Chapter 2

Endogenous I-S and External L-M Diagram in Equilibrium: Towards the Neutrality of Financial/Market Assets to Real Assets

2. 1 Introduction

This chapter focuses an endogenous I-S and L-M, towards the neutrality of the financial and market assets to the real assets, exceptionally using earlier KEWT data-sets 3.09 for 58 countries by sector (the government and private sectors) and by year, 1990-2007. Chapter 4 proves the same issue of neutrality, to solve a market 7 % problem to primary balance in budgetary deficits, by using KEWT 6.12, 1990-2010 for 81 countries by sector. This chapter endogenously replaces the illustrative 'I-S and L-M diagram' in the price-equilibrium with 'the $r^*(i)$ and $m_K = M2/K$ diagram' in the endogenous-equilibrium measured by country and year. $r^*(i)$ is the rate of return ($r^* = \Pi/K$) hyperbola to the ratio of investment to output/income ($i = I/Y$), where capital K is measured simultaneously with the rate of return. M2 is the currency money supply (=demand) corresponding with K, where $r^* = r_0$ is set as a base for connecting the actual data with endogenous data in parallel. The above reformed diagram aims at clarifying the essential relationship between the real assets and the markets, and present urgent policies to improve abnormal situations such as the current crisis. For this endogenous diagram, the neutrality of the markets to the real assets is required and proved using the above data-sets. Under this neutrality, the illustrative I-S and L-M diagram turns to a measurable diagram because market indicators cannot be formulated consistently with the real assets.

For the above neutrality, the author uses three indicators, (1) the above $M2$, (2) $r_{M(DEBT)}$ as 'ten year debt yield,' and (3) $e_{(US)}$ or $e_{(EU)}$ as the exchange rate shown by 'ae', each in *International financial Statistics yearbook*, IMF (2007/8). The author uses three key ratios for the test of neutrality connecting with these indicators: (1) $m_K = M2/K$, (2) $r^* - r_{M(DEBT)}$, and (3) $e_{(US)}/e^*_{(US)}$. The exchange rate key ratio, $e_{(US)}/e^*_{(US)} = e_{(US)}/(e_{(US)} + (r^* - r^*_{(US)}))$, is in fact neutral to the difference of the rates of return between two countries so that in the endogenous diagram the author does not include the exchange rate. The test of neutrality differs from M. Friedman (1977, 451-472) and R. R., Jr., Lucas (1995, 246-265), but endogenously absorbing their approaches.

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The core of the diagram is shown by $r^* - r_{M(DEBT)}$. This is because $r^* - r_{M(DEBT)}$ is equal to the difference of two inflation rates, endogenous and external, whose level suggests urgent policies for recovering from the current crisis. Inflation rates are sensitively involved in the difference between equilibrium and disequilibrium, while resultant $m_K = M2/K$ is roughly constant even at the crisis. Ranges of equilibrium and disequilibrium are measured using the speed of convergence hyperbolic function, $speed(i)$. This $speed(i)$ is related to $r^*(i)$, whose common base is $i = I/Y$. When the diagonal crosses the hyperbolic curve of $speed(i)$, the radius of curvature is measured using Pythagoras equation under right triangle, with the corresponding point of i_{BASE}. The optimum point of equilibrium and $r^*(i)$ exists at a point lower than i_{BASE}. The center at the effective range of $i = I/Y$ for $speed(i)$ and $r^*(i)$ is set i_{BASE}. And $m_K = M2/K$ diagram also follows this effective range.

Each value of the above KEWT data-sets is endogenously measured without depending on econometrics, correlations, elasticity, probability, expectation, and filters (such as Kalman, Hodrick-Prescott, and Band-pass filters). The data-sets are justified by an endogenous Cobb-Douglas production function, which reveals hidden parameters such as *beta* for technology, *delta* for diminishing returns, and *lambda* for the speed of convergence, each as policy-oriented parameters. Finally, the author's motivation at this chapter started with Paul, A. Krugman's (hp; Figure 2, 2008) four I-S and L-M diagrams because his Figure 2 is intuitively suggestive yet remains immeasurable versions.

2.2 The Function to Determine the Endogenous I-S Diagram in Equilibrium

The endogenous I-S diagram is based on the rate of return function of the ratio of net investment to output, $r^*(i)$, where r^* is the rate of return to endogenous capital K and, $i = I/Y$ is the ratio of net investment to endogenous output=income Y (see soon below). Each of endogenous values differs from each of statistics values. Statistics and endogenous values differ partly in that each statistics value comes from a system of national accounts while each endogenous value is one before statistics-taxes are redistributed into consumption and saving, given the balance of payments and budget surplus/deficit.

First let the author raise endogenous values with related parameters and variables, and then, focus on the explanation of $r^*(i)$. Endogenous national disposable income, *Y*, differs from *GDP* and any disposable income in statistics. In the endogenous growth model, *Y* is measured consistently using the data-set by country, by sector (government and private), and by year and over years. Other

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endogenous values used in this chapter are *C*=consumption, *S*=saving, *W*=wages, and *Π*=returns. Then, *Y=C+S=W+Π* holds in equilibrium by sector at the real assets (compare it with the SNA 2008 at References). The relationship between *C* and *W* (adversely, *S* and *Π*) is measured using national taste function of the propensity to consume, $(rho/r) = (C/Y)$, where the endogenous equation between per capita capital, the rate of return, and the wage rate, $k = (\alpha/(1-\alpha))/(r/w)$, must be simultaneously used. As a result, capital and the rate of return are consistently measured, as shown in KEWT 3.09 data-sets 1990-2007 by country and by sector.

In KEWT 3.09 (as shown at home page), basic parameters that remain unchanged in the transitional path are (1) the ratio of investment to output, $i = I/Y$, (2) the relative share of capital, *α=Π/Y*, and (3) the growth rate of population, $n = (L_t - L_{t-1})/L_{t-1}$. The *n* is given from statistics as an exception but the corresponding rate of change in population in equilibrium, n_E, is measured in the data-set by country. The difference between *n* and n_E shows the rate of unemployment in equilibrium as discussed in a few other chapters. Basic parameters that change in the transitional path are (4) the capital-output ratio, $\Omega^* = \Omega_0 = K/Y$, (5) the ratio of quantitative share of investment at convergence, *beta*[*], (6) the diminishing returns to capital coefficient, *delta*$_0$, and (7) the speed of convergence, $1/\lambda^*$. Variables are (8) the rate of return, $r_0 = r^* = \Pi/K$, and (9) the growth rate of output, g_Y^*, where $r^* = \left(\frac{\alpha}{i \cdot \beta^*}\right) g_Y^*$ holds as an endogenous golden rule, differently from Phelps, E. (1961, 638-643). In the transitional path, the current situation is shown with 0 and the value at convergence in equilibrium is shown with *. In the literature, the current value is directly compared with estimated or reversely calculated value using data in statistics, as shown in De Grauwe, P. (2005, 253-260). In equilibrium, with $\alpha/(i \cdot \beta^*)$, the difference of values between the current situation and at convergence is used for changes in policies, where $\Omega^* = \Omega_0 = K/Y$ and $r_0 = r^* = \Pi/K$ ensure to clarify the difference.

