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Toward Rebuilding of Modern Macroeconomic Theory: Market Failure in a Macro Economy and Keynes's Unemployment Equilibrium

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Abstract

The present study aims to perceive an unacceptable unreality of a macro price mechanism: that is, the unreality that under any severe recession, deterioration of deflation or a consistent decrease in the rate of inflation will lead an economy to full employment equilibrium. This unreality results from an arbitrary assumption that the micro price mechanism operates even in a macro economy. This study challenges the existing modern macroeconomics theories on price mechanism and unemployment based on the skepticism toward existing theories based on the observations of a real economy.

The study reveals two main results. First, market failure in a macro economy, that is, the price mechanism is significantly incomplete and does not function, in particular, under deflation. This differs significantly from "the market failure due to the inflexibility of wages and prices, asymmetry of information, and so on," as stated by new Keynesianism. The key reason for market failure in a short-run macro economy is the unavoidable spillover effects, or derived demand effects between goods and labor markets under disequilibrium due to inflexible wages and prices. Macro price mechanism completely overlooks these effects because of the arbitrary assumption, thus leading to the unrealistic price mechanism stated earlier. Considering the spillover effects, or derived demand effects under disequilibrium, the assumption of full employment equilibrium, along with the assumption of flexible wages and prices, does not hold. Although these effects are the results of the short-run analysis, there would be market failure in a macro economy even in the long run as an inevitable conjecture.

To rebuild dynamic stochastic general equilibrium (DSGE) models, it is important to study the aforementioned fundamental and theoretical problem that macro price mechanism does not function. A static model is enough to explain the mechanism and dynamic models appear unnecessary and unfeasible.

Second, Keynes's unemployment equilibrium is realized owing to market failure in a macro economy. Market failure in a macro economy shows that involuntary unemployment results from quantitative and not price aspects. In other words, involuntary unemployment is not a result of the rigidity of real wages but of a shortage in labor demand under rigid real wages. This is possible by reinterpreting the Shapiro–Stiglitz efficiency wage model. Finally, demand is a critical factor in both the short run and the long run.

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JEL classification: E12, E24, J23

Keywords: spillover effects, or derived demand effects under disequilibrium; market failure in a macro economy; Keynes's unemployment equilibrium; the role of aggregate demand

Ⅰ. Introduction

In the new Keynesian dynamic stochastic general equilibrium (DSGE) theories, the standard of modern macroeconomics, the following major proposition holds: when nominal values are sufficiently flexible, an economy realizes full employment equilibrium. However, this proposition raises vital questions given the long-term stagnation experienced by Japanese economy since the 1990s and by the United States and Europe following the financial crisis in 2008, because the above proposition has an unacceptable unreality that under any deep recession, an economy will reach the full employment equilibrium as deflation deteriorates or the rate of inflation falls consistently. This serious issue is the starting point of the present study and elucidates the empirical criticisms of the prevailing theories. This unreality arises from that macro price mechanism, which assumes that the micro price mechanism operates even in a macro economy, is a fallacy of composition as proven in

Section Ⅲ.

The present study reexamines and challenges the concept of modern macroeconomics in terms of price mechanism and unemployment based on the earlier mentioned skepticism regarding the existing theories based on the observations of the real economy. The study results can be summarized as follows. First, the price mechanism does not function, particularly under deflation in the short-run macro economy, and therefore leading to market failure. This completely differs from "the market failure due to the inflexibility of wages and prices, asymmetry of information, and so forth," as stated by new Keynesianism. Second, this failure leads to Keynes's unemployment equilibrium. Thus, involuntary unemployment results from quantitative aspects, that is, lack of labor demand under rigid real wages. Finally, as an inevitable conjecture based on the short-run analysis, market failure in the macro economy would persist in the long run.

The first two points are analyzed as follows. When there is excess supply in both macro goods and labor markets in the short run, it is theoretically and empirically impossible that wages, prices, and real wages would be sufficiently flexible such that the Walrasian general equilibrium and therefore full employment equilibrium would soon be achieved. Thus, a general excess supply persists under short-run rigid wages and prices; consequently, spillover effects, or derived demand effects as shown later, arise between the goods and the labor markets. The critical problem of the Walrasian price mechanism is that both the markets are independent of each other owing to the arbitrary assumption stated earlier and the spillover effects between them, which are inevitable under disequilibrium, are completely overlooked.

In the goods market, for example, firms cannot sell as much as they want owing to demand deficiency under the prevalent prices. Consequently, they face supply constraints that cannot sell more than actual demand. Therefore, considering these constraints, firms must make dual decisions on having effective demand for labor in the labor market. These dual decisions reflect

derived demand effects in that the demand deficiency of goods affects labor demand. In the labor market, however, workers cannot supply labor as much as they desire because of demand deficiency under the existing wages. Hence, they cannot accrue wage income as much as they want because of these supply constraints; they have to make dual decisions to achieve the effective demand for goods in the goods market, considering these income constraints. These dual decisions also show derived demand effects in that the demand deficiency of labor affects demand for goods. Considering these spillover effects, or derived demand effects unavoidable under disequilibrium, the Walrasian general equilibrium and consequently full employment equilibrium cannot be achieved even if wages, prices, and real wages are sufficiently flexible. This condition would lead to market failure in the macro economy; this is the first result. This result is consistent with the theoretical proof on the salient Keynes's propositions proposed by Tobin: the proposition that flexible wages and prices will not stabilize a monetary economy.[1] Recent trend tends toward rebuilding the new Keynesian DSGE models.[2] If the fundamental and theoretical issue that the macro price mechanism does not function is not studied, then any valid rebuilding would not be achieved.

Here, Negishi's (1979) comment on "quantity constraint models" is crucial for analyzing the first result. As stated in section Ⅲ, a "quantity constraint model" is adopted in the present study to explore the validity of the Walrasian price mechanism" and not for explaining Keynesian equilibrium. A static model is enough for this analysis and dynamic models appear unnecessary and technically unfeasible.

If the price mechanism does not function, particularly under deflation in the macro economy, then assuming sufficient flexibility of wages, prices, and real wages does not appear feasible, because the Walrasian equilibrium and the optimal state of the economy will not be achieved even in case of sufficient flexibility. In such a scenario, unemployment cannot be attributed to the price aspect, that is, to the rigidity of real wages, as emphasized by the new

Keynesianism. Unemployment can be eventually attributed to quantitative aspects, that is, to a lack of real aggregate demand and labor demand, as Keynes emphasizes. According to Tobin (1993, p.46), in the absence of instantaneous and complete market clearing, output and employment are frequently constrained by aggregate demand, that is, "any failure of price adjustments to keep markets cleared opens the door for quantities to determine quantities." The second result that market failure in the macro economy leads to Keynes's unemployment equilibrium becomes possible by reinterpreting Shapiro and Stiglitz's (1984) efficiency wage model. Its implication that unemployment is caused by the inflexibility of real wages is altered. Instead, an alternative interpretation that unemployment is caused by a shortage of labor demand under rigid real wages is made.[3]

Although the present study analyzes involuntary unemployment, frictional unemployment is dependent on involuntary unemployment because it also depends on labor demand. Thus, full employment is in fact the level of employment at which there is only frictional and no involuntary unemployment.

Section II empirically criticizes the prevailing theories of price mechanism and unemployment based on the long-term stagnation of the Japanese economy and the recent experiences of the United States and Europe. Section III analyzes market failure in the short-run macro economy. Section IV elucidates Keynes's unemployment equilibrium. Section Ⅴ conjectures market failure even in the long run and reviews the long-run validity of the natural rate hypothesis. Section Ⅵconsiders aggregate demand as a crucial factor even in the long run.

II. Empirical Criticisms of Prevailing Theories

After the 1990s, Japanese economy faced long-term stagnation, and more recently, the United States and Europe faced a similar situation as well. In this background, the present study empirically criticizes the proposition that in the

short term, short-run equilibrium is established when nominal values are inflexible, and in the long term, steady state and therefore full employment equilibrium occurs when nominal values are sufficiently flexible. If this proposition is true, then why is the Japanese economy experiencing persistent sluggishness with high unemployment for over 10 years since the crisis in 1990? It is proposed that even if an economy faces severe depression and consequently excess goods and labor supply, then such an influence is only temporary. The proposition holds that in the short run, decline in prices and real wages will lead to economic recovery, and thus it will lead to a long-term or full employment equilibrium.

Figure 1 illustrates the proposition using a dynamic aggregate demand–aggregate supply (AD–AS) model.[4] Figure 1(a) represents a convergence process to a long-run equilibrium in the Japanese goods market under deflation. Even if the economy is below the full employment level, Y_F, it reaches the long-term equilibrium E^W through downward shifts of the dynamic AS curves (DASs). This is because of the reductions in the expected rate of inflation. In other words, since GDP or income increases as deflation decreases, an economy under deflation will reach the full employment equilibrium. This is, however, entirely in contrast to the real scenario experienced by Japan (Yoshikawa (2000)); therefore, the empirical and theoretical validity of the proposition is challenged. This unreality arises because the model consists of goods market alone, and completely overlooks the spillover effects, or derived demand effects among some markets including those under disequilibrium. This neglect is based on the arbitrary supposition stated earlier. The following explains concretely the Japanese real scenario, which is entirely in contrast with the proposition.

After 1998 when Japan's consumer price index (with the exception of energy and food other than alcoholic liquors) began to decline, the index continued to fall through 2012 with the exception of 2008. Moreover, Japan's GDP deflator, which is equal to the economic overall price index, continued to

decline almost continuously up to 2012, again except in 2008 (see figure 2). Nevertheless, the gap in GDP persisted from 1998 to 2012, except in 2007, and the Japanese economy never reached a long-run equilibrium that the proposition insists (see figure 3).

