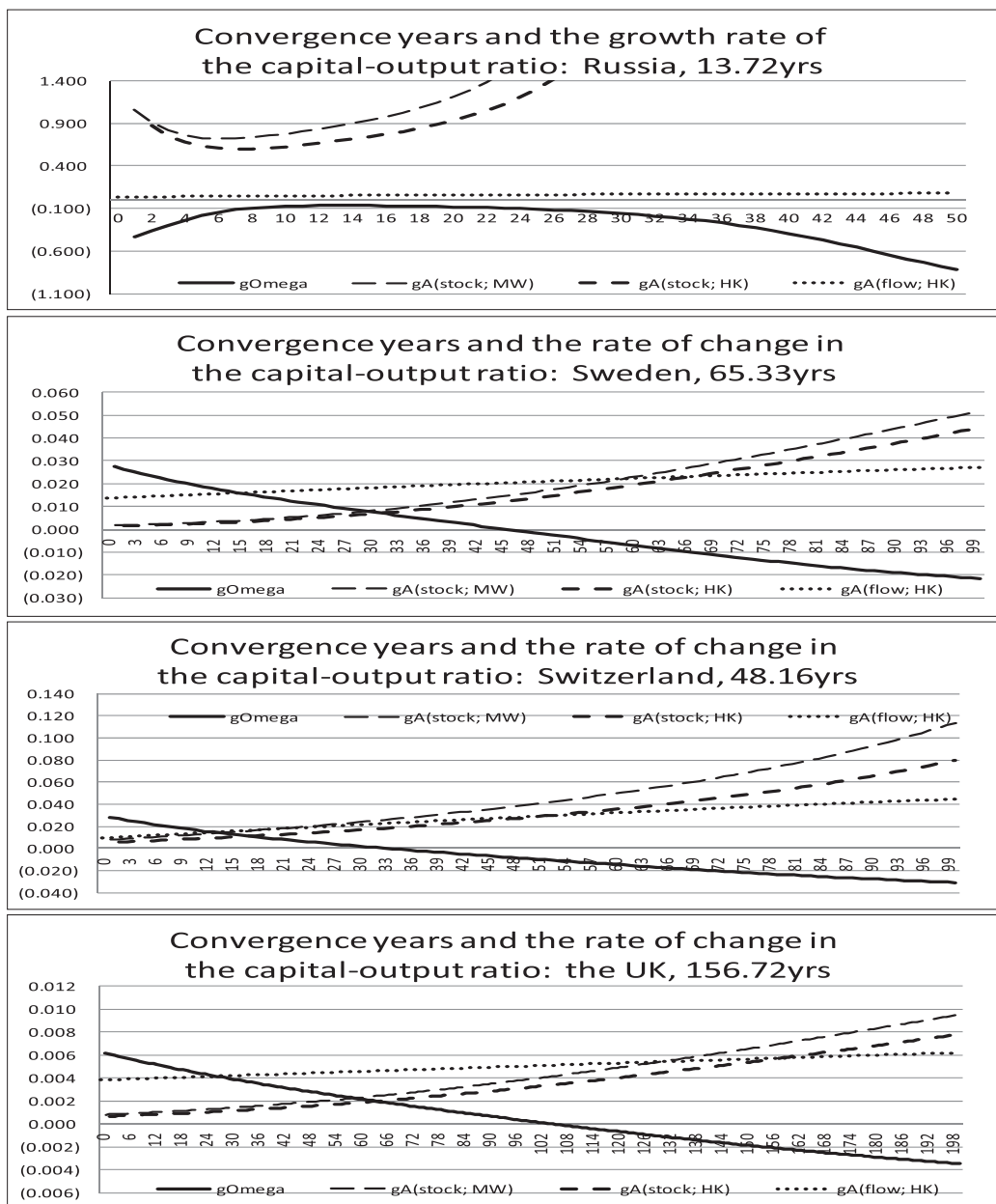
Data source: KEWT 5.11-1 for 17 Asia & Pacific, 1990–2009, whose original data are *International Financial Statistics Yearbook*, IMF

Fig. 1. Convergence years, the rate of change in the capital-output ratio, and the rate of technological progress, flow and stock, compared with the stock by M & W method, in equilibrium, in 4 Asia countries: 1990–2009



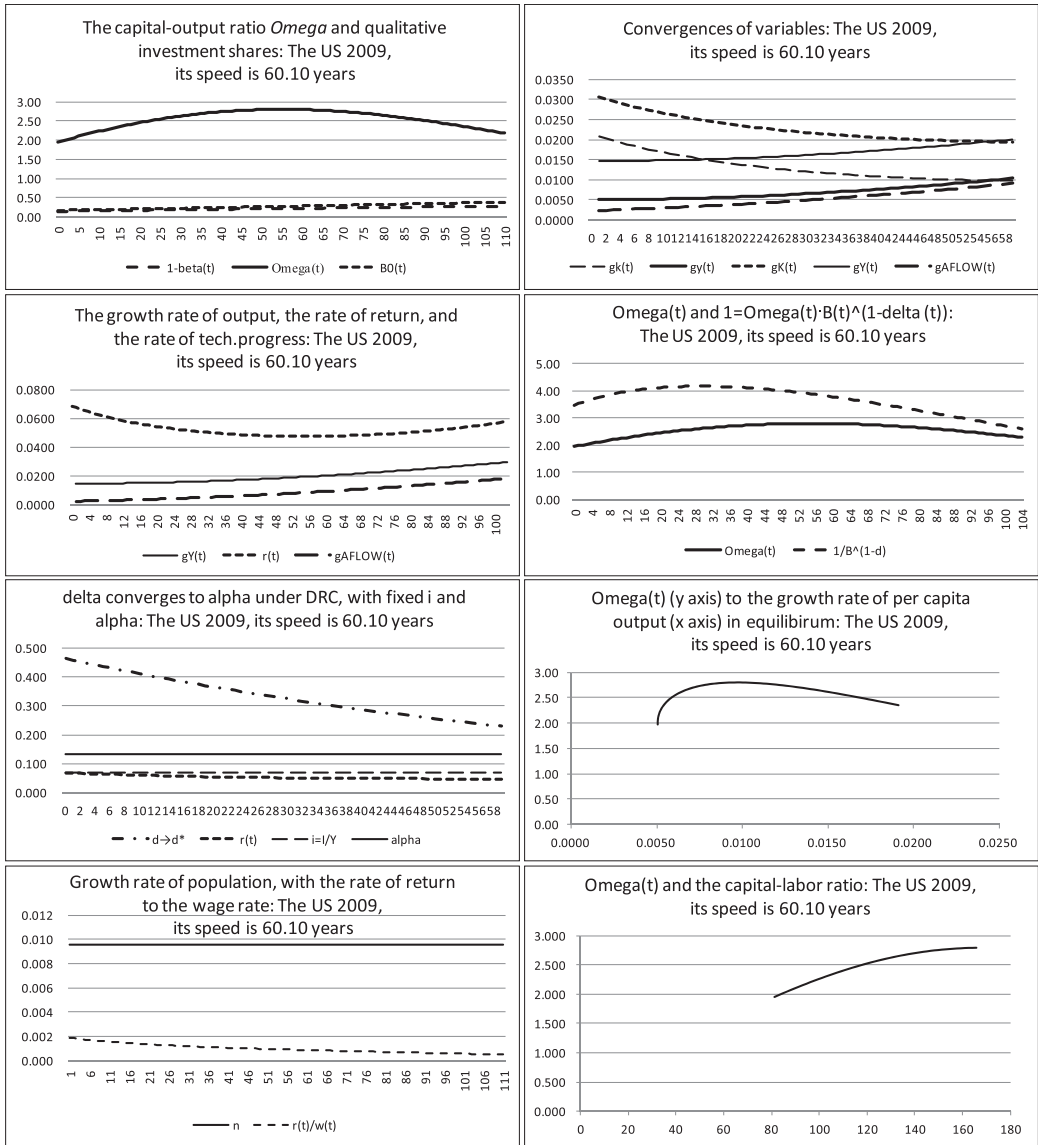
Data source: KEWT 5.11-2 for 14 Euro currency, 1990-2009, whose original data are *International Financial Statistics Yearbook*, IMF