Second, the author clarifies the characteristics of $r^*(i)$ as the clue to the endogenous I-S diagram, stating with each formulation of the rate of return and the capital-output ratio:

$$r^* = \alpha \left(\frac{i\,(1-\beta^*)(1+n)+n(1-\alpha)}{i \cdot \beta^*(1-\alpha)}\right), \text{ where } r^* = \frac{\alpha}{\Omega^*} \text{ and } \Omega^* = \left(\frac{i \cdot \beta^*(1-\alpha)}{i\,(1-\beta^*)(1+n)+n(1-\alpha)}\right) \quad (1)$$

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

$af = cx + d$, and $e = \frac{\alpha(1-\beta^*)(1+n)}{\beta^*(1-\alpha)}$,

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$$r^* = \frac{\alpha(1-\beta^*)(1+n)}{\beta^*(1-\alpha)} + \frac{\alpha \cdot n(1-\alpha)}{i \cdot \beta^*(1-\alpha)} \qquad (2)$$

Using Eq. 2, a hyperbolic function of $r^*(i)$ is formulated. The vertical asymptote (VA) of $r^*(i)$ is zero: $i_{VA} = 0$. If $a \cdot f = \alpha \cdot n \cdot \beta^*(1-\alpha)^2 > 0$, the curve locates at the first quadrant. The horizontal asymptote (HA) of $r^*(i)$, r^*_{HA}, is defined as an endogenous inflation rate, $inf.rate^*_{HA}$. Thus, the 'real' rate of return in equilibrium, r^*_{REAL}, is shown by:

$$r^*_{REAL} = r^* - inf.rate^*_{HA} = r^* - r^*_{HA}, \text{ where } r^*_{HA} = \frac{\alpha(1-\beta^*)(1+n)}{\beta^*(1-\alpha)} \qquad (3)$$

If the relative share of capital $\alpha{>}0$, the *H.A.* locates at the first quadrant and shows the inflation rate (+), where $r^* > r^*_{REAL}$. If $\alpha{<}0$, the *H.A.* locates at the second quadrant and shows the deflation rate (−), where $r^* < r^*_{REAL}$. If $\beta^* = 1.0$, with no technological progress, $r^*_{HA} = 0$, where 'nominal' equals 'real.' $r^*_{HA} = g^*_A \cdot \frac{(1+n)}{\beta^*(1-\alpha)}$ implies that the endogenous inflation rate is a function of the rate of technology $g^*_A = \alpha(1-\beta^*)$: for example, if g^*_A is minus, the inflation rate, $inf.rate^*_{HA}$, turns to a deflation rate, as shown in many cases of government sector, due to huge deficit. There is no possibility that $r^*_{HA} > 0$ holds under deflation, as the author confirmed this fact using 58 countries by sector. This fact rigorously reverses the shape of the I-S curve; in accordance with 'from $\alpha{>}0$ to $\alpha{<}0$.'

However, the endogenous inflation rate is free from the markets. Since the inflation rate is mostly related to the markets, the author here uses an external inflation rate such as the rate of change in consumers' price index (*CPI*): $inf.rate_M = g_{CPI}$. Then, the real rate of return will be:

$$r_{M(REAL)} = r_{M(DEBT)} - inf.rate_M \qquad (4)$$

Eqs. 3 and 4 each holds in parallel to the real and financial assets. Then, using both assets, the third inflation rate is derived as a composition of the market, $r_{M(DEBT)}$, and endogenous real, r^*_{REAL}. This is the composite inflation rate, $inf.rate_{COMP}$, as shown in Eq. 5

$$r_{M(DEBT)} = inf.rate_{COMP} + r^*_{REAL} \qquad (5)$$

Eq. 5 produces $r_{M(DEBT)} - r^* = inf.rate_{COMP} - inf.rate^*_{HA}$. If $r_{M(DEBT)} - r^* = 0$, the real assets match the financial assets, where market inflation equals endogenous inflation. For the rate of return, $r_{M(DEBT)} - r^*$ and/or $r_{M(DEBT)}/r^*$ are key ratios to examine the level of the neutrality of the financial assets to the real

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assets. Without measuring the rates of return and related inflation rates, external and endogenous, the essence of the I-S diagram is not revealed.

2.3 Money Supply and the Exchange Rate: Comparing with Endogenous Real Assets

To test the neutrality of financial assets to the real assets, the author selects three items in the markets: (1) Currency money supply (prefers $M2$ to others of money when $M2$ is available in *IFSY*, IMF), (2) ten year debt yield, $r_{M(DEBT)}$, and (3) the exchange rate as country's currency per US Dollar or Euro ('*ae*' of *IFSY*, IMF). These market items are related to each other. The level of neutrality at $M2$, $r_{M(DEBT)}$, and the exchange rate are essential before finalizing the author's I-S and L-M diagram and each tested using the data-sets of 58 countries. These tests are satisfied by comparing with capital, the rates of return, and the growth rate of per capita output in equilibrium between two countries. Test of neutrality was executed earlier by Friedman, M. (1959, 25p; 1977, 451-472) as the positive theory. The difference of approaches between the two tests is whether or not endogenous parameters and variables are used for the tests.

More importantly, even under the proof of the neutrality, movements of $r_{M(DEBT)}\text{-}r^*=inf.rate_{COMP}\text{-}inf.rate^*_{HA}$ differ significantly and, this enables policy-makers to cope with recent crisis towards sustainable resuscitation.

For $M2$, the author just refers to purchasing power parity (PPP). PPP uses general price level relying on the markets and is based on quantity theory of money. The author's $m_K = M2/K$ is related to Marshall's k or $m = M2/Y$. But, m_K and m are connected with endogenous capital-output ratio, Ω, where capital K is endogenous, independent of the markets:

$$m \equiv \Omega \cdot m_K, \text{ where } m = M2/Y \text{ and } m_K = M2/K \tag{6}$$

Turing to the exchange rate test, the author first shows Krugman's arbitrage equation (hp, Japan still trapped, 2008; for the background, see Krugman, P. A. and Obstfeld, M., 2005, 418-442). Then the author formulates his endogenous equation. Krugman's notations are: 'e' is the logarithm of the 'real' exchange rate, 'e_L' is that of the long-run equilibrium real exchange rate, 'r' and 'r^*' are the domestic and foreign real interest rates (imagining that expected returns on domestic and foreign bonds are equalized), and 'g' is a fraction of the gap per year between the actual and long run rates:

$$e = e_L - (r - r^*)/g, \text{ from } r - r^* = g(e_L - e) \tag{7}$$

On the other hand, the author starts with local currency per US Dollar, $e_{(US)}=$'ae' at *IFSY*, IMF (or Euros per US Dollar, $e_{(EU)}=$'ae') by country and defines $e^*_{(US)}$ as $e_{(US)} + (r^* - r^*_{(US)})$, where Krugman's real interest rate is replaced by the rates of return at convergence, r^* and $r^*_{(US)}$. If $e_{(US)}/e^*_{(US)} \neq 1$, the exchange rate reflects the difference of the rates of return between the two countries. $e_{(US)}/e^*_{(US)} = 1$ implies that the foreign exchange market satisfactorily works, based on the rate of return measured at the real assets. In short, the level of matching is tested using:

$$e_{(US)}/e^*_{(US)} = e_{(US)}/\left(e_{(US)} + (r^* - r^*_{(US)})\right) \tag{8}$$

When the rate of return, r^*, is formulated with the growth rate of output at convergence, g^*_Y, as below, anyone is able to test the neutrality of financial and foreign exchange markets more widely than before. And, this g^*_Y is tightly related to the growth rate of per capita output, g^*_y, and the rate of technological progress, g^*_A.

$$r^* = \left(\frac{\alpha}{i \cdot \beta^*}\right) g^*_Y \qquad g^*_Y = g^*_y(1+n) + n$$

$$g^*_y = i(1-\beta^*)/(1-\alpha), \text{ and } g^*_A = i(1-\beta^*) \tag{9}$$

The three determinants of the relationship between r^* and g^*_Y is (1) the relative share of capital α, (2) $i = I/Y$, and (3) the ratio of quantitative to qualitative and qualitative investment β^*. As a typical case, the government sector's relationship between r^*_G and $g^*_{Y(G)}$ clarifies an interesting result: $r^*_G = (\alpha_G/i_G \cdot \beta^*_G)g^*_{Y(G)}$. When the ratio of deficit to output, $\Delta d = \Delta D/Y$, is high, r^*_G turns to minus while $g^*_{Y(G)}$ remains plus, due to minus values of r^*_G and the government relative share of capital α_G. The above proves the mechanism of deflation that starts with deficit.