Furthermore, several times during 1998–2002, the "deflation spiral" was prominent in Japan about a vicious circle of deflation and depression. Decline in the general price level negatively affected firms' businesses in terms of both sales and profits, which in turn controlled wages and employment and decreased households' consumption demand. This negative impact on business results affected equipment investment decisions as well as households' housing investments. Consequently, the overall investment demand declined. In addition, when firms or individuals could not repay their debts, banks exerted caution about new loans owing to this increase in bad debts, which accelerated the decrease in investment and consumption demand from the finance perspective. Therefore, the economy falls into a vicious circle where deflation decreases aggregate demand and deepens the depression, which again in turn aggravates deflation. The late Keynesian professor James Tobin called a long-run equilibrium that the proposition insists "Never Never Land," indicating a destination that can never be reached.

The failure of this proposition in reality is not only evident in and specific to the Japanese economy after the 1990s, but its failure also applies to economic depressions experienced in other developed countries and their subsequent economic stagnation, starting with the autumn 2008 US financial crisis as well as the 1930s' Great Depression. Figure 1(b) depicts a convergence process to a long-run equilibrium in a usual goods market or the market in the United States and Europe. In other words, because GDP or income increases as the rate of inflation decreases, the economy will reach the full employment equilibrium. This is, however, in contrast to the experience of the United States and Europe, indicating this proposition's divergence from reality. In fact, the dynamic where persistent decline in the rate of inflation leads to deflation

in an economy has been the common reality across countries such as the United States, Europe, and Japan.

III. The Price Mechanism does not function, particularly under Deflation: Market Failure in the Short-Run Macro Economy

This section deconstructs the validity of the price mechanism in the macro economy, the essence of this study. Before doing so, however, we examine studies insisting that the economy becomes unstable when prices are sufficiently elastic. These studies have the following crucial problem: any results claiming to prove this proposition are derived based on models that completely differ from neoclassical models that insist the existence of a perfect price mechanism. Because the neoclassical model does not accept the validity of other models, any results derived from such other models will not be able to influence neoclassical thought.

Our basic viewpoint is that examining the price mechanism's validity seems to be impossible unless it is questioned using the same framework as used in neoclassical economics. That is, the Walrasian general equilibrium supposing flexibility of wages and prices, which is the major proposition of neoclassical macro theory, must be questioned. As shown later, we pay attention to "quantity constraint models" which play a crucial role for the examination. Specifically, the quantity constraint models of Benassy (1977) and Negishi (1979) are used to demonstrate that the price mechanism is significantly incomplete in the macro economy and does not function, particularly under deflation. A key factor enabling this analysis is spillover effects, or derived demand effects under disequilibrium, which is neglected by modern macroeconomics. No dynamic analysis is necessary for this explication. If we used a dynamic analysis, the analysis of spillover effects that are essential under disequilibrium would become virtually impossible.

Quantity constraint models received widespread attention as micro theoretical foundations of Keynesian economics in the 1970s in particular.

However, their popularity declined rapidly at the beginning of the 1980s because they failed to establish themselves as the micro theory of Keynesian equilibrium, as will be explored in detail below. However, a general disequilibrium theory using the quantity constraint models of Benassy and Negishi underpins our analysis on the incompleteness of the price mechanism in the macro economy because they provide a model to question the price mechanism's validity, as will be explained next.

The core premise of quantity constraint models is that wages and prices are assumed to be constant because price adjustments occur much more slowly than quantity adjustments and are therefore beyond the scope of short-run models. Indeed, the assumption of short-run rigidity of wages and prices is much more valid than that of flexibility in modern macroeconomics. The quantity constraint models pioneered by Clower (1965) distinguish between notional and effective demand. Notional demand for goods and notional supply of labor are derived from the Walrasian model of households as functions of prices of goods and labor. When the notional supply of labor is not realized, i.e., the labor market is in excess supply, households have to make dual decisions to have effective demand for goods, since notional demand for goods cannot be financed by the proceeds from the realized labor supply. Given the realized quantity of labor supply, the effective demand for goods is then derived subject to budget constraints in which the labor supply is constrained by the realized quantity. Effective demand is therefore a function not only of prices of goods and labor but also of households' realized income.

A similar idea was suggested by Patinkin (1964) for firms that face excess supply in the goods market. As demand for labor is constrained by the realized demand for output, firms have to make dual decisions to achieve effective labor demand. Benassy (1977) and Negishi (1979) combined Clower (1965) and Patinkin (1964), and they developed a general disequilibrium model of income and employment that analyzes spillover effects, or derived demand effects between both markets with excess supply or excess demand or different

states.[5]

Before explaining quantity constraint models concretely, we will first discuss the criticism that quantity constraint is not compatible with the assumption of a price taker under perfect competition. Arrow (1959) indicated that when a competitive market experiences excess supply, a competitive supplier is not a price taker facing a horizontal demand curve but a monopolist facing a downward sloping demand curve. If one wished to explicitly analyze the dynamics of price adjustment, discarding the perfectly competitive paradigm of the producer as a price taker would be necessary. However, since the purpose here lies in focusing on the reaction of economic units to given wage and price levels and analyzing the validity of the price mechanism based on such reactions, our analysis does not contradict Arrow's indication. Otherwise, quantity constraint models could not have been realized as a theoretical model in the first place.

Although Benassy (1975) formally developed a general model of quantity constraint, Negishi (1979) considered a simple example given by Benassy (1977) as explicitly revealing the implications of quantity constraint models (his explanation, however, slightly differs from that of Benassy because of his attempt to simplify the story.) Consider a short-run economy comprising two aggregated or representative agents: a consumer household and a firm. There are consumer goods, labor, and money. Correspondingly, two markets exist wherein goods and labor are exchanged for money.

The short-run production function of the representative firm is

$$(1)\ Y^S = F(L^D)\quad F' > 0,\ F'' < 0,$$

where Y^S denotes the level of output (i.e., supply) of consumer goods, and L^D denotes the level of labor input (i.e., demand), and the utility function of the representative consumer is

$$(2)\ U = a_1 \log Y^D + a_2 \log M + a_3 \log(L_0 - L^S) \qquad a_i > 0,$$

which is a log-linear function of the demand for goods Y^D, the demand for

money M, and leisure $L_0 - L^S$ (total amount of time available minus supply of labor service).

Walrasian notional demand and supply from the competitive firm are

(3) $L^D = (F')^{-1}\left(\frac{W}{P}\right) = L_1, \quad Y^S = F(L_1) = Y_1,$

where P denotes the given price of goods, and W denotes the given price of wages. The Walrasian budget constraint is

(4) $PY^D + M + W(L_0 - L^S) = M_0 + \Pi + WL_0,$

where M_0 denotes the initial amount of money and Π denotes the profit distributed by the firm. The maximization of (2) subject to (4) gives

$$Y^D = \frac{a_1}{a_1+a_2+a_3}\frac{M_0+\Pi+WL_0}{P}$$

and

$$L_0 - L^S = \frac{a_3}{a_1+a_2+a_3}\frac{M_0+\Pi+WL_0}{W}.$$

Therefore, Walrasian notional demand and supply from the competitive consumer are

(5) $Y^D = \frac{a_1}{a_2}\frac{M_0}{P} = Y_2$

and

(6) $L^S = L_0 - \frac{a_3}{a_2}\frac{M_0}{W} = L_3$

when the profit is considered as

$$\Pi = PY^D - WL^S,$$

which is not the profit planned by the firm but the profit expected by the consumer. Corresponding to Y_2 and L_3, let us define L_2 and Y_3 by

(7) $Y_2 = F(L_2), \quad Y_3 = F(L_3).$

Disequilibrium combinations of real wages W/P and real balance M_0/P are grouped into the four following cases according to the sign of notional excess demand in the goods and labor markets:

I $\quad Y^D - Y^S > 0,\ L^D - L^S < 0$

II $Y^D - Y^S < 0$, $L^D - L^S < 0$

III $Y^D - Y^S > 0$, $L^D - L^S > 0$

IV $Y^D - Y^S < 0$, $L^D - L^S > 0$.

Figure 4 represents this in a (M_0/P, W/P) diagram.

The downward sloping curve L_1L_2 shown in the figure is the equilibrium locus of the goods market, which shows the different combinations of real wages and real balance that satisfy the condition $L_1 = L_2$. Since L_1 corresponds to the notional supply of the firm Y^S in (3) and L_2 to the notional demand of the consumer Y^D in (7) and (5), the condition $L_1 = L_2$ thus assures equilibrium in the goods market. This locus is downward sloping since L_1 is decreasing with respect to W/P in (3) while Y_2, and therefore L_2, is increasing with respect to M_0/P in (5). Any point to the left of this curve implies excess supply in the goods market since it corresponds to $L_1 > L_2$, whereas any point to the right of this curve implies excess demand in the goods market since it corresponds to $L_1 < L_2$.

Similarly, the upward sloping curve L_1L_3 in Figure 4 indicates the equilibrium locus of the labor market. Since L_1 is the notional labor demand of the firm L^D in (3) and L_3 is the notional supply of labor L^S in (6), the labor market is cleared if $L_1 = L_3$. This locus is upward sloping since L_1 will decrease in response to an increase in W/P from (3) while M_0/W must increase in (6) to maintain the equality of L_1 and L_3 which, in view of the increasing W/P, requires an increase in M_0/P. Any point to the left of this curve implies excess supply in the labor market since it corresponds to $L_1 < L_3$, whereas any point to the right of this curve implies excess demand in the labor market since it corresponds to $L_1 > L_3$.

Area I in Figure 4 indicates that notional excess demand exists in the goods market and excess supply exists in the labor market. In Area II (III), excess supply (demand) prevails both in the goods and labor markets. In Area IV, excess demand exists in the labor market along with excess supply in the goods market. Only at the point of intersection of the curves L_1L_2 and L_1L_3,

i.e., point E^W, the Walrasian general equilibrium is established.

