

Teaching Keynes's Principle of Effective Demand within the Real Wage vs. Employment Space

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ABSTRACT

This paper reviews several models for teaching Keynes's principle of effective demand with a special focus on a framework that is familiar to advanced undergraduate students of macroeconomics: the real wage vs. employment space. It is argued that existing approaches to teaching Keynes's principle of effective demand reflect a tension between two goals: being true to Keynes and translating the effective-demand principle into a story about real wages and employment within a single graphical space. Our main contribution consists of presenting an extended version of a model originally proposed by Lavoie (2003), which seems to be a reasonable compromise between these two goals.

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1. Introduction

The purpose of this paper is mainly pedagogical. By summarizing existing research, we aim at providing a tool for teaching Keynes's principle of effective demand within a framework that is familiar to advanced undergraduate students of macroeconomics: the real wage vs. employment space. As we will argue, existing approaches to teaching Keynes's principle of effective demand reflect a tension between two goals: being true to Keynes and translating the effective-demand principle into a story about real wages and employment within a single graphical space. Our main contribution consists of presenting an extended version of a model originally proposed by Lavoie (2003), which seems to be a reasonable compromise between these two goals.

In order to be useful for students, this paper must be appealing for instructors. Since there many types of economists and many different topics of interest, we need to target the audience. So, in particular, this paper aims at reaching three categories of colleagues. The first one includes instructors who normally teach the mainstream view of the labour market, either neoclassical or new-Keynesian¹, and want to provide their students with a truly Keynesian view of the basic relationships that characterize the real wage vs. employment space. The second category includes colleagues who do not want that their students experience 'the Farmer's disconnect'². The third one includes heterodox economists who do not dislike equations. More generally, this paper is targeted at economists who apply critical and comparative teaching methods.

Although the use of the real wage vs. employment space as underlying framework implies the acceptance of a number of (not always realistic) assumptions about the way the labour market works, a discussion of these assumptions goes beyond the objective of this paper. Further, since the paper is primarily intended to provide undergraduate students of macroeconomics with an additional learning tool, some more sophisticated matters of theory will inevitably remain

¹ By new-Keynesian, we mean the model based on the intersection between the so-called price-setting equation and the wage-setting curve. This model is briefly discussed in Section 4.

² "It is difficult to read the General Theory without experiencing a disconnect between what is in the book and what one has learned about Keynesian economics as a student. The most egregious misrepresentation is the notion of aggregate demand and supply that we teach to undergraduates and that bears little or no relationship to what Keynes meant by these terms" (Farmer, 2007, p. 20).

uncovered (for example, the ‘Cambridge controversy on capital’ and its implications for the theory of the marginal labour productivity).

To begin with, it is worth stressing that the last fifty years look characterized by a discontinuous effort of translating Keynes’s principle of effective demand into the real wage vs. employment space. Several works by Patinkin (1956), Barro and Grossman (1971), Davidson (1983, 1998), Dalziel and Lavoie (2003) and Lavoie (2003) testify for the interest in this issue. One of the objectives of the existing literature consists of providing a unified, teaching-friendly framework for comparing the standard neoclassical model of the labour market with the theory of employment developed by Keynes (1936).

To briefly review the neoclassical approach, let us label the price level as p , the monetary wage as w and the real production-income level as Y . Further, let us assume that there exists a production function $f(L)$, continuous and twice-differentiable in the employment level L , with $f'(L) > 0$ and $f''(L) < 0$, such that $Y = f(L)$. The standard neoclassical model of the labour market determines real wage and employment level as intersection between two market curves: the labour demand and the labour supply.