When the neutrality is accepted using the following tests, the author is able to reform the I-S and L-M diagram. For the financial market test, ten year debt yield is compared with r^*. If $r_{M(DEBT)} = r^*$, the neutrality of the financial market holds. For the exchange rate test, the author examines not only the above Eq. 7 of

$e_{(US)}/e_{(US)}^*$ but also $e_{(US)}/g_y^{**}$ (for the EU, similarly using $e_{(EU)}$). In these tests,

$g_y^{**} = g_y^*/g_{y(US)}^*$, $r^* - r_{(US)}^*$, and $g_y^*/g_{y(US)}^*$ are involved. Furthermore, using Eq. 8, the cost of capital $r^* - g_Y^*$, the valuation value ratio $V = \Pi/(r^* - g_Y^*)$, and the valuation ratio $v = r^*/(r^* - g_Y^*) = V/K$ are measured. Then, macro leverage is derived, where if $g_Y^* = 0$, $K = V$ holds and if $r^* = g_Y^*$ or $\alpha = i \cdot \beta^*$ holds, the Petersburg paradox happens without using probability, differently from D. Durand (1957, 348-363):

$$l_{EV} \equiv D/(D + v \cdot K) \tag{10}$$

When the neutrality of currency money $M2$ using $m_K = M2/K$ is empirically proved, the above leverage is substantially used for policy-makers, similarly to $r_{M(DEBT)} - r^* = inf.rate_{COMP} - inf.rate_{HA}^*$.

2.4 Tests of the Neutrality of the Markets Using 58 Countries by Sector

The author tests the neutrality of the financial and exchange markets to the real assets, by using key ratios available in KEWT 3.09, 1990-2007, as '58 country' data-sets by sector, and its 'three area' on weighted average. For delicate movements, see Figure N1 for $M2$ and the exchange rate, and Figure N2 for the series of rates of return, including endogenous and external inflation/deflation rates at the end of this chapter. The tests become a base not only for the endogenous diagram of this chapter but also for stopping bubbles which have occurred once or twice in a decade. Does the existence of the I-S and L-M diagram still remain when the tests clarify that the markets are neutral to the real assets? Yes, it remains. The existence of the diagram clarifies the importance of policy-making towards sustainable economy, by revealing the essence of the diagram. This essence is to watch the relationships between the market key ratios and the series of rates of return, with endogenous and external inflation/deflation rates, as shown in equations above. Policy-making and the neutrality do not contradict. Policy-making must control When inflation/deflation rates, endogenous, external/market, and composite, are controllable, policy-making ensures its foundation, where the financial and market assets still support the real assets.

The outline of the tests is shown in **BOX 2-1**. First, the author tests currency money $M2$, using the ratio of $M2$ divided by endogenous capital K: $m_K = M2/K$. This ratio becomes stably constant in developed countries: much more stable than

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the Marshall's k or $m = M2/Y$ by country (among 58 countries). The tests were successful, based on endogenous capital (measured by (1) the labor function of the propensity to consume with national taste and (2) an accounting identity of wage rate, the rate of return, the capital-labor ratio, and the relative share of capita).

As a special case of currency money $M2$, the Euro currency area (thirteen countries aggregated at the KEWT), after 1999, has unique exchange rate of Euro: m_K stays at an extremely narrow range of 0.337 and 0.347. This verifies not only neural money supply but also accurate endogenous capital measurement, without influenced by changes in the exchange rate.

BOX 2-1 Endogenous I-S; external L-M diagram, supported by the neutrality of financial and foreign exchange markets to the real assets
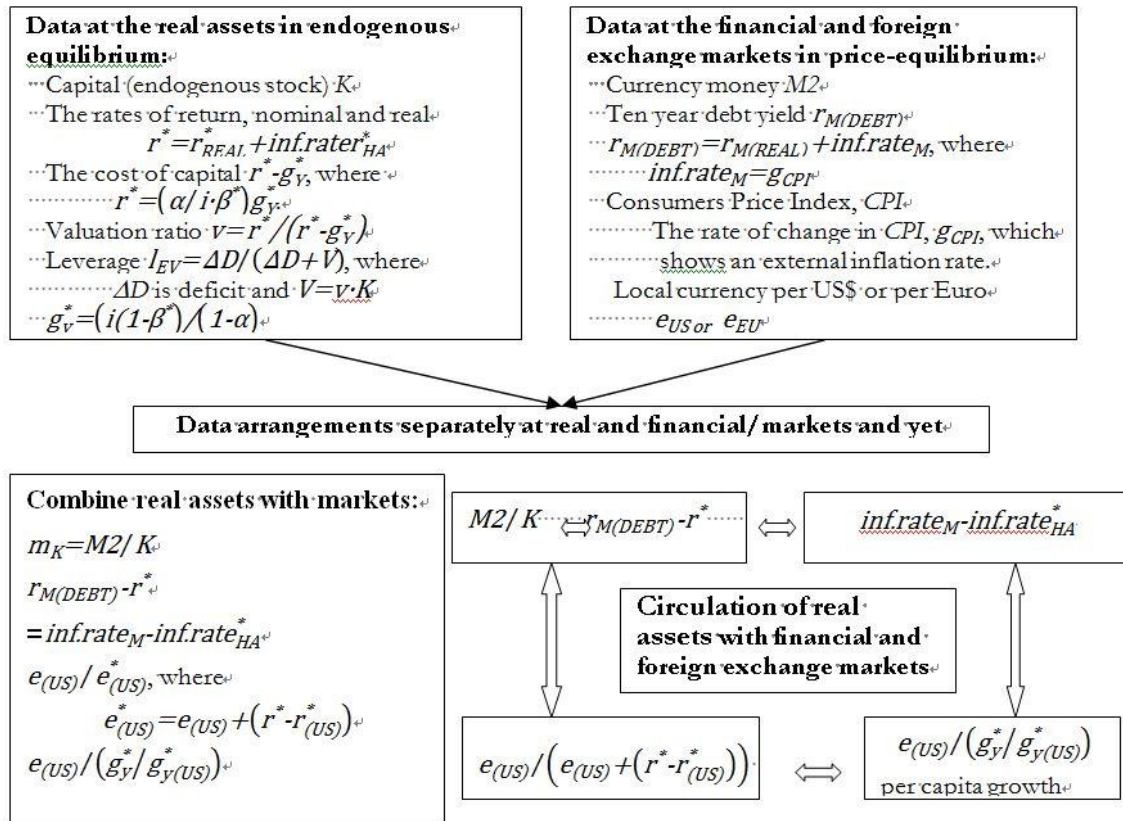
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Second, the author tested ten year debt yield, $r_{M(DEBT)}$, using $r_{M(DEBT)} - r^*$ and/or $r_{M(DEBT)}/r^*$. National debt produces interest yields as a whole, regardless of whether or not bond is issued. The fact is that developed countries each show $r_{M(DEBT)} < r^*$ while developing countries each show $r_{M(DEBT)} > r^*$. However, most countries, including Euro currency area after 1999, have shown $r_{M(DEBT)} < r^*$. This implies that a bud of bubbles has been gradually accumulated in the 2000s and that policy-makers must watch both $m_K = M2/K$ and $r_{M(DEBT)} - r^*$ at the same time. In this respect, the central bank needs the information of both endogenous K and a series of rates of return in equilibrium.