Fig. 2. Convergence years, the rate of change in the capital-output ratio, and the rate of technological progress, follow and stock, compared with the stock by M & W method, in equilibrium: 4 Euro countries, 1990-2009



Data source: KEWT 5.11-3 for Non-Euro Europe, 1990–2009, whose original data are *International Financial Statistics Yearbook*, IMF

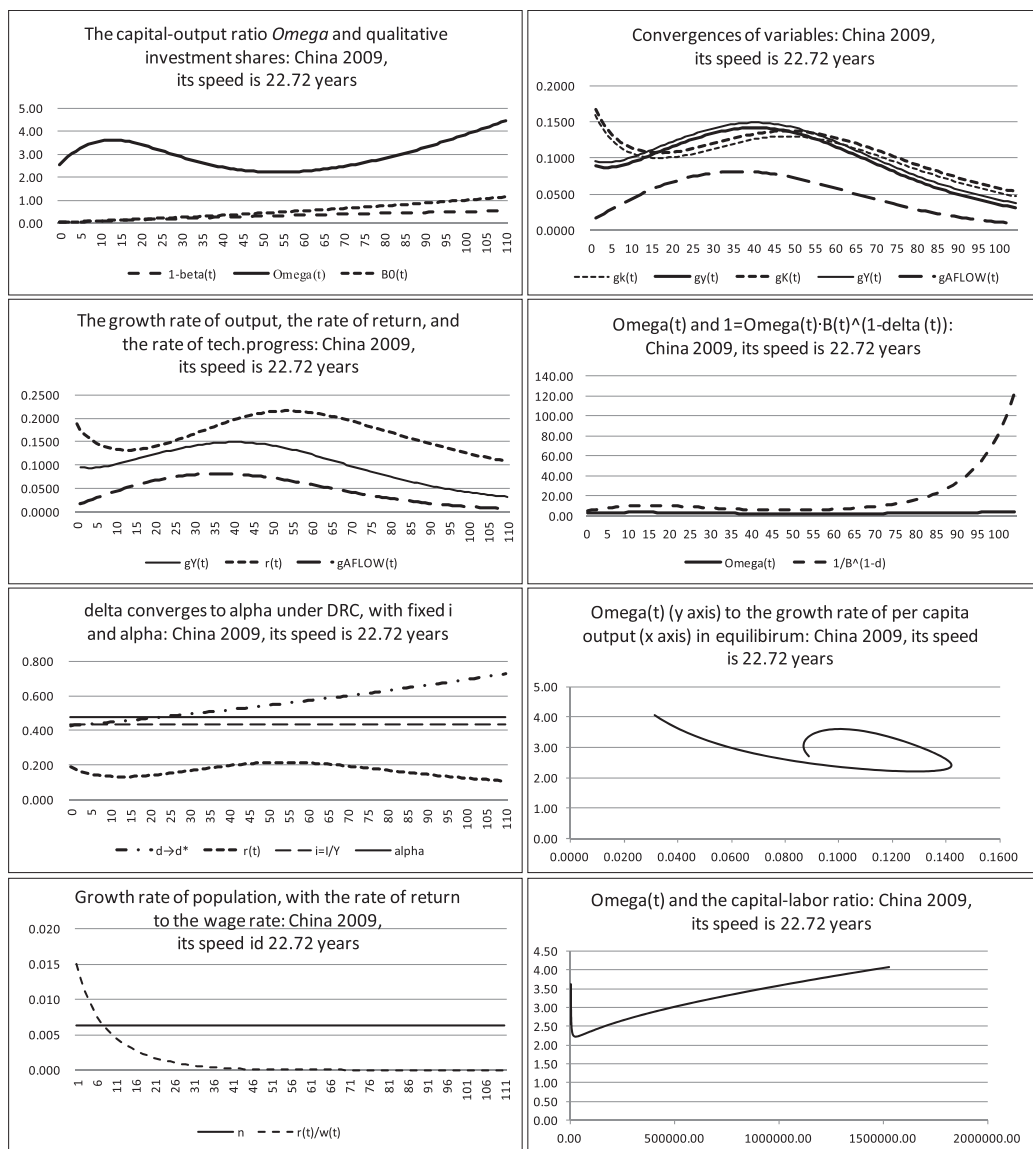
Fig. 3. Convergence years, the rate of change in the capital-output ratio, and the rate of technological progress, follow and stock, compared with the stock by M & W method, in equilibrium: 4 Non-Euro Europe countries, 1990–2009



Data source: KEWT 5.11-1 for 17 Asia & Pacific, 1990–2009, whose original data are *International Financial Statistics Yearbook*, IMF