In the respective areas, e.g., Area II in the figure, since excess supply exists in both markets, notional supplies $Y^S = Y_1$ and $L^S = L_3$ are not realized. Since the firm is not constrained in the labor market, $Y^S = Y_1$ remains the effective supply Y^{SE} in the goods market; that is, $Y^{SE} = Y_1$. Since the consumer is constrained in the labor market, however, the effective demand for goods Y^{DE} is again obtained using the budget constraint

$$(8)\ PY^D + M = M_0 + \Pi + WL,$$

where L is the realized employment. Equation (8) replaces L^S with L in the Walrasian budget constraint (4). The realized profit is

$$(9)\ \Pi = PY - WL,$$

where Y is the realized purchase of goods. The maximization of utility (2) with respect to Y^D and M subject to (8) and (9) gives

$$(10)\ Y^{DE} = \frac{a_1}{a_1+a_2}\left(\frac{M_0}{P} + Y\right).$$

As the consumer is on the short side of the goods market, we have

$$(11)\ Y = Y^{DE}.$$

From (10), (11), and (5), the effective demand for goods is

$$(12)\ Y^{DE} = \frac{a_1}{a_2}\frac{M_0}{P} = Y_2$$

and therefore the excess effective demand for goods is

$$(13)\ Y^{DE} - Y^{SE} = Y_2 - Y_1$$

in Area II. In the labor market, on the other hand, the effective supply L^{SE} coincides with the notional supply $L^S = L_3$ since the consumer is not constrained in the goods market, and no dual decisions are made.[6] Effective demand for labor, however, differs from the notional demand since the firm is on the long side of the goods market. The firm must base its plan regarding demand for labor on realized sales in the goods market, which is Y_2 according to (11) and (12). The effective demand for labor L^{DE} is therefore L_2.

Consequently, the excess effective demand for labor is

(14) $L^{DE} - L^{SE} = L_2 - L_3$.

Since L_2 and Y_2 are the least among L_i and Y_i, respectively, in Area II and are therefore realized, excess effective supply dominates, as expected, both the labor and goods markets in Area II.

In Area III, excess demand exists in both markets and therefore notional demands $Y^D = Y_2$ and $L^D = L_1$ are not realized. Since the firm is on the short side of the goods market, the effective demand for labor L^{DE} is the same as the notional demand $L^D = L_1$; that is, $L^{DE} = L_1$. The consumer has, however, to make dual decisions regarding the supply of labor since it is constrained in the goods market. The effective supply of labor is again obtained by maximizing (2) subject to

(15) $PY + M + W(L_0 - L^S) = M_0 + \Pi + WL_0$,

where Y is the realized purchase of goods. This gives

(16) $L^{SE} = L_0 - \frac{a_3}{a_2+a_3}\frac{M_0 + \Pi + WL_0 - PY}{W}$.

Since the consumer is on the short side of the labor market, the realized profit is

(17) $\Pi = PY - WL^{SE}$.

From (16) and (17), the effective supply of labor is

(18) $L^{SE} = L_0 - \frac{a_3}{a_2}\frac{M_0}{W} = L_3$,

in view of (6). Therefore, the excess effective demand in the labor market is

(19) $L^{DE} - L^{SE} = L_1 - L_3$.

In the goods market, on the other hand, the effective demand Y^{DE} coincides with the notional demand $Y^D = Y_2$; that is, $Y^{DE} = Y_2$ since the consumer is not constrained in the labor market, and there are no dual decisions.[7] Effective supply in the goods market, however, differs from the notional supply since

the firm is on the long side of the labor market and has to make dual decisions on the supply of goods. The firm must base its supply plan on the realized purchase of labor, which is L_3 from (18). Therefore, the effective supply of goods Y^{SE} is Y_3. Excess effective demand in the goods market is then

(20) $Y^{DE} - Y^{SE} = Y_2 - Y_3$.

Since L_3 and Y_3 are, respectively, the least among L_i and Y_i in Area III and are therefore realized, excess effective demand exists, as expected, in both the labor and goods markets in Area III.

Similarly, in Area I, dual decisions are made, and effective excess demand is derived. Stating the conclusion, the sign of effective excess demand is the same as the sign of notional excess demand in Area I as well as in Areas II and III. This implies that the effective excess demand for goods is positive and the effective excess demand for labor is negative, and they are

$$Y^{DE} - Y^{SE} = \frac{a_2}{a_1 + a_2} (Y_2 - Y_1)$$

and

$$L^{DE} - L^{SE} = \frac{a_2}{a_2 + a_3} (L_1 - L_3), \text{ respectively.}$$

Finally, in the case of Area IV, since the consumer is not constrained in both markets, effective demand in the goods market and effective supply in the labor market are, respectively, the same as the notional ones, $Y^D = Y_2$ and $L^S = L_3$, i.e., $Y^{DE} = Y_2$ and $L^{SE} = L_3$. The firm is, on the other hand, constrained in both markets and dual decisions have to be made regarding demand in the labor market and supply in the goods market. Effective demand in the labor market is $L^{DE} = L_2$ since the supply from the firm in the goods market is constrained at Y_2. Effective supply in the goods market is $Y^{SE} = Y_3$ since the demand from the firm in the labor market is constrained at L_3. Therefore, effective excess demands in the labor and goods markets are, respectively,

$$L^{DE} - L^{SE} = L_2 - L_3$$

and

$$Y^{DE} - Y^{SE} = Y_2 - Y_3 = F(L_2) - F(L_3).$$

Their signs depend on the relative magnitude of L_2 and L_3.

Figure 5 is obtained from Figure 4 by adding the L_2L_3 curve, which shows the combination of W/P and M_0/P satisfying the condition $L_2 = L_3$. This curve is upward sloping since L_2 increases with an increase in M_0/P from (5) while M_0/W decreases according to (6) to keep L_3 equal to the increased L_2, and therefore W/P must increase. Since any point to the left of this curve satisfies the inequality $L_2 < L_3$, and any point to the right satisfies $L_2 > L_3$, dual decisions must be made under each disequilibrium. In Figure 4, the subarea of Area IV, which is also shown to the left of L_2L_3 in Figure 5, excess supply exists in both the labor and goods markets. We have (13) and (14) again as the results of further dual decisions. In Figure 5, therefore, Area II is enlarged to include this subarea where effective excess demand is negative in both the labor and goods markets. Similarly, in the subarea of Area IV located to the right of L_2L_3, excess demand dominates both markets. Dual decisions repeated imply (19) and (20) again, where effective excess demand is positive in both the goods and labor markets. Therefore, Area III is enlarged to include this subarea in Figure 5. In Figure 5, Area IV declines into a part of the curve L_2L_3, i.e., E^WL_3.

The Walrasian notional demand is equalized with the corresponding Walrasian notional supply in both markets only at E^W in Figure 5. Keynesian situations are cases in which effective excess supply exists in both markets as shown in Area II. The combinations of W/P and M_0/P on the curve E^WL_3 are non-Walrasian equilibria, where effective demand and effective supply are equal in the two markets. However, they are by no means Keynesian underemployment equilibria since the household is not constrained and no Keynesian involuntary unemployment exists. The theory of dual decisions presupposes that the speed of quantity adjustments is much faster than that of

price adjustments. Keynesian situations are, then, disequilibria in which there is effective excess supply in both the labor and goods markets. However, how can such disequilibria be considered to be Keynesian equilibria? This is the crucial limitation of quantity constraint models and the reason why these models failed to be accepted as the microtheory of Keynesian economics. As emphasized by Negishi (1979, 1980), merely assuming that wage and price adjustments are much slower in comparison with quantity adjustment is insufficient. The reason why wage and price adjustments are almost negligible in the presence of excess supply in both markets must be fully explained.

Although quantity constraint models thus failed to be established as the microtheory of Keynesian economics, we have now reached a point from which we can effectively use these models to question the validity of the price mechanism in the macro economy. New classical macroeconomics assumes the Walrasian general equilibrium by supposing the sufficient flexibility of wages and prices even in the short run. We analyze whether such an assumption of perfect short-run market mechanisms is really valid, particularly under deflation in the macro economy.

Figure 6(a) illustrates processes by which the economy designated by a point (M_0/P, W/P) in Area II in Figure 4 converges to the Walrasian general equilibrium E^W under the supposition of the perfect flexibility of wages and prices and therefore of real wages and real balances. It is supposed that W/P also declines in deflationary Area II where both W and P decline and W/P also rises in inflationary Area III where both W and P rise. If it was supposed that W/P rises in Area II and declines in Area III, the supposition is intuitively invalid and its foundation must be explained. Furthermore, the Walrasian price mechanism will not be achieved under such a supposition. (The explanation is omitted). In addition, assuming W/P = const. in Area II and III is neglected for a similar reason.

Incidentally, the Walrasian price mechanism such as in Figure 6(a) assumes that goods and labor markets are completely independent under disequilibrium,

that is, entirely neglects the existence of spillover effects, or derived demand effects inevitable between both markets under disequilibrium. Therefore, the analysis regarding adjustment processes in the macro economy must be based on Figure 5 taking spillover effects, or derived demand effects under disequilibrium into consideration. Figure 6(b) illustrates how the economy designated by a point (M_0/P, W/P) traces its path in each area in Figure 5 under the supposition of the perfect flexibility of wages and prices and therefore of real wages and real balances.

The following explication regarding each area in Figure 6(b) is an analytical approach to explore the validity of the price mechanism in the macro economy in which spillover effects under disequilibrium are considered. First, let us begin with Area II, which Keynes intended. In this area, there exists effective excess supply in both the goods and labor markets: the area is in deflation. Therefore, it is supposed that P, W, and W/P are completely flexible downward, as stated above, to analyze the validity of the price mechanism in Area II. Consequently, a point (M_0/P, W/P) moves in a right and downward direction. Our analysis then concerns whether the economy designated by the point reaches the Walrasian general equilibrium E^W; in other words, whether effective excess supply of both goods and labor at the point decreases to zero.