Star ups often occur in some countries and in some consecutive fiscal years. The main reason is traced back to the deficit and returns at the government sector, which influences results of the total economy significantly even if the government share of output is less than one-fourth. At the government sector, the relative share of capital equals the rate of return (since national taste is neutral to the propensity to consume): $\alpha_G = r_G^*$. In other words, if the rate of return is minus, the relative share is also minus. The author sets a hypothesis that extreme deficit causes deflation, as expressed in Figure N2. Policy-makers need to clarify the government sector's reversed hyperbola to recognize the level of deflation rate.

The author cites all the cases of plus/minus government relative share of capital α_G in 1990 to 2007, classifying into four:

1. Plus α_G : Ireland, Luxemburg, Czech Republic, Slovenia, Latvia, Slovak, Switzerland, Turkey, Mexico, China, Indonesia, Korea, Malaysia, Philippines, Singapore, Thailand, Vietnam, Argentina, Chile, Peru, Iran, Kazakhstan, Egypt.
2. Minus α_G , within several years: Austria, Netherlands, Portugal, Bulgaria, Denmark, Iceland, Latvia, Russia, Canada, Australia, New Zealand, Brazil, Kenya, Tanzania.
3. Minus α_G, roughly one half of years: Belgium, Finland, Spain, Norway, Sweden, India, Columbia, Kuwait, Saudi Arabia.
4. Minus α_G, almost all the years: France, Germany, Greece, Italy, Hungary, Poland, Romania, the UK, the US, Japan, Pakistan, Nigeria, South Africa, where the level of Japan is the worst.

The case of (1) stimulates inflation. The case of (4) leads to a lower inflation due to the deflation of the government sector. Surplus/deficit is cash flow yet, expressed as the difference between saving and investment at the government sector. Therefore, deflation of the government sector is measured and deflation is inevitable when democracy cannot control huge deficit, as typically shown in Japan. When the size of government (measured by endogenous taxes), the level of deflation is not serious as shown in some countries. Developed countries, in particular, the Euro currency countries suffered from deflation before 1999.

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Third, the author tested the exchange rate $e_{(US)}$ or $e_{(EU)}$, using $e_{(US)}/(e_{(US)} + (r^* - r^*_{(US)}))$ and $e_{(US)}/(g_y^*/g_{y(US)}^*)$. Endogenous results were in favor of the neutrality test, in particular justified by the fact of $r^* - r^*_{(US)} = 0$. The result is typical in thirty countries other than the EU area. Note that each country has a different range of $e_{(US)}/(g_y^*/g_{y(US)}^*)$, according to economic stage by country (see Figure N1). Developing countries will have robust movements before entering into matured stage. This implies that the neutrality of the markets only shows one aspect of real assets key ratios.

BOX 2-2 From Krugman's (2008) Figure 2 to the author's version of the I-S and L-M diagram
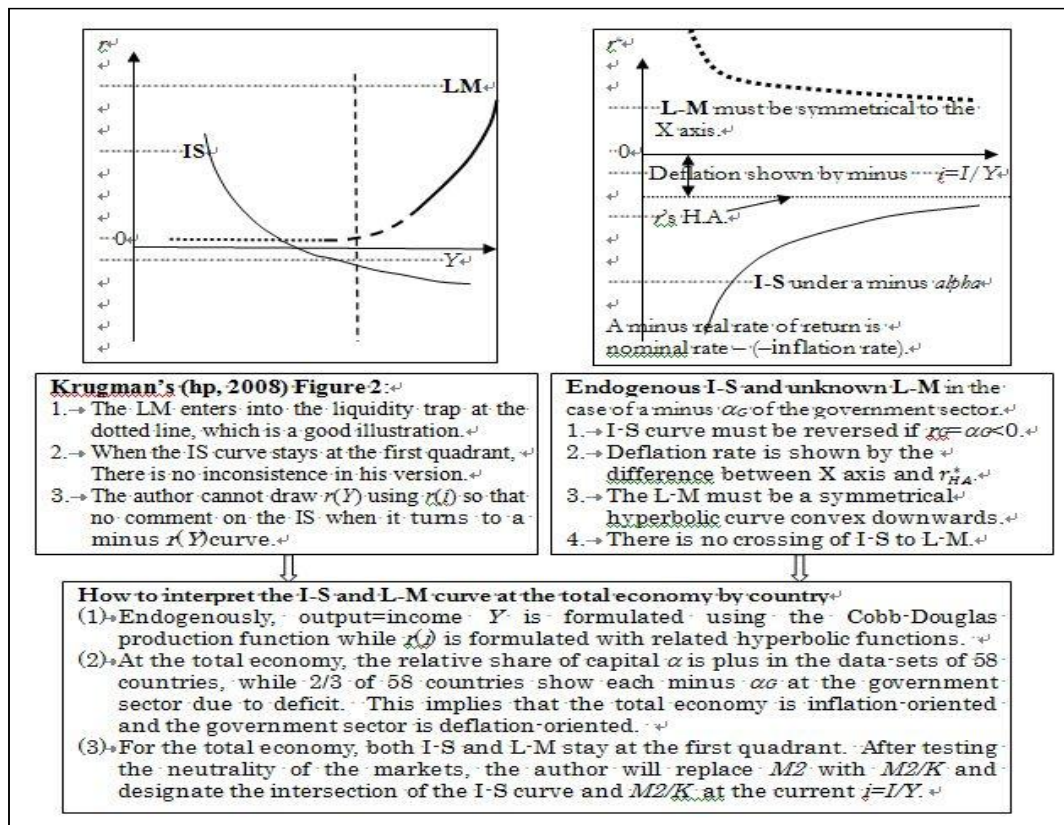
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2.5 From the Illustrative I-S and L-M to Endogenous Diagram:
Its Policy-Oriented Implication

The author first revisits J. R. Hicks (1937) that illustrates the framework of Keynes J. M. (1936), using Hicks' illustrations and second compares P. Krugman's (2008) illustration with the author's version, where the author still stays at a version of currency money shown by the L-M curve. Third, the author summarizes the three steps to endogenous diagram, where the L-M curve is replaced one intersection of $m_K = M2/K$. This diagram is justified by the proof of the above neutrality. The author presents implications of this diagram and furthermore challenges for how to cope with the current crisis, despite the neutrality of the markets to the real assets.

First, Hicks' (ibid., 147-159) three figures are based on Keynes' General Theory of $M = L(I, i), I_X = C(i), I_X = S(I)$, where M is the given quantity of money, L is the demand of money, I is total income, I_x is I of investment goods, C is the amount of investment, i is the rate of interest, S is saving, and $C=S$ (in an closed economy). The diagram sets total income for the X axis and the rate of interest for the Y axis. His Figure 1 (ibid., 153) shows the *IS* curve and the curve *LL*. Figure 2 (ibid., 153) shows the curve *LL*, where *LL* rises up sharp (like a hyperbolic) along with the increase in total income. The left-side of Figure 3 (ibid., 157) shows the relationship between *C* (=the author's *I=ΔK)* and *S* to the investment goods and the right-side is similar to Figure 1, yet the *IS* is convex to the top. Roughly speaking, the above diagrams have remained unchanged up to date, except for the range and shape of each curve. The relationship between income and investment remains totally unsolved.