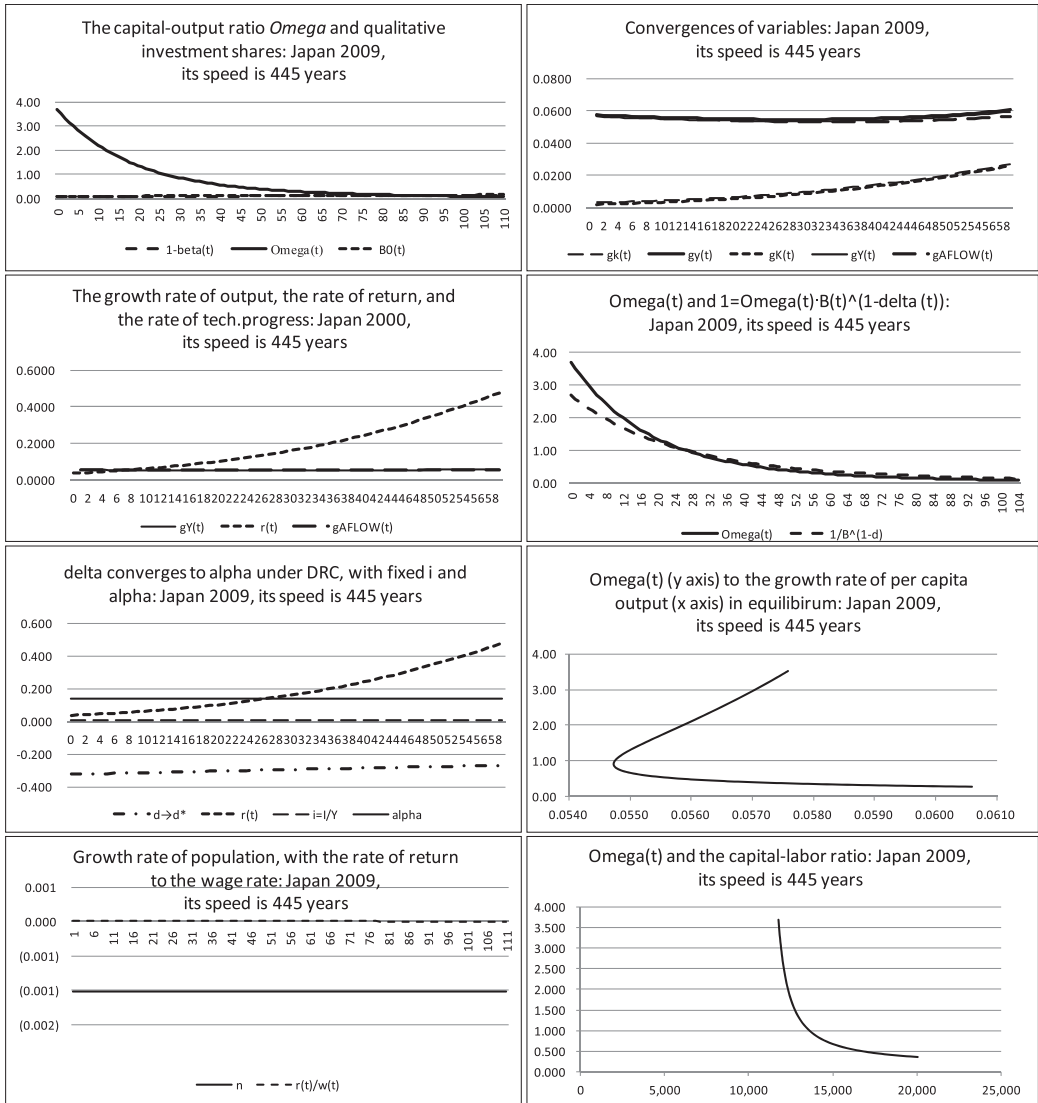
Fig. 4A. Parameters and variables in the transitional path using recursive programming: 4 Asian countries, 1990–2009

Essence of Endogenous Model and System and Its Geometrical Philosophy



Data source: KEWT 5.11-1 for 17 Asia & Pacific, 1990–2009, whose original data are *International Financial Statistics Yearbook*, IMF

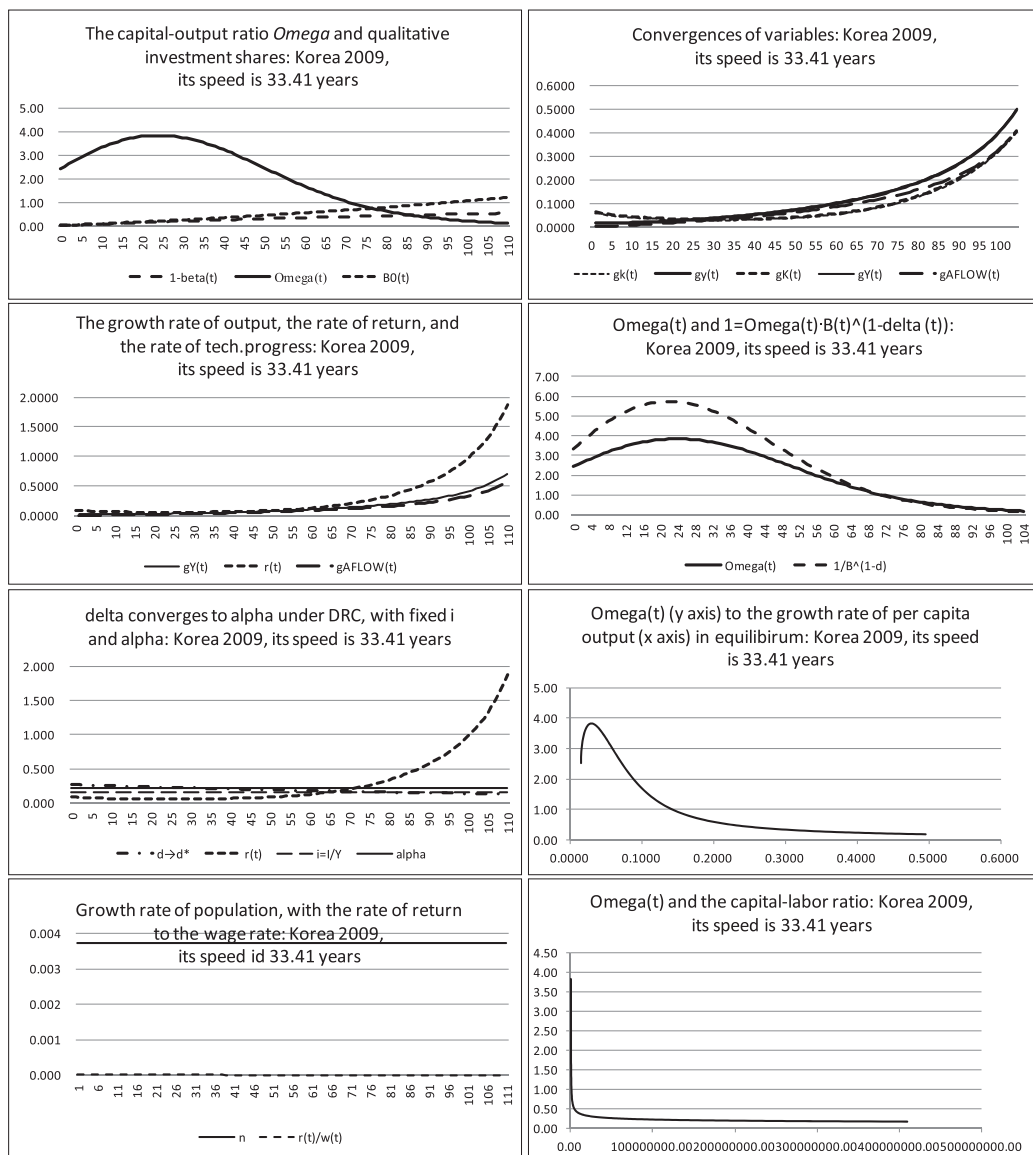
Fig. 4B. Parameters and variables in the transitional path using recursive programming: 4 Asian countries, 1990–2009