The effective excess supply of goods is

$$(21)\ Y^{SE} - Y^{DE} = Y_1 - Y_2 > 0$$

$$= F\left(L_1\left(\frac{W}{P}\right)\right) - \frac{a_1}{a_2}\frac{M_0}{P} > 0.$$

Generally, this will not become zero through a decline in W/P and an increase in M_0/P; that is, $Y_1 = Y_2$ ($L_1 = L_2$) will not be generally realized. On the other hand, since the effective excess supply of labor is

$$(22)\ L^{SE} - L^{DE} = L_3 - L_2 > 0$$

$$= \left(L_0 - \frac{a_3}{a_2}\frac{M_0}{W}\right) - \left(\text{L corresponding to } Y_2 = \frac{a_1}{a_2}\frac{M_0}{P}\right) > 0,$$

it will certainly become zero sooner or later due to a decline in W and an increase in M_0/P; that is, $L_2 = L_3$ will be realized. In Area II, therefore, the economy will reach any point on the E^WL_3 curve. To see the point where the economy intersects the curve, it is convenient to divide this area into two parts.

Dividing Area II into subareas reflecting points higher and lower than W/P at the Walrasian equilibrium, then in the lower subarea, the economy always arrives at some point on the E^WL_3 curve except the point E^W, as indicated by the trajectory of A in Figure 6(b). In this subarea, the economy never reaches E^W. This implies that the Walrasian general equilibrium is never realized, but a non-Walrasian equilibrium is realized. On the other hand, even in the upper subarea, the economy always arrives at some point on the E^WL_3 curve except E^W, as shown by the trajectory of B in Figure 6(b) unless a_1/a_2 is sufficiently large. Even in this subarea, unless a_1/a_2 is sufficiently large, the economy never reaches the Walrasian general equilibrium, and a non-Walrasian equilibrium is realized.

As long as a_1/a_2 is sufficiently large in (21), the effects of the increase in M_0/P—that is, real balance effects—become sufficiently large, and therefore the effective excess supply of goods becomes zero. In other words, the economy reaches on the L_1L_2 curve. Then, the economy converges at the intersection point of the L_1L_2 and L_2L_3 curves, namely the Walrasian general equilibrium E^W, like the trajectory of C or C' in Figure 6(b). Now defining e_1 and e_2 as the elasticity of utility for the demand for goods and elasticity of utility for the demand for money, respectively, we have $a_1/a_2 = e_1/e_2$ since $a_1 = e_1U$ and $a_2 = e_2U$. That is, a_1/a_2 is the ratio of each elasticity defined above. Hence, only if the elasticity of demand for goods is significantly larger than the demand for money elasticity, i.e., only if consumption is profitable enough compared to money holding, the Walrasian general equilibrium will emerge.

However, such a condition is not satisfied under real deflation. In fact, the reverse situation occurs: money holding is more profitable than consumption.

We can enumerate the following three points as empirical foundations that substantiate this assertion. First, in the deflationary situation such as that depicted in Area II, decreased incomes and anxiety about the future of business and employment intensify tendencies toward saving and considerations of safety. The former tendency decreases consumption and consequently increases money holding. The latter tendency also increases money holding as a safe financial asset. Second, since people's deflationary expectations curb their present consumption, consumption decreases and money holding increases. Third, although the model lacks an integrated rate of interest, very low rates of interest under deflation increase money hoarding or the amount of money hoarded by households. Large decline in aggregate demand in turn decreases firms' demand for funds and increases their funds in hand (the third point corresponds to a "liquidity trap"). In these situations, therefore, it cannot be expected that the Walrasian general equilibrium will be established due to sufficiently large real balance effects.

Next, in Area III, unlike in Area II, there exists effective excess demand in both the goods and labor markets: the area is in inflation. Thus, it is supposed that P, W, and W/P are entirely flexible upward to analyze the validity of the price mechanism in Area III. Consequently, a point (M_0/P, W/P) moves in a left and upward direction. Our analysis remains focused on the question of whether the economy denoted by the point will reach the Walrasian general equilibrium E^W.

The effective excess demands for labor and goods are, respectively,

$$(23)\ L^{DE} - L^{SE} = L_1 - L_3 > 0$$

$$= L_1\left(\frac{W}{P}\right) - \left(L_0 - \frac{a_3}{a_2}\frac{M_0}{W}\right) > 0$$

$$(24)\ Y^{DE} - Y^{SE} = Y_2 - Y_3 > 0$$

$$= \frac{a_1}{a_2}\frac{M_0}{P} - \left(\text{Y corresponding to } L_3 = L_0 - \frac{a_3}{a_2}\frac{M_0}{W}\right) > 0.$$

The economy will generally reach either the L_1L_3 or L_2L_3 curve. To see where

the economy arrives on either curve, this area is divided into three parts as in Figure 6(b) based on the levels of M_0/P and W/P at the Walrasian equilibrium.

In the lower left subarea, the economy necessarily arrives at any point on the E^WL_3 curve except the point E^W; the Walrasian equilibrium is never realized. In the upper right subarea, the economy necessarily arrives at any point on the L_1E^W curve except E^W and thereafter enters Area I.

In the lower right subarea, when a_1/a_2 is sufficiently large in (24), the effects of the decrease in M_0/P—that is, negative real balance effects—become sufficiently large, and therefore the effective excess demand for goods decreases rapidly to zero. Consequently, the condition $Y_2 = Y_3$ is realized: the economy reaches a point on the L_2L_3 curve. Now, in an inflationary situation such as in Area III in contrast with Area II, we can assume that $a_1/a_2 = e_1/e_2$ is sufficiently large: the demand elasticity of utility for goods is sufficiently larger than the demand for money elasticity; in other words, consumption is sufficiently more preferable than money holding. Empirical foundations that satisfy this condition are as follows. First, decreases in money values because of inflation make consumption more profitable than money holding. Second, since people's inflationary expectations stimulate their present consumption, money holding decreases. Hence, in this subarea, the economy is most likely to arrive at some point on the E^WL_3 curve except point E^W. Only in the case of simultaneous realization of both the conditions $L_1 = L_3$ and $Y_2 = Y_3$ ($L_2 = L_3$), E^W is established in this subarea. Since a_1/a_2 is sufficiently large in this area, there is little possibility that the economy will arrive on the L_1E^w curve and thereafter enter Area I.

Finally, let us refer to Area I. In Area I, it is assumed that P is completely flexible upward and W is downward because of the presence of effective excess demand for goods and effective excess supply of labor. A point (M_0/P, W/P), therefore, moves in a left and downward direction. The effective excess demand for goods and the effective excess supply of labor are, respectively,

$$(25)\ Y^{DE} - Y^{SE} = \frac{a_2}{a_1+a_2}(Y_2 - Y_1) > 0$$

$$= \frac{a_2}{a_1+a_2}\left\{\frac{a_1}{a_2}\frac{M_0}{P} - F\left(L_1\left(\frac{W}{P}\right)\right)\right\} > 0$$

and

$$(26)\ L^{SE} - L^{DE} = \frac{a_2}{a_2+a_3}(L_3 - L_1) > 0$$

$$= \frac{a_2}{a_2+a_3}\left\{\left(L_0 - \frac{a_3}{a_2}\frac{M_0}{W}\right) - L_1\left(\frac{W}{P}\right)\right\} > 0.$$

The economy will generally reach either the L_1L_2 or L_1L_3 curve. To see where the economy arrives on each curve, it is convenient to divide this area into a left and right subareas vis-à-vis M_0/P at the Walrasian equilibrium.

In the left subarea, the economy always arrives at some point on the L_1E^Wcurve except point E^W and subsequently enters Area II. In the right subarea, the economy arrives on the L_1E^W curve and subsequently enters Area II or converges at E^W. In Area I, the economy can trace one of three trajectories because a_1/a_2 in (25) is supposed to larger than in Area II but smaller than in Area III.

The above analyses on the validity of the price mechanism in the macro economy thus show that the price mechanism is significantly incomplete in a short-term macro economy and does not function, particularly under deflation. Furthermore, it is demonstrated that the economy is most likely to converge at a non-Walrasian equilibrium as long as wages and prices are sufficiently flexible. At this equilibrium, no Keynesian involuntary unemployment exists, but since it is not the Walrasian equilibrium, the Pareto-optimum state is not realized. It is therefore a market failure of the macro economy that the price mechanism does not fully function but is incomplete at the macro level. Thus, assuming that the price mechanism at the micro level holds as it does in the macro level can be considered to be a fallacy of composition. Thus, the analysis presented above can be considered to be the basis for an argument that macroeconomics has its own theoretical paradigm that differs from that of microeconomics. Therefore, big questions are raised regarding DSGE theory

such as real business cycle (RBC) models that assume the existence of a perfect market mechanism even in the short run.

IV. The Cause of Involuntary Unemployment lies eventually in Quantitative Aspects: Lack of Aggregate Demand and Keynes's Unemployment Equilibrium

The preceding section demonstrated that the price mechanism is clearly incomplete in the short-run macro economy and does not realistically function, at least under deflation. Following on from that argument, this section indicates the existence of Keynes's equilibrium with involuntary unemployment.

However, it is necessary to refer to the earlier studies of Keynesian equilibrium. These studies have the following inherent drawbacks. That is, to evaluate the perfect price mechanism, as in Section III, the validity of the Walrasian general or full employment equilibrium assuming wage and price flexibility must be reexamined. However, it must be first studied within a framework similar or identical to the neoclassical approach; otherwise, any analyses of the Keynesian equilibrium will not be sufficient to invalidate the neoclassical principle of the perfect price mechanism.