Second, the author pays attention to Krugman, P. A. (Figure 2, 2008, hp). His diagram sets output/income on the X axis and the 'real' interest rate on the Y axis. His I-S curve ranges from plus to minus to explain Japan's liquidity trap but, the L-M curve remains above zero, where the intersection stands at a plus point close to zero. He illustrates that the Japanese economy falls into a liquidity trap at the range such that the L-M curve remains a horizontal line close to the X axis. Now let the author compare his illustration with the author's preliminary version of the I-S and L-M diagram (see **BOX 2-2**).

The preliminary version takes the ratio of investment to output/income, $i = I/Y$ on the X axis. The author cannot directly formulate the relationship between $i = I/Y$ and output/income Y, since Y is complicatedly formulated using hidden endogenous parameters in an endogenous Cobb-Douglas production function.

If the author replaces his real rate of interest by the endogenous real rate of return at convergence, $r^*_{REAL} = r^* - inf.rate^*_{HA} = r^* - r^*_{HA}$, his liquidity of trap

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is well expressed supported by endogenous rates of return, and without touching the L-M curve. His diagram is true in the case of total economy, whose relative share of capital α is plus. However, for the government sector, the deficit as cash flow is expressed as $S_G - I_G$ and this solves problems of the government sector. His diagram does not holds under $\alpha_G<0$. Two third of 58 countries suffers from heavy deficit, resulting in $\alpha_G<0$. This implies the I-S curve at the government sector is reversed and it is difficult to draw the L-M curve as shown at the right figure of BOX 2-2. Furthermore, money supply=money demand holds in the price-equilibrium or at the markets. The L-M curve must be replaced by a key ratio that is consistent with the I-S curve in endogenous equilibrium: that is $m_K = M2/K$. This condition is justified by the neutrality of the financial and market assets to the real assets.

BOX 2-3 Three steps from illustrative to endogenous diagram, connecting real asset measurements with those at financial/market assets

Step 1 Replace the illustrative I-S diagram with $r^*(i)$ in equilibrium on the 1st or 4th quadrant

For Y axis:
r^* and r^*_{HA}
r^*_{REAL}
$= r^* - r^*_{HA}$
$r_{M(DEBT)}$
Inf.rateCOMP
$= r_{M(DEBT)}$
$- r^*_{REAL}$
$i = I/Y$
$r_{M(DEBT)} - r^*$
g^*_Y
g^*_y

If $\alpha>0$: $= I/Y$

inflation

Moving from the first quadrant   deflation

If $\alpha<0$:

Using each $r^*(i)$ equation; By sector

For X axis:
If $bop=BOP/Y$ is set, r^* is shown each to s and i. In this case, the consistency as a whole system is required.

Step 2 Replace the illustrative L-M with $m_K = M2/K$ in equilibrium and under neutrality

For $m_K=M2/K$, no equation exists. m_K is only given externally.

i m_K

The I-S and L-M diagram, if any, is based on the hyperbolic of m_K, shown on the left.

m_K
m_K

The real assets work as a host and the markets are neutral. L-M is shown using $m_K=M2/K$.

m_K i

deflation

$i = \dfrac{I}{Y}$

Fact shows that m_K is constant over years, and the higher r^* the lower the i. The intercept is the only point with. No formulated $m_K(i)$.

Step 3 Compounded inflation rates as the core of policy-making at the $r^*(i)$ and $m_K = M2/K$

$l_{EV}=D/(D+r K)$

$r^*(i)$ with an intersection point of m_K

The exchange rate is neutral to

$r^* - r^*_{(US)}$

$r_{M(DEBT)} - r^* = inf.rate_{COMP} - inf.rate^*_{HA}$

the $r^*(i)$ and $m_K = M2/K$ diagram, where $inf.rate_{COMP} = r_{M(DEBT)} - r^*_{REAL}$

Note: The Marshall's k is shown by $m = M2/Y$, where $m = \Omega \cdot m_K$ holds, using the capital-output ratio Ω. This k is also shown by $m = \alpha \cdot m_\Pi$, where $\alpha = \Pi/Y$ and $m_\Pi = M2/\Pi$.

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Third, the author shows three steps to the author's endogenous diagram that holds under the neutrality. Then, how can policy-makers foresee economic crisis that starts with markets and what key ratios can be used for the overcoming the crisis? Three steps are shown in **BOX 2-3** above.

Step 1 shows the I-S diagram using $r^*(i)$, comparing an inflation case with a deflation case. The shape of the hyperbolic curve is reversed according to the sign of the relative share of capital. Step 2 shows the relationship between the I-S and L-M diagram using $r^*(i)$ and $m_K = M2/K$, where m_K remains an illustration, as in the literature. Step 3 shows the implications of the diagram under the neutrality. Step 3 also shows how to cope with the economic crisis by using hidden key ratios of $r_{M(DEBT)} - r^* = inf.rate_{COMP} - inf.rate^*_{HA}$ and $l_{EV} \equiv D/(D + v \cdot K)$ (see Eqs. 5 and 10).

For the implications of the final diagram, the author first interprets $m_K = M2/K$ with key determinants of the neutrality to the real assets, and then discusses how to foresee and conquer bubble and crisis. As shown in BOX 2-1 for testing the neutrality, $m_K = M2/K$ is related to the rates of return in equilibrium and the market rates of return. Under the neutrality of $m_K = const$, the difference between $r_{M(DEBT)}$ and r^* differs by country and by year. This difference is low in the Euro currency countries but fluctuates widely among all the countries except for the Euro currency countries. This implies that policy-makers must watch much more cautiously than $M2$ and $m_K = M2/K$. Of course, slight movement of $m_K = M2/K$ is a sign towards bubbles. Note that the exchange rate of a country to the US shows in $r^* = r^*_{(US)}$, in particular thirty countries other than the EU area. This proves that the foreign exchange market is completely neutral.

Then, why do bubbles start from the financial assets-side under the neutrality of financial assets to the real assets? This is partly because some speculative funds absorb extra money supplied by the central bank and these funds produce profits (apart from the real assets). These funds and their returns are mostly out of disclosure; globally accumulated at tax heavens. Yet, published currency money also reflects some part of hidden money, resulting in slightly abnormal movements. At the same time, extra money runs into robust countries such as China, India, and Brazil through direct investment. These phenomena will raise the external (flow) inflation rate such as the rate of change in *CPI*. Yet, the trigger of bubbles starts with asset (stock) inflation, which is accelerated by real estate-price level. Policy-makers foresee bubbles by these signs.

Then, how can policy-makers stop bubbles? Flag of justice is endogenous

capital K measured by sector. Policy-makers, first of all, send a signal to the markets by (1) raising official interest rate, (2) directly regulating borrowers who are in favor of real estate-price jumping, and (3) regulating leverage of $l_{EV} \equiv D/(D + v \cdot K)$ and the valuation ratio of $v = r^*/(r^* - g_Y^*) = V/K$ in cooperation with BIS regulation. A target of sustainable economies is to stabilize the value of $inf.rate_{COMP} = inf.rate_{HA}^* + (r_{M(DEBT)} - r^*)$. Deficit does not help economies but lower growth in the long run. Abnormal assets inflation contradicts sound real and financial assets. It seems that there exists no different policy but, conventional policies are reproduced by endogenous capital K and a series of rates of return by sector in equilibrium, and endogenous inflation rate.