Data source: KEWT 5.11-1 for 17 Asia & Pacific, 1990–2009, whose original data are *International Financial Statistics Yearbook*, IMF

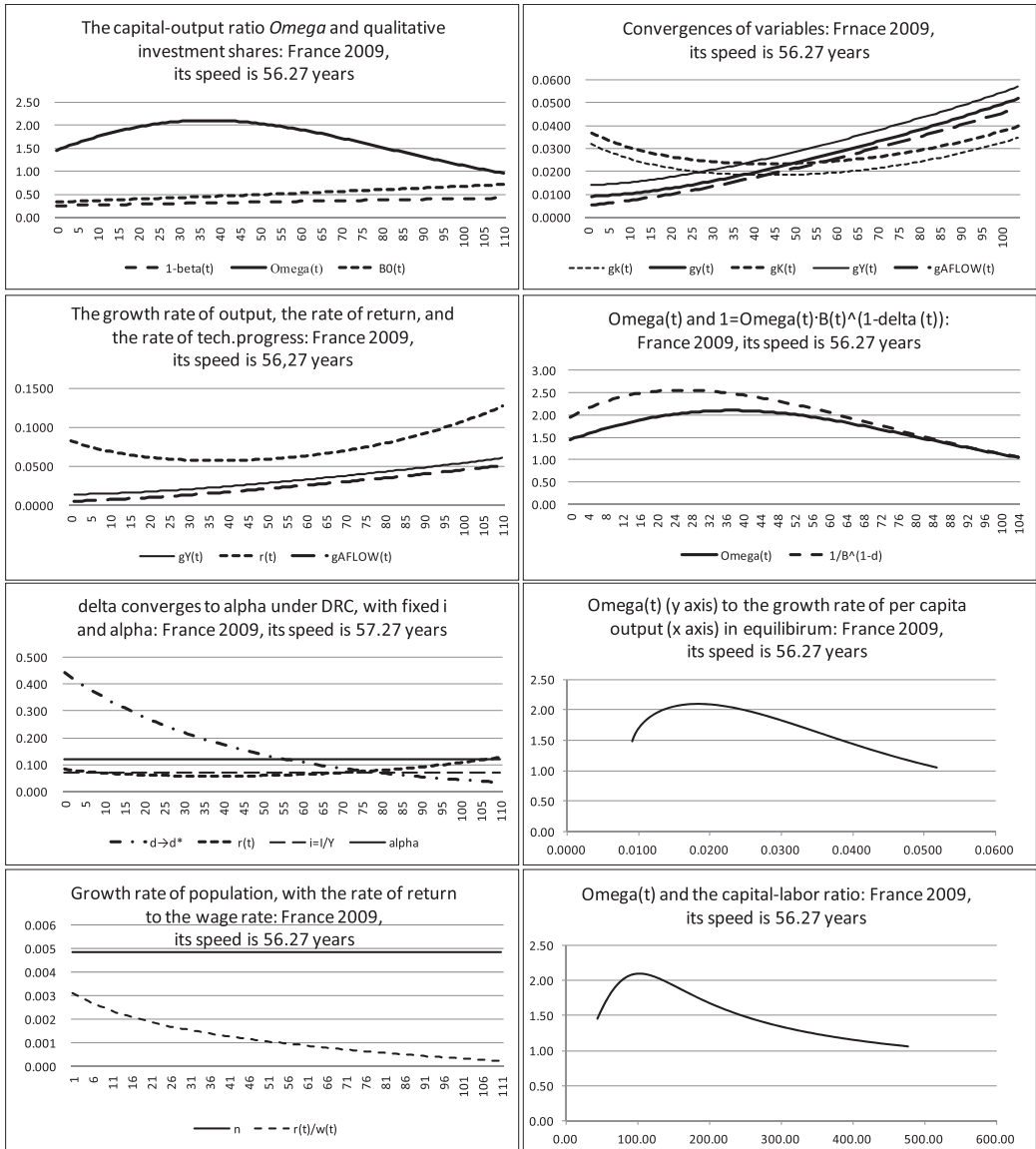
Fig. 4C. Parameters and variables in the transitional path using recursive programming: 4 Asian countries, 1990–2009

Essence of Endogenous Model and System and Its Geometrical Philosophy



Data source: KEWT 5.11-1 for 17 Asia & Pacific, 1990–2009, whose original data are *International Financial Statistics Yearbook*, IMF

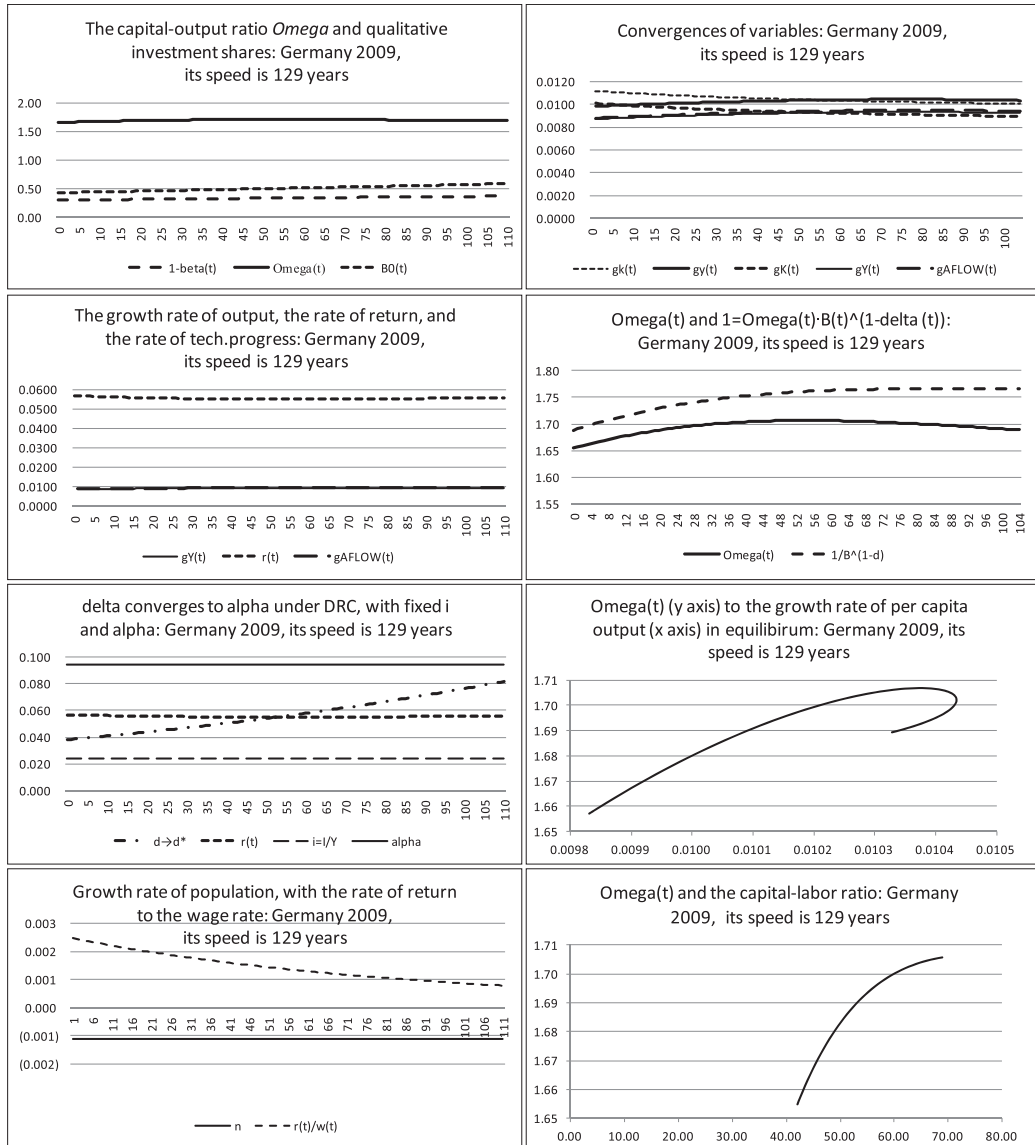
Fig. 4D. Parameters and variables in the transitional path using recursive programming: 4 Asian countries, 1990–2009