Returning to the cause of unemployment, the focus of this section, it can be said that as long as the price mechanism does not function under deflation, the Walrasian general equilibrium is not established, and therefore the economy's optimal condition is not realized. Thus, supposing real-wage flexibility does not make inherent sense. Conversely, reasons for real-wages rigidity should be offered. It is empirically well known that real wages are indeed more stable than money wages.

However, the cause of unemployment is not attributed to real-wage rigidity as stated by the new Keynesianism. This is because, as demonstrated above, supposing real-wage flexibility is invalid. It is, therefore, logical that Keynesianism eventually attributes unemployment to the quantitative aspect: a

shortage of real aggregate demand and labor demand, as stated by Keynes. Indeed, this can be confirmed by unemployment models of the new Keynesianism, which explain the rigidity of real wages. Thus, by re-interpreting an existing theory to explain the cause of unemployment as being the shortage of demand, there is no need to construct a novel model.

In the following, we examine new Keynesian theories of unemployment to show that the shortage of demand is the cause of unemployment. New Keynesianism holds that involuntary unemployment is generated because real wages are for some reason sticky at a higher level than at their equilibrium level, and therefore they are not adjusted below it. The new Keynesianism models develop efficiency wage theory and insider–outsider theory based on the root causes of real-wage stickiness. This study adopts one of the most prominent efficiency wage models as new Keynesian theories of involuntary unemployment—the Shapiro–Stiglitz model—which has attracted great attention.[8]

The Shapiro–Stiglitz (1984) focuses on the possibility that firms' limited monitoring abilities force them to provide their workers with an incentive to exert effort. The model is the most rigorous theoretically among efficiency wage models. Romer (2018) summarizes it as follows.

The economy comprises a large number of workers, $\bar{L}$, and a large number of firms, N. The workers maximize their expected discounted utilities, and firms maximize their expected discounted profits. For simplicity, the analysis focuses on steady states.

The representative worker's lifetime utility is

$$(30)\ U = \int_0^{\infty} e^{-\rho t}\ u(t)dt \qquad \rho > 0,$$

where u(t) is instantaneous utility at time t, and ρ is the discount rate. Instantaneous utility is defined as

$$(31)\ u(t) = \begin{cases} w(t) - e(t) & \text{if employed} \\ 0 & \text{if unemployed,} \end{cases}$$

where w is the real wage, and e is the worker's effort. Only two possible effort

levels exist: e = 0 and e = $\bar{e}$. Thus, at any moment, a worker must be in one of three states: employed and exerting effort (denoted E), employed and not exerting effort (denoted S, for shirking), or unemployed (denoted U).

A key ingredient of the model is its assumptions concerning workers' transitions between these three states. First, there is an exogenous rate at which jobs end. Specifically, if a worker begins working in a job at some time t_0 (and if the worker exerts effort), the probability that the worker is still employed in the job at some later time, t, is

(32) $P(t) = e^{-b(t-t_0)} \qquad b > 0.$

Processes like (32) are known as Poisson processes. Under such processes, the probability of job breakup is b per unit of time because (32) implies $P'(t)/P(t) = -b$.

The second assumption concerning workers' transitions between states is that firms' ability to detect workers who are shirking is also a Poisson process. Specifically, it is assumed that detection occurs with probability q per unit of time, and it is independent of job breakups. Workers who are caught shirking are fired.

Third, unemployed workers find employment at rate a per unit of time. Each worker takes a as given. In the economy as a whole, however, a is determined endogenously.

A firm's profits at time t are

(33) $\Pi(t) = F(\bar{e}L(t)) - w(t)\,[L(t) + S(t)] \qquad F' > 0,\ F'' < 0,$

where L is the number of employees who are exerting effort, and S is the number who are shirking. The problem facing the firm is to set w sufficiently high so that its workers do not shirk, and to choose L. Because the firm's decisions at any date affect profits only at that date, the firm chooses w and L at each moment to maximize the instantaneous flow of profits.

The final assumption of the model is that $\bar{e}F'(\bar{e}\bar{L}/N) > \bar{e}$. This condition states that if each firm hires 1/N of the labor force, $\bar{L}$, the marginal product of

labor in full employment exceeds the cost of exerting effort. As will be shown later, this means that there is full employment in the absence of imperfect monitoring.

Let V_i denote the "value" of being in state i (for i = E, S, and U). That is, V_i is the expected value of discounted lifetime utility from the present moment forward for a worker in state i. Because we focus on steady states, the V_i's are constant over time. Instead of using dynamic programming to find V_E, V_S, and V_U, an intuitive approach is employed for saving space.

Consider an asset that pays dividends at rate $w - \bar{e}$ per unit of time when the worker is employed but pays no dividends when the worker is unemployed. In addition, assume that the asset is being priced by risk-neutral investors with required rate of return ρ. Since the expected value of discounted lifetime dividends of this asset is the same as the worker's expected value of discounted lifetime utility, the asset's price must be V_E when the worker is employed and V_U when the worker is unemployed. For the asset to be held, it must provide an expected rate of return of ρ. That is, its dividends per unit time, plus any expected capital gains or losses per unit time, must equal ρV_i. When the worker is employed, dividends per unit time are $w - \bar{e}$, and there is a probability b per unit of time of a capital loss of $V_E - V_U$. Thus,

$$(34)\ \rho V_E = (w - \bar{e}) - b(V_E - V_U).$$

If the worker is shirking, the "dividend" is w per unit of time, and since the respective probabilities of job breakups and detection are b and q per unit of time, the expected capital loss is $(b + q)(V_S - V_U)$ per unit of time. Thus,

$$(35)\ \rho V_S = w - (b + q)(V_S - V_U).$$

Finally, if the worker is unemployed, the dividend is 0 and the expected capital gain (assuming that firms pay sufficiently high wages that employed workers will exert effort) is $a(V_E - V_U)$ per unit of time. Thus,

$$(36)\ \rho V_U = a(V_E - V_U).$$

The firm must pay enough that $V_E \geq V_S$; otherwise, workers exert no effort and produce nothing. Simultaneously, since effort cannot exceed $\bar{e}$, there is no need to pay any excess over the minimum needed to induce effort. Thus, the firm chooses w so that V_E just equals V_S[9];

(37) $V_E = V_S$.

Equations (37), (34), and (35) imply the following:

(38) $V_E - V_U = \bar{e}/q$.

Equations (34), (36), and (38) imply that the wage must be

(39) $w = \bar{e} + (a + b + \rho)(\bar{e}/q)$.

To substitute employment per firm, L, for the rate at which unemployed workers find jobs, a, in (39), we can use the fact that since the economy is in steady state, movements into and out of unemployment must balance. The number of workers becoming unemployed per unit of time is NLb, where b is the rate of job breakups, and the number of unemployed workers finding jobs is $(\bar{L} - NL)a$. Equating these two quantities yields

$$a = NLb / (\bar{L} - NL).$$

Substituting this into (39) yields

(40) $w = \bar{e} + (\rho + \frac{\bar{L}}{\bar{L} - NL} b)(\bar{e}/q)$.

Equation (40) is the no-shirking condition. It shows, as a function of the level of employment, the wage that firms must pay to induce workers to exert effort. The wage needed to deter shirking is an increasing function of employment. At full employment, unemployed workers find work instantly, and thus there is no cost to being fired and no wage that can deter shirking. The set of points in (NL, w) space satisfying the no-shirking condition (NSC) is shown in Figure 7.

Next, equation (33) implies that when its workers are exerting effort, a firm's flow profits are $F(\bar{e}L) - wL$. Thus, the condition for the marginal

product of labor to equal the real wage is

(41) $\bar{e}\, F'(\bar{e}L) = w$.

The conventional labor demand curve satisfying (41) is also shown in Figure 7. Labor supply is horizontal at $\bar{e}$ up to $\bar{L}$ number of workers and then becomes vertical. In the absence of imperfect monitoring, equilibrium occurs at the intersection of labor demand and supply. The above assumption that the marginal product of labor at full employment exceeds the disutility of effort ($\bar{e}\, F'(\bar{e}\bar{L}/N) > \bar{e}$) implies that the Walrasian equilibrium occurs at Point E^W in the diagram.

With imperfect monitoring, equilibrium occurs at the intersection E of the L^D curve and the NSC locus. At this equilibrium, unemployment exists. Because wages are determined at the level of equilibrium and not adjusted below it, this unemployment persists even in equilibrium.

However, as demonstrated in Figure 7, the Shapiro–Stiglitz model holds that unemployment is not created because real wages are sticky at a level of equilibrium. In fact, as stated in the following, unemployment arises due to a shortage of aggregate demand and labor demand. If aggregate demand and labor demand is sufficient, unemployment does not emerge. In Figure 7, the L^D curve will shift depending on business situation or the level of aggregate demand. The higher the level of aggregate demand, the more to the right-hand side the L^D curve is located, and thus the unemployment becomes lower (correspondingly, real wages rise). In contrast, the lower the level of aggregate demand, the more to the left-hand side the L^D curve is located, and thus the higher unemployment becomes (correspondingly, real wages decline). This indicates that the cause of unemployment is not the rigidity of real wages, as the new Keynesian insists, but the shortage of real aggregate demand and labor demand, as Keynes emphasized. This conclusion does not contradict the moderate procyclical property of real wages.[10]

Incidentally, referring to the point of the Shapiro–Stiglitz model, an empirical problem is that the survey evidence is less favorable. Respondents

consistently express little sympathy for the idea that imperfect monitoring and effort on the job are important to their decisions about wages. Therefore, it may be an effective improvement to re-examine the model based on a more valid implication about the determinants of the efficiency wage. The other point concerns the theoretical problems with *bonding* and *job selling* indicated by Carmichael (1985). Regarding these problems, we will examine in a future work.