2.6 Conclusions

The real assets express the essence of an economy, but still needs some cooperation with the markets. It is a new fact that currency money *M2* exists in proportion to endogenous capital K. The endogenous diagram of this chapter is expressed as 'the $r^*(i)$ and $m_K = M2/K$ diagram.' A hidden core of the diagram is an equation of $r_{M(DEBT)} - r^*$, which is equal to $inf.rate_{COMP} - inf.rate_{HA}^*$. This implies that endogenous and external inflation rates are deeply involved in the markets. The so called I-S and L-M diagram, external and/or endogenous, will not be used for policies without clarifying involved inflation rates. Under equilibrium, if the horizontal asymptote of $r^*(i)$ is zero, ten year debt ratio is equal to the rate of return at convergence, where no inflation exists between endogenous and external. This constitutes a zero base for the inflation rate. Policy makers must watch a sign of bubbles and set up urgent policies for stable economies, controlling involved inflation rates. These policies do definitely hold if and only if endogenous capital is endogenously measured with the series of rates of return in equilibrium.

The author was stimulated by four figures of Krugman (home page, 2008). His figures now turn to a measurable diagram by applying two functions in equilibrium: the speed of convergence function and the rate of return at convergence function, each to the ratio of net investment to output. The author's diagram does not directly express the balance of payments and deficit, yet both are involved in endogenous equilibrium of the real assets. Also, the author's diagram holds by sector.

More than two-third among 63 countries, 1990-2007, showed deflation at the government sector in KEWT 3.09. Currently 81 countries show deflation endogenously except for dozen countries at the government sector in KEWT 6.12, due to heavier burden of deficits (see Chapters 3, 4, 5). Note that at the total

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economy almost all the countries show inflation as a weighted aggregate average of the government and private sectors.

Therefore, the author's diagram stays at the first quadrant, with a normal curve of $r^*(i)$, and under the endogenous-equilibrium. Without measuring the deflation rate due to huge deficit at the government sector, the endogenous diagram is incomplete. Without externally estimating the inflation rates at the total economy, the endogenous diagram does not work for policy-making. This is because most policy-makers first understand actual facts empirically and then they bravely execute their policies.

At the current crisis, even if $m_K = M2/K$ moves slightly apart from a constant value, policy-makers must watch and take actions against unstable changes in $r_{M(DEBT)} - r^* = inf.rate_{COMP} - inf.rate^*_{HA}$ and the valuation ratio, $v = r^*/(r^* - g^*_Y) = V/K$. Even under the existence of neutrality, there is much room for detecting a bud of bubbles and immediately taking action not to have next bubbles; consistently with and beyond the current empirical macro EMU rules and proposed micro BIS regulations (for detail, go to the next three Chapters and then, Chapters 12 and 13).

Roadmap: Neutrality of the financial/market assets to the real assets, along with chapters; with limited monetary and financial policy at the Bank of Japan

This chapter presented an original paper itself published by *International Advances in Economic Research*, 16, 282-296, 2010 and, with a few paragraph updated. Chapters 5 and 9 also present original papers published at *Forum for Economists International*, Amsterdam, 2011 and 2012. Thirteen others chapters were newly written, to make conspicuous each essence by aspect, using the current KEWT 6.12, 1990-2010 and/or 1960-2010, by sector. Ideas and researches of thirteen other chapters are mostly originated to the author's papers published by *Papers of the Research Society of Commerce and Economics* and *Journal of Economic Sciences*.

Endogenous I-S and External L-M Diagram in Equilibrium: Towards the Neutrality of Financial/Market Assets to Real Assets

This roadmap includes the following three points in equilibrium:

<u>Point 1</u> Essence of Mundell, R. A. (97-109, 1965) that topologically clarifies the relationship between financial/market assets and real assets under the price-equilibrium.

<u>Point 2</u> Implication of purchasing power parity (PPP) doctrine reappraised by Balassa, Bela (584-596, 1964).

<u>Point 3</u> Samuelson's (111-154, 1964) consciousness anguished on 'Theoretical notes on trade problems.'

Readers paying attention to <u>the Roadmap</u> may understand why the author did not step into the PPP at Chapter 2 that focuses the neutrality of the financial/market assets to the real assets (the neutrality, hereunder).

Point 1: Mundell (1965)

Point 1 fairly and evenly explains the relationship between financial/market assets and real assets under the price-equilibrium. The base is $MV=PY$ (Eq. 1), where M is money supply, V is velocity, P is price level, and Y is output. Productivity of capital, ϕ, is defined as output divided by capital (Eq. 3). Finally, ϕ is maximized by solving parabola equation (Eq.35 and Figure 2). Then, Figures 3 and 4 are each shown by topology using the rate of inflation, π, on the x axis and velocity, W, on the y axis. $dW/dt = \pi - \rho$ (Eq. 32) holds, where $\rho = (dM/dt)/M$. The use of parabola and its topology is inevitable under the price-equilibrium and represents the literature. Of course, the rate of inflation is external. The author pays attention to $\phi = 1/\Omega$, where Ω is the author's capital-output ratio. Recall Chapter 8, where the capital-output ratio in the endogenous-equilibrium is a key for controlling seven endogenous parameters. Ω connects the literature with the endogenous system. The endogenous system measures capital and the rate of inflation simultaneously at Chapter 6. As a result, the neutrality is simultaneously proved theoretically and empirically.

Point 2: Balassa (1964)

The PPP is closely related to the price-equilibrium. The PPP is a tool within the price levels and price indexes. There is no other tool/method so that the PPP has been utilized hitherto. The endogenous system has the neutrality. The neutrality exists as a foundation of the PPP when the neutrality discovery sets one of three neutralities the exchange rate. The neutrality constitutes a starting point of the endogenous system and, prevails into Monograph. The PPP is useful to sector and industry analyses at the micro level, as estimated at Balassa's Figures 3, 5, and 6. Towards the micro level, see 'D. Future home task at EES revolving to the

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micro-level from the current macro level alone,' in <u>Practical Steps to Ideal Cyclical Green Society by Country for Generations in the 21st Century</u> (at the end of this Monograph).

One recognizes that the market principle fairly exists just like God's decision. It is true in the long-term. Yet, the market principle does not express any definite cause, while the real assets exclusively clarify causes and effects hidden behind the market principle. EES simultaneously reveals the causes and effects. Suppose that there exists no endogenous system like the KEWT database and its recursive programming. Then, people have to rely on the relationship between the exchange rate and the PPP. The author accepts inevitable default of price indexes that have quality-character changed at least once or twice in a decade. The author appreciates the existence of various price indexes. This is because it is modest for EES to compare endogenous results with the price indexes as shown in Chapter 2.

Point 3: Samuelson (1964)

'Theoretical notes on trade problems' by Samuelson's (111-154, 1964) impressed the author. The author feels the scientific discoveries of Samuelson (1937, 1939, 1940, 1941, 1942; 1975) at each chapter of Monograph (see References at the end of Monograph). This is because Samuelson's lifework is most vast yet, real assets-oriented in bottom. Samuelson (111-154, 1964) starts with maximum and minimum under the price-equilibrium, similarly to Mundell (97-109, 1965). Naturally, Samuelson treats the PPP for the exchange rate, similarly to Balassa, Bela (584-596, 1964). Nevertheless, in his (153, ibid.) conclusion, the following sentence appears in terms of direct investment of the US:

> *The prime element in all this is the reducing of the technological miracle gap between America and the less-than-most-affluent nations.*

Samuelson perceives that the rate of technological progress is a core of the real assets. The rate of technological progress has actually been a bottleneck of macroeconomics in the literature. EES is surprisingly fortunate to have the rate of technological progress measured consistently by country, sector, year, and over years.