Data source: KEWT 5.11-2 for 14 Asia & Pacific, 1990-2009, whose original data are *International Financial Statistics Yearbook*, IMF

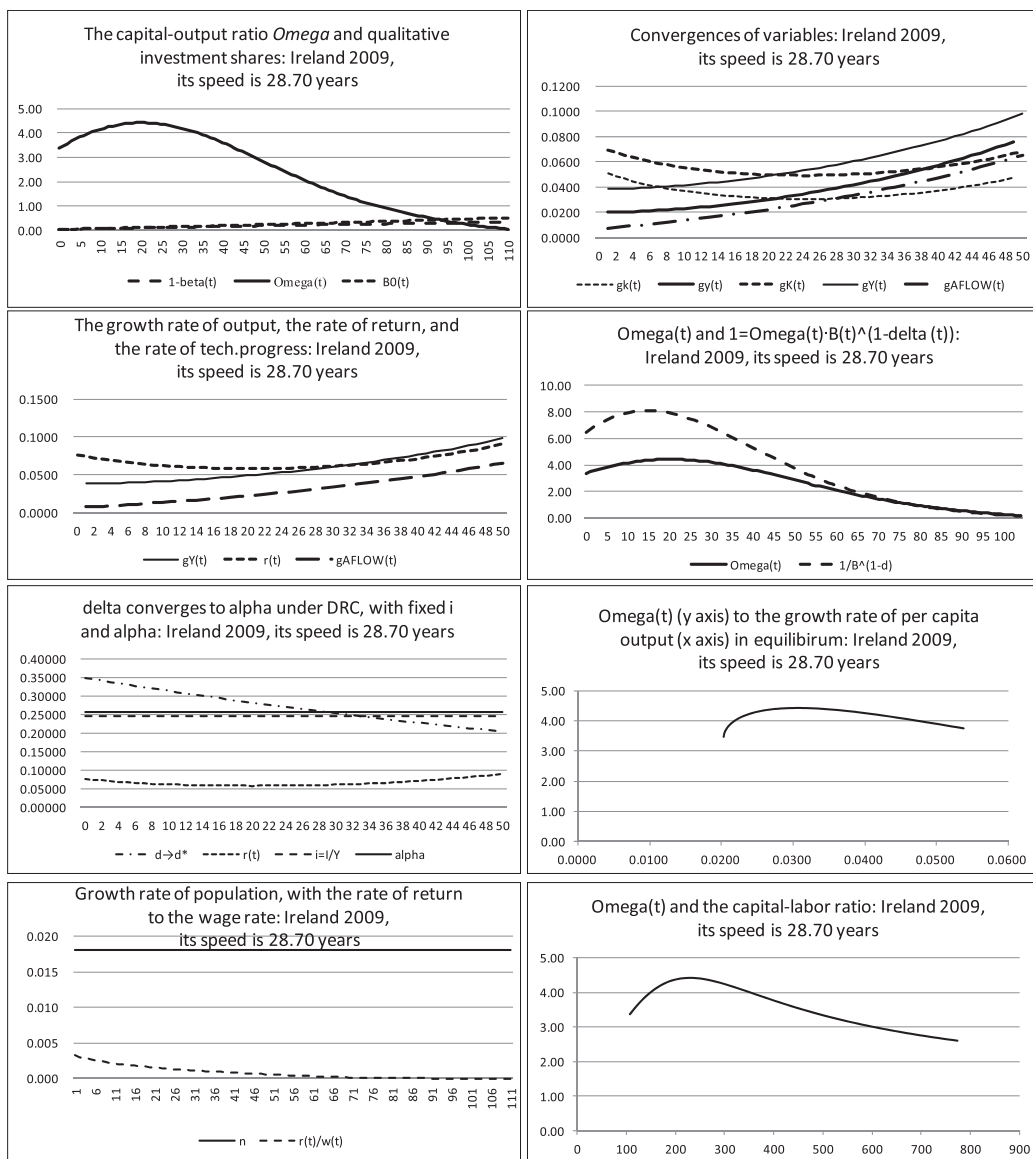
Fig. 5A. Parameters and variables in the transitional path using recursive programming: 4 Euro countries, 1990-2009

Essence of Endogenous Model and System and Its Geometrical Philosophy



Data source: KEWT 5.11-2 for 14 Asia & Pacific, 1990–2009, whose original data are *International Financial Statistics Yearbook*, IMF