Finally, this section critically analyzes an empirical study based on RBC models concerning the long-term stagnation of the Japanese economy after the 1990s. The study analyzed the slump of Japan's GDP in the 1990s based on the RBC model. The model uses the given conditions for each path of government expenditure and total factor productivity (TFP) and concludes that the decline in the TFP growth rate in 1990s as a reflection of technical progress can be considered to be the primary cause of the Japanese economy's long-term stagnation The same conclusion has been found not only in Japan but also in many long-term deep recessions around the world. According to our analysis in Section III, however, the price mechanism does not actually function under deflation in the short-run macro economy. Therefore, such a conclusion derived from the RBC model—in which the fully functional price mechanism even in the short-run is a major premise—is unlikely. The decline in the TFP growth rate cannot therefore be identified as the primary cause of the long-term stagnation. Conversely, the long-term slump due to decreases in aggregate demand decreased the TFP growth rate. According to Basu (1996), cyclical variations of TFP measured as a Solow residual are generated not only by technical progress but also by variations in operation rates of capital and labor due to fluctuations in aggregate demand. It is, therefore, misunderstanding to interpret TFP variations as variations in technical progress alone.

Furthermore, subsequent empirical studies have sought to uncover the cause of decline in the Japanese TFP growth rate. However, the primary cause of this

decline remains unclear from these empirical studies. In contrast, empirical studies on the determinants of TFP, which have considered industrial organization, labor markets, and international trade, have not clarified the most important residual problem. This arises from the big question stated above regarding the validity of the RBC theory.

V. Market Failure in the Macro Economy does not Change even in the Long Run: An Inevitable Conjecture from the Short-Run Analysis

Section III, which discussed the short run when only labor was variable, showed that the price mechanism in the macro economy is incomplete. In this section, the results of the short-run analysis support the argument that even in the long run, the price mechanism in the macro economy will not function effectively as in the short run. Hence, we question the validity of the natural rate hypothesis as a likely supposition in long-run analyses. The long run in this study is defined in neoclassical terms. That is, it is assumed that the complete flexibility of wages and prices, the volumes of existence of labor and capital, and production technology are all given.

Figure 8 is a classical long-run equilibrium model presupposing the complete flexibility of W, P, and R (rental price of capital). In the figure, R/P is the real rental price of capital, and $\bar{L}$, $\bar{K}$, and $\bar{Y}$ are the volumes of existence of labor and capital in the long run, and the level of full employment or natural rate of output, respectively. LRAS is the long-run aggregate supply curve in the goods market. The general equilibrium in the classical long-run model is the intersection, E^W, of notional demand and supply equilibrium conditions in the respective goods, labor, and capital markets: $Y^D = \bar{Y}$, $L^D = \bar{L}$, and $K^D = \bar{K}$. The model has, however, the critical problem that it has not considered spillover effects, or derived demand effects among each market under disequilibrium, such as those analyzed in the latter half of Section III. If the model considered those effects among each market under long-run disequilibrium, it could be easily supposed from the results of short-run

analysis that the economy would not be able to attain the general equilibrium, E^W, stated above, at least under deflation.

Therefore, the following supposition holds inevitably in the long-run analysis as an extension of the short-run analysis. Even if W, P, and R are completely flexible in the long run, the price mechanism does not function generally, especially under deflation. Consequently, the natural rate hypothesis and the neutrality of money are not valid.

Basing on this supposition, assuming the complete flexibility of W, P, and R under at least deflation even in the long run will not make inherent sense. Thus, if unemployment and idle equipment exist even in the long run, the cause cannot be attributed to the rigidity of W, P, and R. It can eventually be stated that the cause of factor underemployment lies in the quantitative aspect as well as in the short run, that is, in the shortage of real aggregate demand and therefore labor and capital demand.

At the macro level, the price mechanism is much more incomplete than previously supposed, regardless of whether the short or long run is considered. Therefore, the lack of real aggregate demand—the cause of Keynesian unemployment—will play a critical role even in the long run.

VI. Concluding Remarks

Based on the long-term sluggishness of the Japanese economy for a period exceeding 10 years since the 1990s as well as the recent US and European experiences, a big question was raised concerning prevailing theories of modern macroeconomics in terms of their explanations of the price mechanism and unemployment. Clearly, their view of the price mechanism is exceedingly incomplete in the short-run macro economy and does not function, especially under deflation: market failure in the macro economy. This result is explored utilizing the concept of quantity constraint models of Benassy and Negishi, which analyze spillover effects, or derived demand effects between goods and labor markets essential under disequilibrium, an aspect neglected in

modern macroeconomics.

As a result of the demonstrated market failure in the short-run macro economy and based on reinterpreting the Shapiro–Stiglitz model, we showed the existence of Keynes's unemployment equilibrium. If the price mechanism does not function, then assuming real-wage flexibility does not seem sensible, and thus the cause of involuntary unemployment cannot be attributed to the price aspect, i.e., to the real-wage rigidity, as new Keynesianism claims. Finally, it was shown that the cause of involuntary unemployment lies in the quantitative aspect, that is, in the lack of real aggregate demand and labor demand, as Keynes posited.

If the Shapiro–Stiglitz model, which explains the rigidity of real wages, is re-interpreted—that the shortage of labor demand under rigid real wages is the cause of unemployment—it becomes a powerful model for explaining involuntary unemployment. However, since the model has problems such as lack of supporting survey evidence and *job selling*, a re-examination of old models or creation of a new efficiency wage model is needed.

A DSGE theory such as the RBC model that presupposes the perfect market mechanism even in the short run has major problems as a macrotheory. Therefore, the ability of such a model to contribute to empirical studies on long-term stagnation in Japan and around the world is unlikely.

From the results of the short-run analysis, we suppose inevitably that even in the long run, but not the ultra-long run, the price mechanism would not function, especially under deflation. Consequently, we suggested that the natural rate hypothesis in the long run and the neutrality of money would not be realized.

Based on this supposition, when underemployment of production factors exists even in the long run, it can be stated that the cause lies in the quantitative aspect as well as in the short run: in the shortage of real aggregate demand and therefore labor and capital demand. This suggests that real aggregate demand should play a critical role in the long run as well as in the

short run.

Recent trend tends toward rebuilding the new Keynesian DSGE models. If the fundamental and theoretical problem that the macro price mechanism does not function, however, is not examined, any valid rebuilding would not be realized.

Finally, the suggestion that real aggregate demand should play a critical role in the long run as well as in the short run could potentially significantly impact analytical approaches used by ultra-long-run economic growth theories. Both new Keynesian and neoclassical approaches agree on the point that because full employment is realized in the long run when wages and prices are flexible, economic growth in the ultra-long run is on a path to full employment growth. From the supposition in Section V, however, in the long run with flexible wages and prices, there is no need for full employment to be realized. As Yoshikawa (2000) emphasizes, therefore, even if the supply of production factors determines a growth ceiling, these are not necessarily determinants of economic growth. We consider that the paths of real aggregate demand play an important role even in the process of economic growth.[11]

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Footnotes

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1 See Dimand (2010, 2014) regarding Tobin's Keynesianism.

2 Rebuilding Macroeconomic Theory, *Oxford Review of Economic Policy*, Spring and Summer 2018, 34.

3 The ideas regarding the analytical approaches to the first and second results explicated above are already stated in Kawai (2014). Basic Macroeconomics, Chapter Ⅷ (Column) On the Price Mechanism in Macro Economy, Chapter Ⅸ(Column) On the Cause of Involuntary Unemployment.

4 Mankiw, N. Gregory, *Macroeconomics, 9th ed.*, Worth Publishers, 2016, Part 5, chapter 15.

5 Benassy (1975), Malinvaud (1977), and so forth are other main literature on quantity constraint models.

6 One may object that the consumer, though not constrained in the goods market, is still constrained since the realized profit differs from the expected one. Therefore, this assumption merely serves to simplify the explanation.

7 Specifically, again the consumer is constrained by the fact that the realized profit is different from the expected one, which we ignore for simplicity.

8 Since insider–outsider models seem to have theoretical problems, we will discuss them elsewhere.

9 Since all firms are the same, they choose the same wage. Thus, V_E and V_S do not depend on what firm a worker is employed by.

10 Alexopoulos (2004) considers a model variation where shirkers, rather than being fired, receive a lower wage for some period. By this change, the cost of forgoing a given amount of wage income does not depend on the prevailing unemployment rate. As a result, the no-shirking locus is flat, and the impact of a shift in labor demand falls entirely on employment.