Endogenous I-S and External L-M Diagram in Equilibrium: Towards the Neutrality of Financial/Market Assets to Real Assets

Limited monetary and financial policy at the Bank of Japan
(After reading Monograph, see Practical Steps at the end of Monograph)

Under the lack of the endogenous system, some money-oriented interest groups pressure the Bank of Japan: The author burns with righteous indignation to the movements to change the law related to the Bank of Japan. According to "Annual Review 2012" published on Ended March 31, 2012, 'The Bank's Business Operations' are the following seven:

I. Monetary Policy.
II. Financial System Policy.
III. Enhancement of Payment and Settlement Systems and Market Infrastructure.
IV. International Operations.
V. Issuance, Circulation, and Maintenance of Banknotes.
VI. Services Relating to the Government.
VII. Communication with the Public.

The author does not blame persons but person's money first at the costs of households and family people. The author lists partial, wrong, or avaricious statements against robust central bank policies as follows:

1. Increase boldly the supply of money printed by the Bank of Japan. Then, an economy is stimulated with inflation and business be activated.
2. First take growth strategies and then tax revenue increase naturally.
3. The balance of payments is good so that deficit be utilized for the recovery of business activities.
4. Actual circumstances reflect no policies taken by leaders and policy-makers.
5. Macro policies do not work for getting rid of deflation.
6. Deflation is independent of deficits accumulated over years.
7. Government savings must be solely utilized for business activities.
8. Crowing out is non-sense. Enterprises are just conservative and enough cash flows.
9. Government spending recovers business activities and decreases unemployment.
10. Deficit is independent of sustainable growth.
11. Tax reduction be ahead to recover business activities.
12. The Bank of Japan is responsible for growth and business activities in corporation with government.
13. The Bank of Japan be responsible for not only the financial and market assets but also for real assets.
14. Neutrality of the Bank of Japan to government is an empty theory.
15. Business cycle is positively related to the growth rate of population.
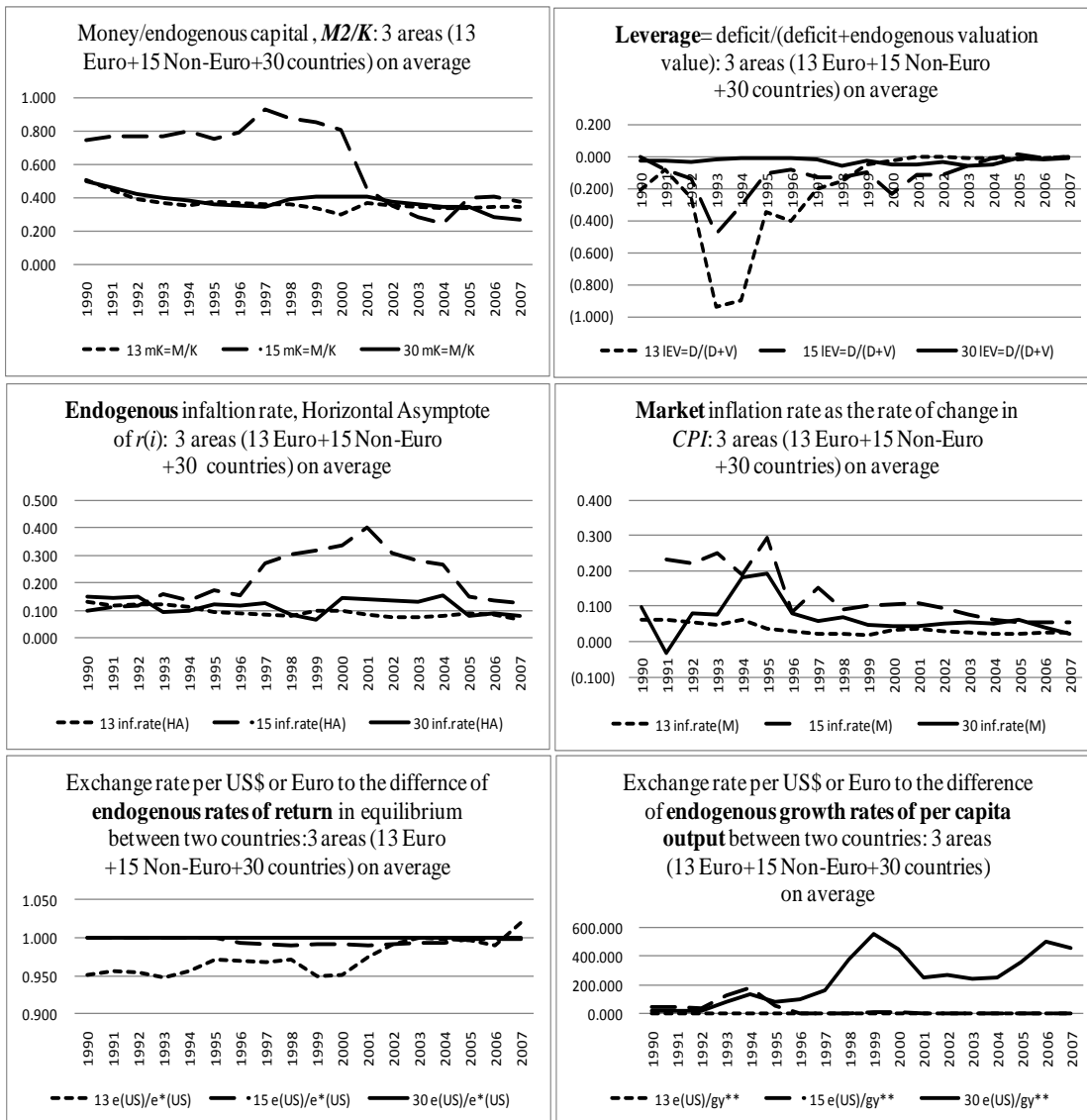16. Consumption is one and technology is the other. Or, stop inequality first.

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The author proves in Manuscript each reversal of the above sixteen statements, theoretically and empirically. In this respect, the author admires the resistance of the Bank of Japan against government pressure. The neutrality of financial/market assets to the real assets exists in the real assets. Some people know it intuitively. In short,

1. The Bank of Japan systematically manages monetary and financial policy.
2. Government most effectively contributes to sustainable and robust growth with deficit=zero, as Samuelson (1942) found as his scientific discovery and no others. Tax reduction and subsidies retard sustainable technological progress and growth.