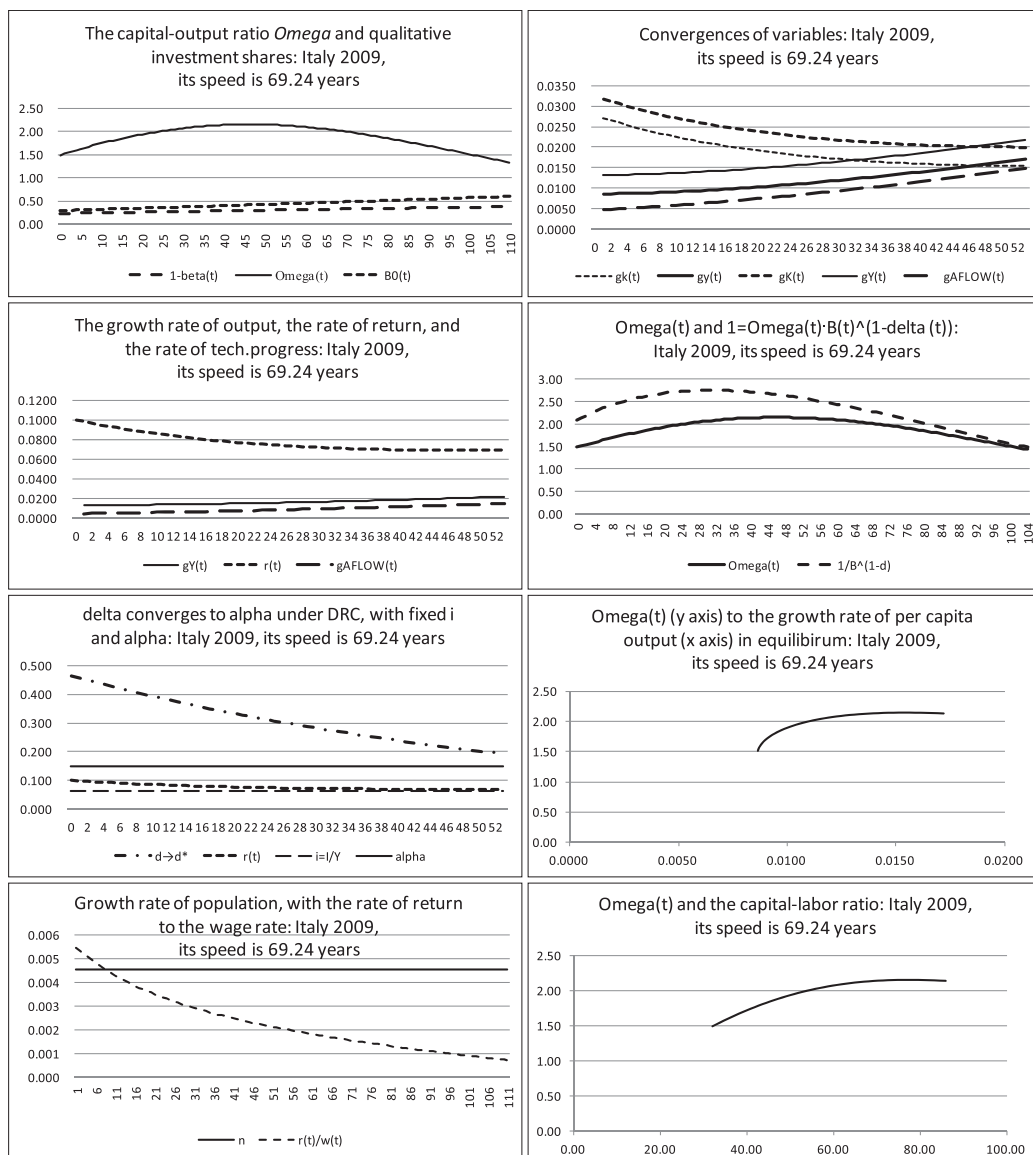
Fig. 5B. Parameters and variables in the transitional path using recursive programming: 4 Euro countries, 1990–2009



Data source: KEWT 5.11-2 for 14 Asia & Pacific, 1990–2009, whose original data are *International Financial Statistics Yearbook*, IMF

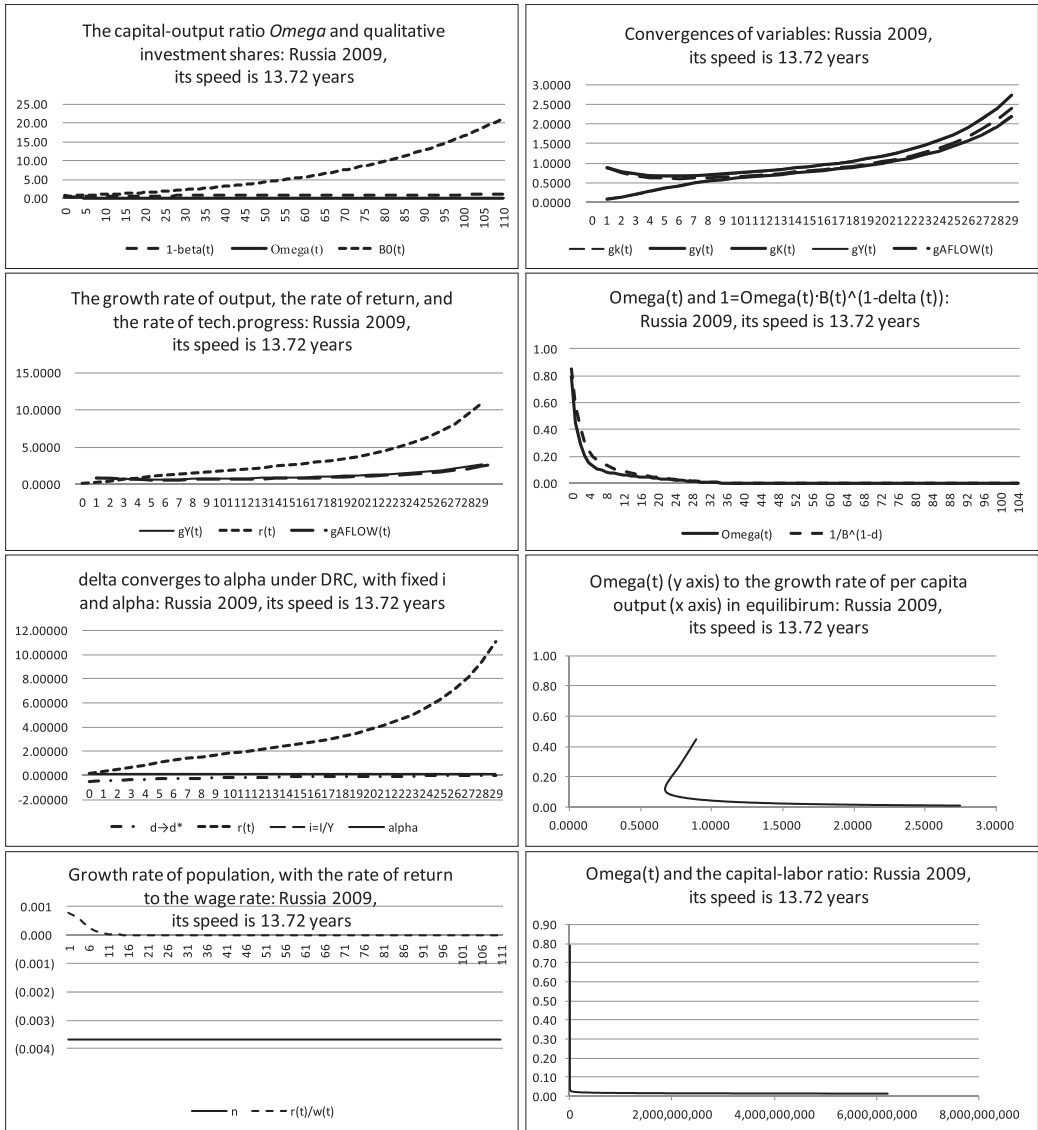
Fig. 5C. Parameters and variables in the transitional path using recursive programming: 4 Euro countries, 1990–2009