11 See Yoshikawa (2000) pp. 51-54.

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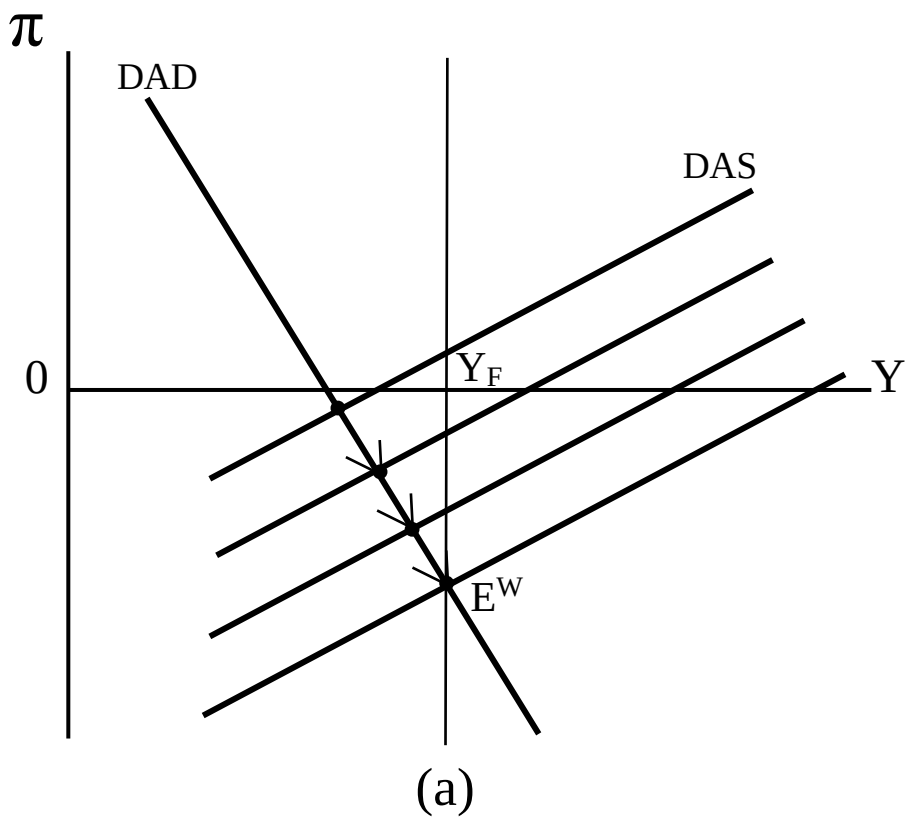
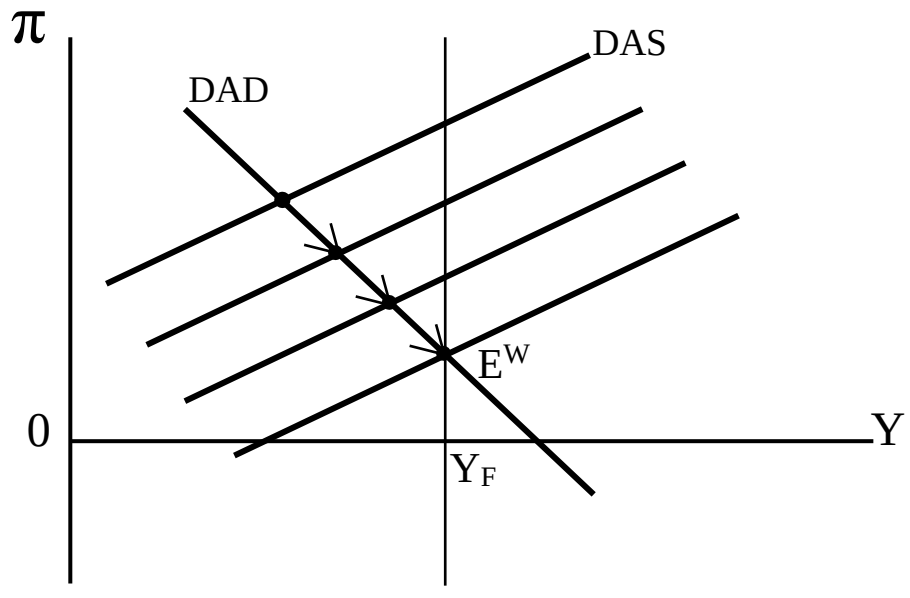
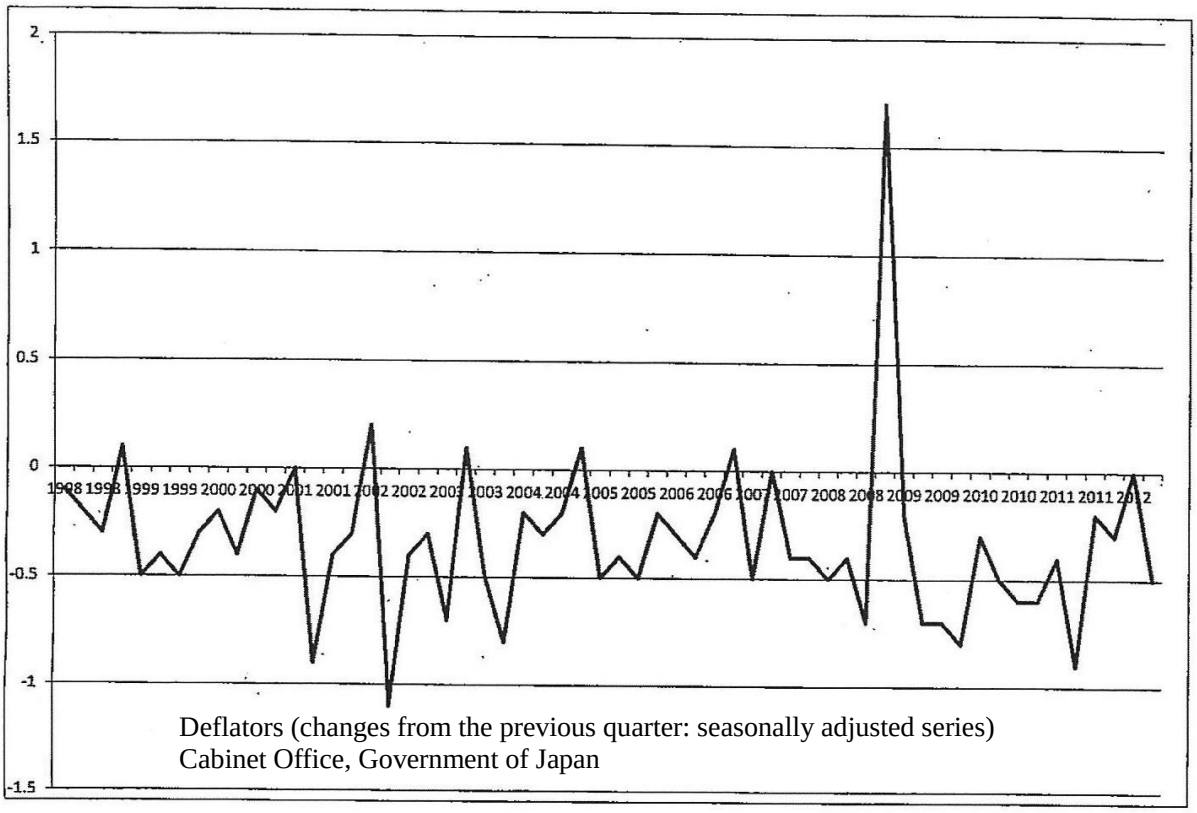


(a)



(b)

FIGURE 1. CONVERGENCE PROCESSES TO THE LONG-RUN EQUILBRIUM E^W IN A DYNAMIC AD–AS MODEL



Deflators (changes from the previous quarter: seasonally adjusted series)
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FIGURE 2. THE RATES OF CHANGE OF THE GDP DEFLATORS

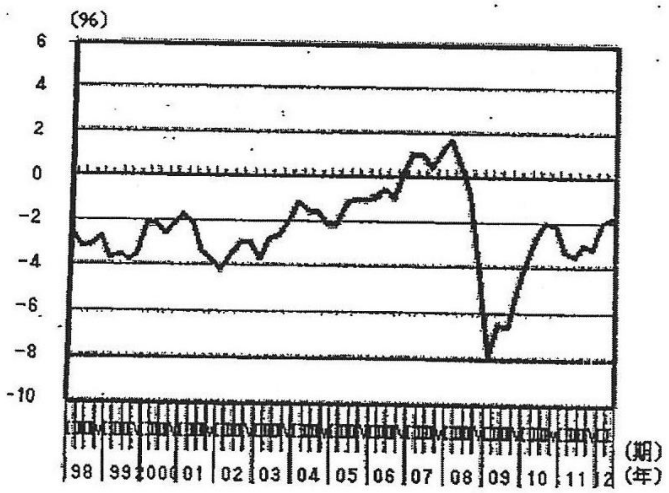

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FIGURE 3. THE TRANSITION OF THE GDP GAPS