Politicians may believe that it is possible for policy-makers to control policies for financial, market, fiscal, and economic. From the viewpoint of the endogenous system and its KEWT database, the integration of these policies is next to impossible. Economic growth and stability are only maintained by controlling the real assets, which include fiscal policy (for fiscal policy, see Chapters 12 and 13). The financial and market assets are external yet, author' neutrality of the financial/market assets to the real assets was discovered, as in Chapter 2. It implies that if the endogenous-equilibrium is within a certain range of moderation, money supply, increase in public investment, and central bank's function work temporarily. However, the true cause of deflation comes from huge deficits and debts over years. Deflation is out of control and extremely far from the moderate range of the endogenous-equilibrium. It is bitter to some enterprises yet bonus to citizens. A problem is seemingly unemployment but, the endogenous-equilibrium guarantees full-employment (see, Chapter 15). Deflation is a direct warning through the price-equilibrium. Deflation never recovers without sharp decrease in debts since the market intuitively knows this fact or uncontrollable policies (further, see C. M. Reinhart' (2008), eight hundred history of defaults at many countries in Chapter 4).
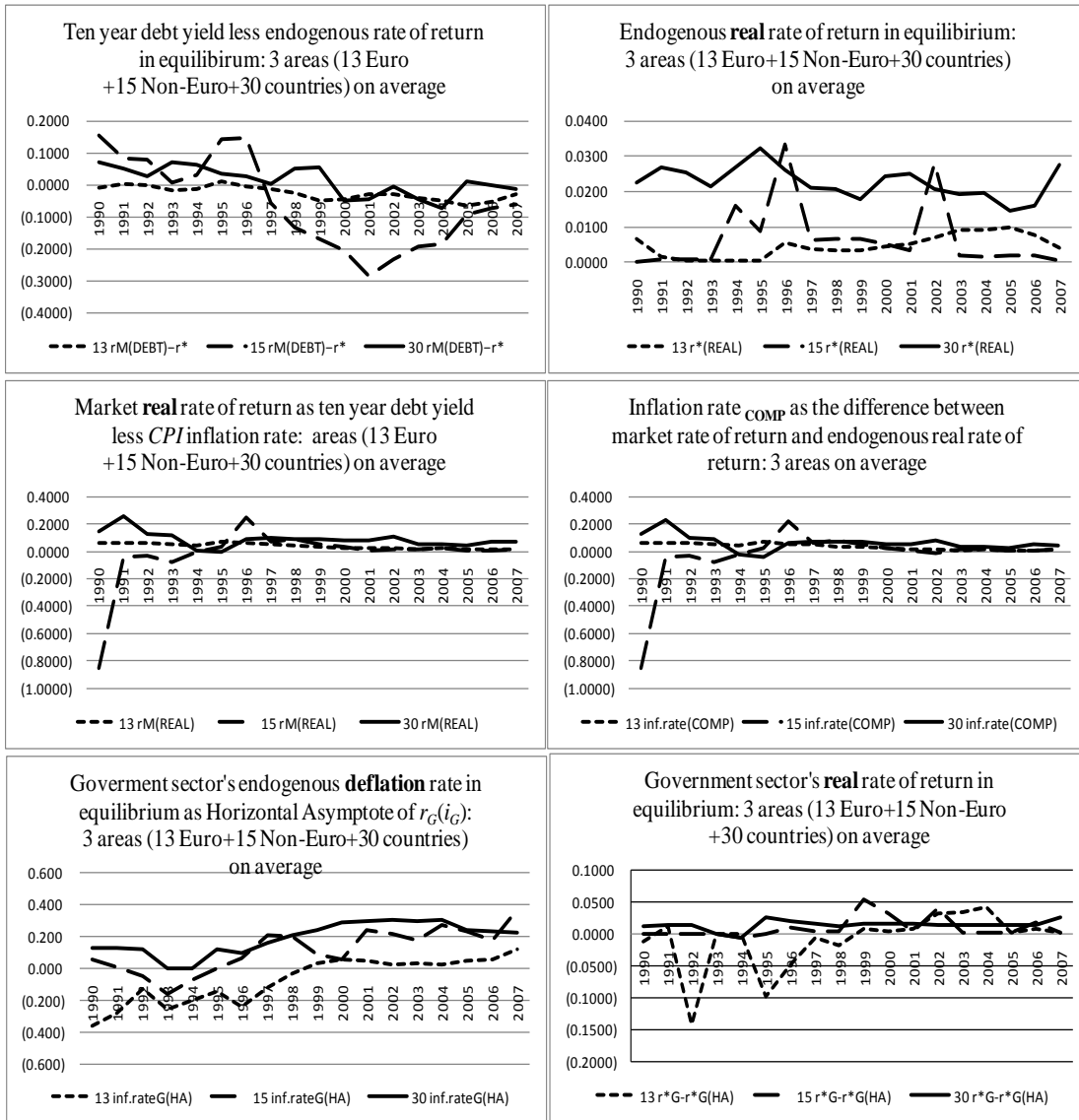
Endogenous I-S and External L-M Diagram in Equilibrium:
Towards the Neutrality of Financial/Market Assets to Real Assets

Money/endogenous capital , *M2/K*: 3 areas (13 Euro+15 Non-Euro+30 countries) on average

13 mK=M/K · 15 mK=M/K 30 mK=M/K

Leverage= deficit/(deficit+endogenous valuation value): 3 areas (13 Euro+15 Non-Euro +30 countries) on average

13 lEV=D/(D+V) 15 lEV=D/(D+V) 30 lEV=D/(D+V)

Endogenous infaltion rate, Horizontal Asymptote of *r(i)*: 3 areas (13 Euro+15 Non-Euro +30 countries) on average

13 inf.rate(HA) · 15 inf.rate(HA) 30 inf.rate(HA)

Market inflation rate as the rate of change in *CPI*: 3 areas (13 Euro+15 Non-Euro +30 countries) on average

13 inf.rate(M) 15 inf.rate(M) 30 inf.rate(M)

Exchange rate per US\$ or Euro to the differnce of **endogenous rates of return** in equilibrium between two countries:3 areas (13 Euro +15 Non-Euro+30 countries) on average

13 e(US)/e*(US) · 15 e(US)/e*(US) 30 e(US)/e*(US)

Exchange rate per US\$ or Euro to the difference of **endogenous growth rates of per capita output** between two countries: 3 areas (13 Euro+15 Non-Euro+30 countries) on average

13 e(US)/gy** · 15 e(US)/gy** 30 e(US)/gy**

Note: Differences of economic stage, developing and developed, most influence on money supply=demand *M2* and also the exchange rate per US\$ or Euro to growth rate in equilibrium, although after 2000 the neutrality of the markets to the real assets becomes more stabilized. (2) Changes in the series of rates of return clarify the back ground of figures as shown in Figure N1, even under the neutrality, (see the next Figure N2).

Figure N1 $M2/K$, endogenous leverage, endogenous versus external inflation rates, and exchange rate per US\$ or Euro to endogenous variables; among three areas

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Ten year debt yield less endogenous rate of return in equilibirum: 3 areas (13 Euro +15 Non-Euro+30 countries) on average

Endogenous **real** rate of return in equilibirium: 3 areas (13 Euro+15 Non-Euro+30 countries) on average

Market **real** rate of return as ten year debt yield less *CPI* inflation rate: areas (13 Euro +15 Non-Euro+30 countries) on average

Inflation rate $_{COMP}$ as the difference between market rate of return and endogenous real rate of return: 3 areas on average

Goverment sector's endogenous **deflation** rate in equilibrium as Horizontal Asymptote of $r_G(i_G)$: 3 areas (13 Euro+15 Non-Euro+30 countries) on average

Government sector's **real** rate of return in equilibrium: 3 areas (13 Euro+15 Non-Euro +30 countries) on average

Note: (1) $r_{M(DEBT)} - r^* = inf.rate_{COMP} - inf.rate_{HA}^*$ is a core of the series of rates of return, endogenous and market, where $inf.rate_{COMP} = r_{M(DEBT)} - r_{REAL}^*$ holds as a composite inflation rate. (2) for endogenous real, $r_{REAL}^* = r^* - inf.rate_{HA}^* = r^* - r_{HA}^*$ holds and for market real, $r_{M(REAL)} = r_{M(DEBT)} - inf.rate_M$ holds. (3) The seismic centre of deflation is the government sector, whose deficit is huge. The deflation of the government sector due to deficit turns to inflation at the total economy due to the weighted average of the government and private sector.

Figure N2 Relationship between endogenous and market inflation rates in the total economy, compared with deflation at the government sector

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