Essence of Endogenous Model and System and Its Geometrical Philosophy



Data source: KEWT 5.11–2 for 14 Asia & Pacific, 1990–2009, whose original data are *International Financial Statistics Yearbook*, IMF

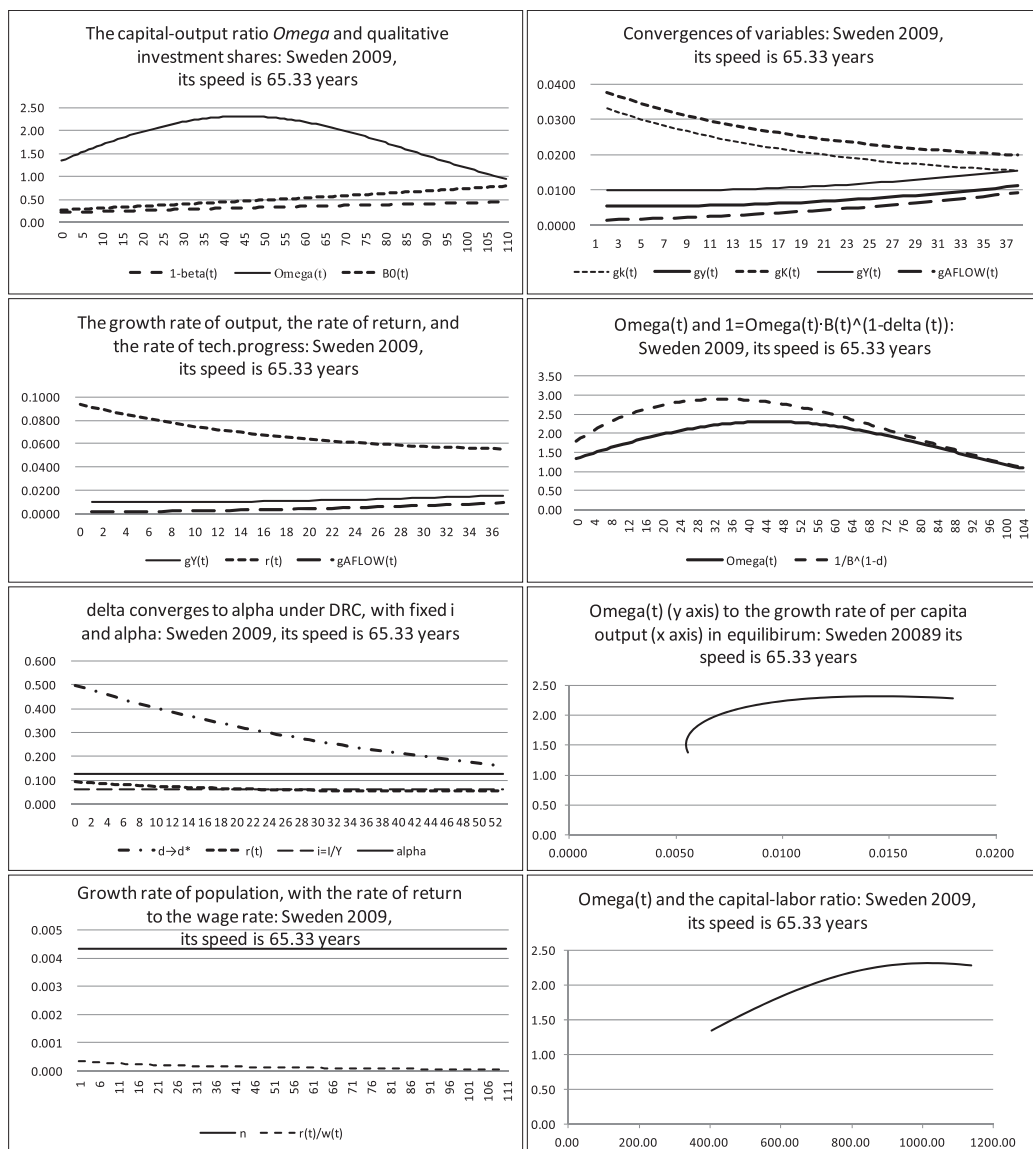
Fig. 5D. Parameters and variables in the transitional path using recursive programming: 4 Euro countries, 1990–2009



Data source: KEWT 5.11-3 for 15 Asia & Pacific, 1990-2009, whose original data are *International Financial Statistics Yearbook*, IMF