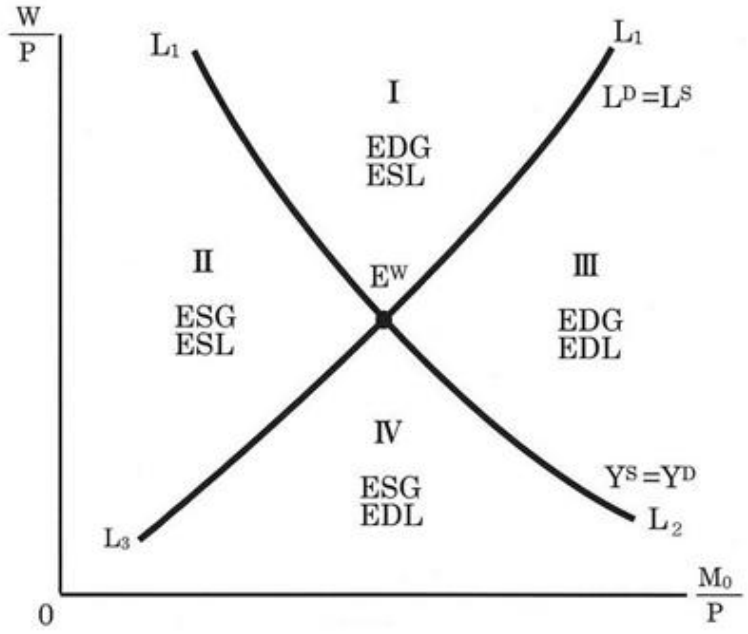

FIGURE 4. GROUPING OF DISEQUILIBRIUM COMBINATIONS OF REAL WAGES AND REAL BALANCE

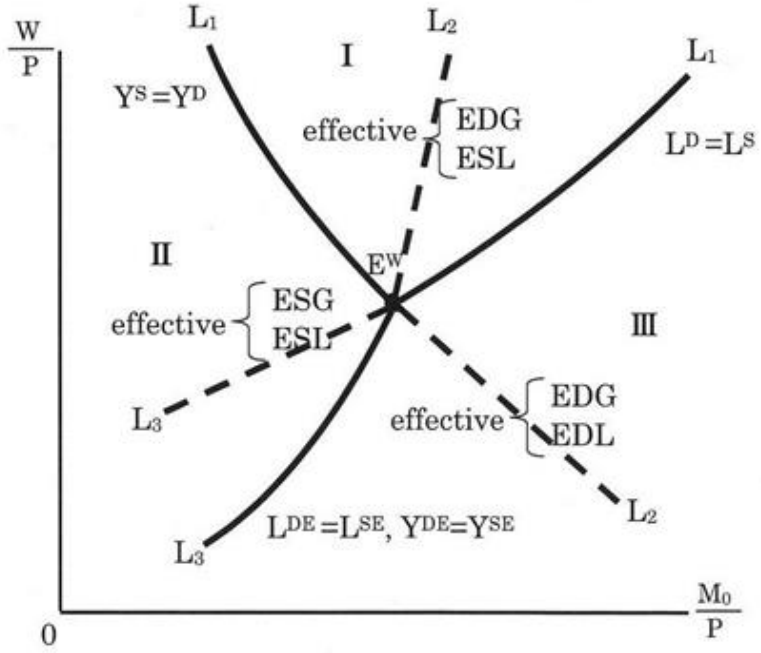

FIGURE 5. GROUPING OF COMBINATIONS OF REAL WAGES AND REAL BALANCE UNDER DISEQUILIBRIUM OF EFFECTIVE SUPPLY AND DEMAND

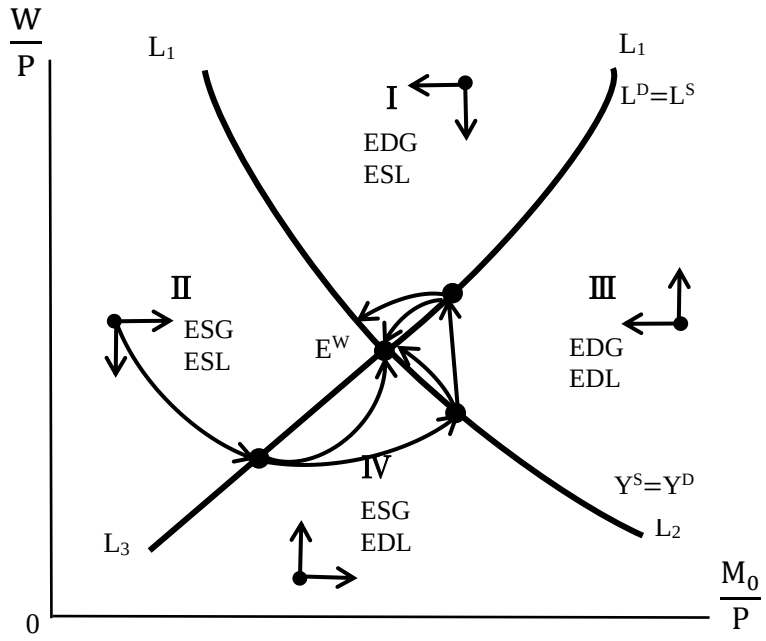

FIGURE 6(a). THE WALRASIAN PRICE MECHANISM STARTING FROM AREA Ⅱ

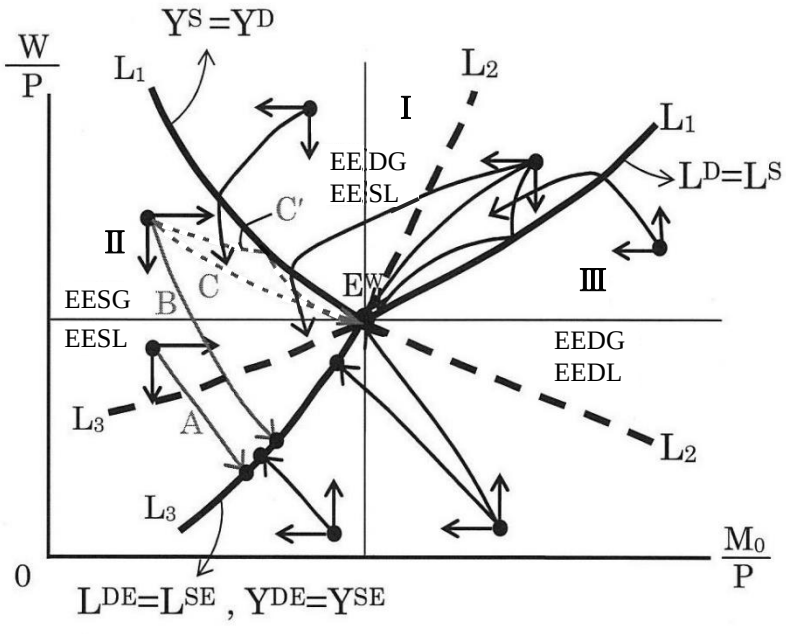

FIGURE 6(b). ADJUSTMENT PROCESSES IN A MACRO ECONOMY TAKING SPILLOVER EFFECTS UNDER DISEQUILIBRIUM INTO CONSIDERATION

c

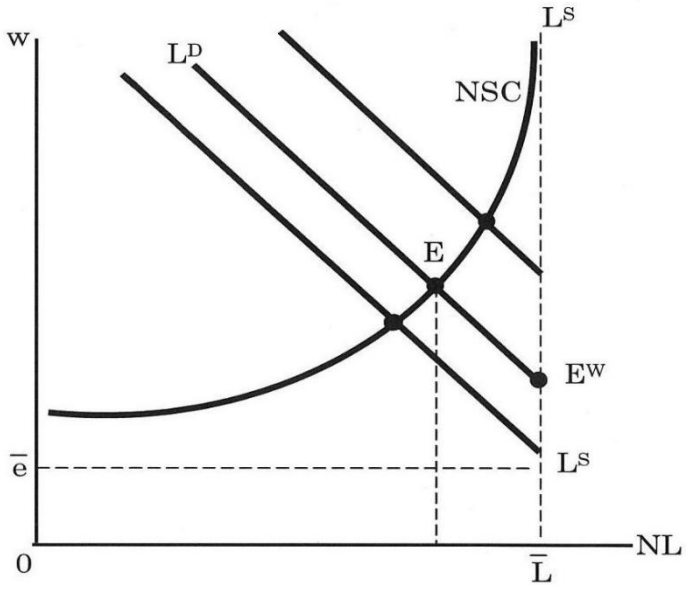

FIGURE 7. THE SHAPIRO–STIGLITZ MODEL

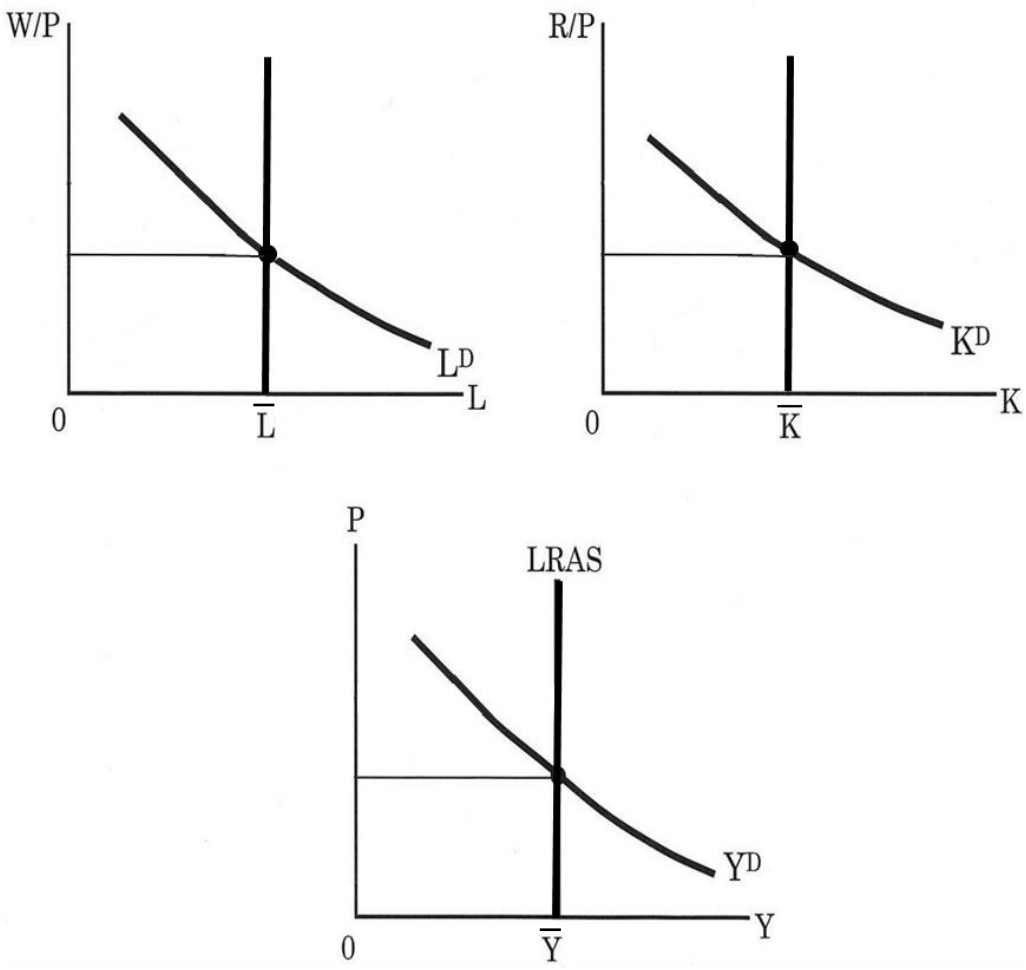

FIGURE 8. A CLASSICAL LONG- RUN EQUILIBRIUM MODEL