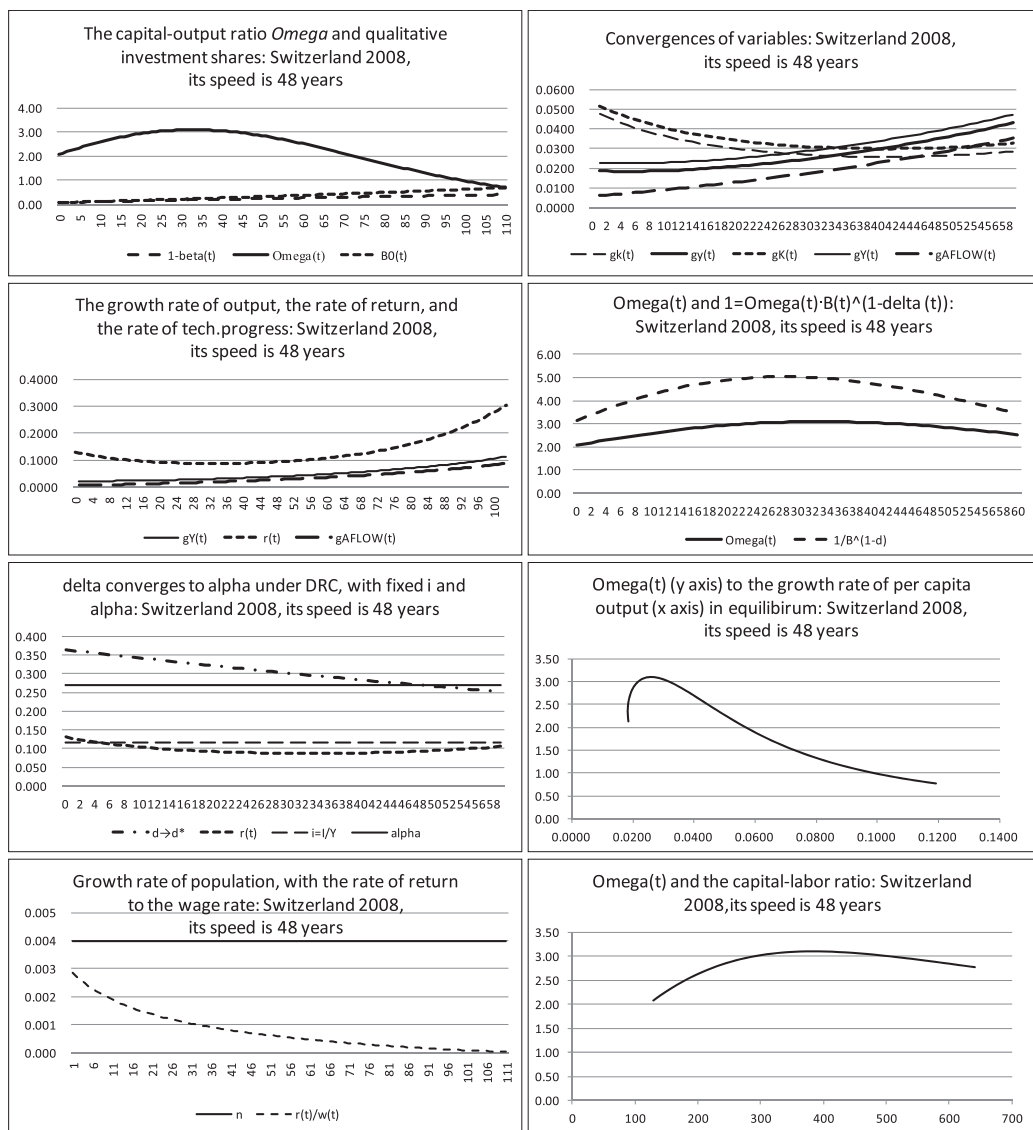
Fig. 6A. Parameters and variables in the transitional path using recursive programming: 4 Non-Euro Europe countries, 1990-2009

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Data source: KEWT 5.11-3 for 15 Asia & Pacific, 1990-2009, whose original data are *International Financial Statistics Yearbook*, IMF

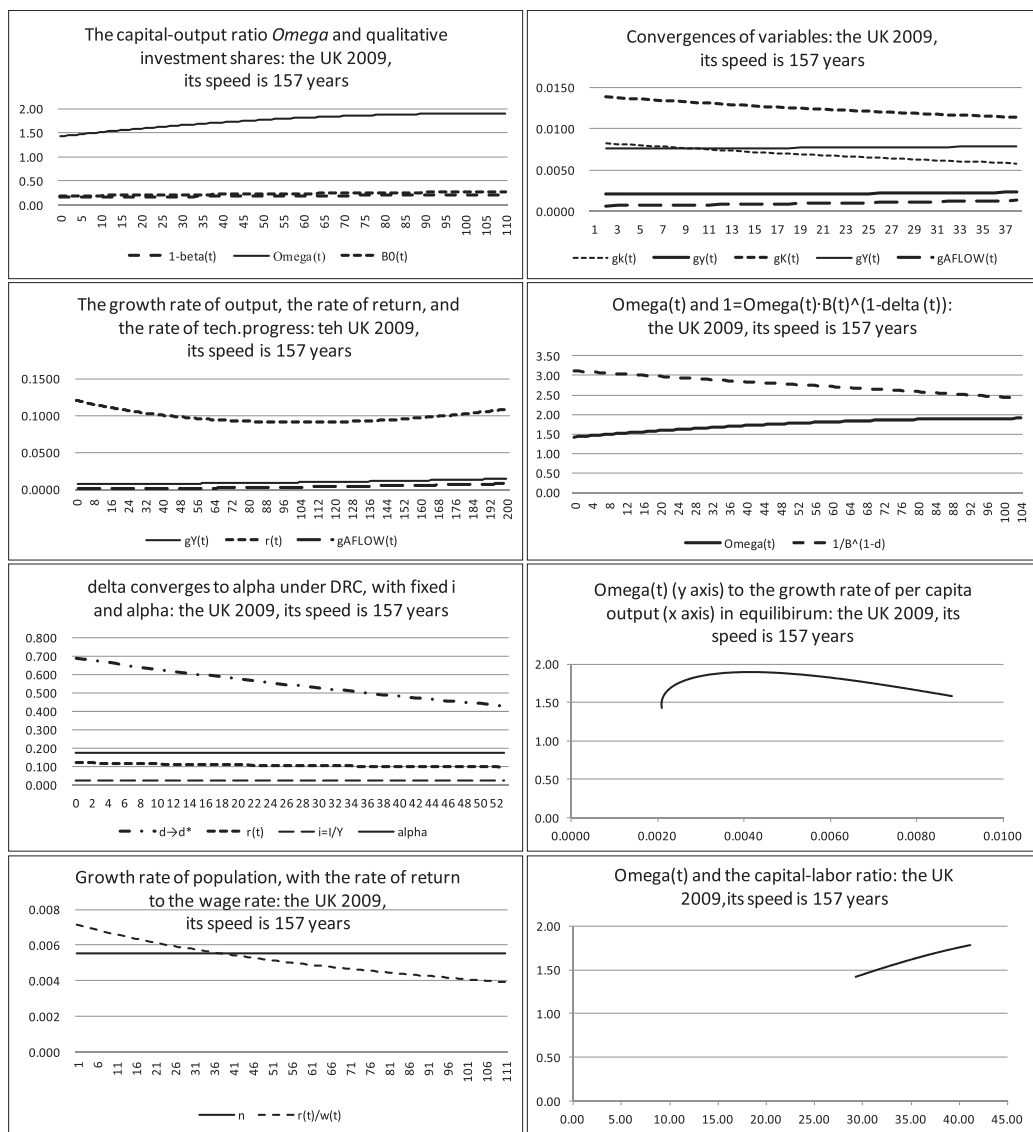
Fig. 6B. Parameters and variables in the transitional path using recursive programming: 4 Non-Euro Europe countries, 1990-2009



Data source: KEWT 5.11-3 for 15 Asia & Pacific, 1990-2009, whose original data are *International Financial Statistics Yearbook*, IMF

Fig. 6C. Parameters and variables in the transitional path using recursive programming: 4 Non-Euro Europe countries, 1990-2009

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Data source: KEWT 5.11-3 for 15 Asia & Pacific, 1990-2009, whose original data are *International Financial Statistics Yearbook*, IMF

Fig. 6D. Parameters and variables in the transitional path using recursive programming: 4 Non-Euro Europe countries, 1990-2009