There are several ways of constructing these curves. One way is the following. The labour-demand curve, also called notional demand for labour, can be based on the argument that the production sector chooses labour units L by maximizing aggregate nominal profits $\Pi = pf(L) - wL$, i.e. by

equating the real-wage level $\frac{w}{p}$ to the marginal labour-productivity schedule $f'(L)$. For example, if

we assume that $f(L) = L^\varepsilon$ with $\varepsilon \in (0,1)$, then the notional demand for labour is given by $\frac{w}{p} = \varepsilon L^{\varepsilon-1}$

and is downward sloping in the real wage vs. employment space. The labour supply, in the simplest case, can be assumed to be equal to a given amount of labour units, say L_{fe} , and therefore to be a vertical line in the real wage vs. employment space. As we focus on the labour-demand side, the labour supply is assumed to be independent of the real wage in (almost) all the models that are presented in this manuscript.

The remainder of this paper is as follows. Section 2 summarizes the principle of effective demand as typically presented in the basic macroeconomics textbook, i.e. following Samuelson (1948). Section 3 reviews the existing attempts to translate the effective-demand principle into the real wage vs. employment space. Section 4 presents an extended version of a model originally proposed by Lavoie (2003). Section 5 provides a comparative summary of the models presented in the previous two sections, also discussing pedagogical issues.

2. The principle of effective demand in the basic macroeconomics textbook

Let us start from the basic features of the principle of effective demand. We label $(pY)_{fe}$ the aggregate monetary production-income level corresponding to the full-employment level L_{fe} .

A problem of insufficient effective demand arises because the marginal propensity to consume c (the variation in the aggregate monetary consumption expenditure associated with a variation in the aggregate monetary production-income level) is positive and lower than one. The latter condition implies that the amount of aggregate monetary savings S increases as the aggregate monetary production-income level pY increases, for instance according to the equation $S = s(pY)$ where $s = 1 - c$ is the so-called marginal propensity to save of income-recipients. By consequence, as summarized in Figure 1, the monetary production-income level $(pY)_{fe}$ can only be achieved if the aggregate monetary investments are high enough to compensate the lack of effective monetary expenditure due to the formation of the aggregate monetary savings S_{fe} at the monetary production-income level corresponding to the full-employment level L_{fe} . However, in general, the aggregate monetary investments I_0 are not high enough ($I_0 < S_{fe}$), thus causing the formation of unemployment.

Note that the neoclassical theory does not disregard the latter issue. Indeed, it argues that the level of the monetary investments is always equal to S_{fe} because the interest rate guarantees this equality.

In contrast, Keynes argues that the interest rate must be interpreted as the ‘equilibrium price’

between money demand and money supply. Therefore, even assuming that monetary investments are sensitive to the interest rate, there is no general reason to think that the equilibrium interest rate, determined in the money market, is always compatible with a level of monetary investments equal to S_{fe} . This is the link among employment, interest and money that Keynes has probably in mind when he titles his book as The General Theory of Employment, Interest, and Money.

Samuelson's model

The simplest representation of Keynes's principle of effective demand, outside the real wage vs. employment space, is well known to students of macroeconomics and is based on a famous work by Samuelson (1948). The nominal aggregate demand is given by:

$$(1) \quad AD = C + I_0$$

where $C = c(pY)$ is monetary consumption expenditure, $c \in (0,1)$ is a given marginal propensity to consume and I_0 is a given monetary investment expenditure, by assumption lower than S_{fe} .

The nominal aggregate supply is, instead, given by:

$$(2) \quad AS = pY.$$

Then, as described in Figure 2, the equilibrium between AD and AS determines a unique level of maximum nominal production-income $(pY)^* = \frac{I_0}{1-c}$, which is generally lower than $(pY)_{fe}$. Note that, unless the parametric conditions of the aggregate demand (namely c and I_0) change, a nominal production-income level greater than $(pY)^*$ cannot be achieved because any situation where the nominal aggregate supply AS is higher than the nominal aggregate demand AD cannot be an equilibrium situation.

Further, let us assume that the production sector hires labour units according to the profit-maximization equality between real wage and marginal labour productivity, i.e. $\frac{w}{p} = \varepsilon L^{\varepsilon-1}$. Note

that one can write the latter condition as $\frac{w}{p} = \varepsilon \frac{L^\varepsilon}{L}$ or, alternatively, as $L = \frac{\varepsilon p Y}{w}$, meaning that the

equilibrium nominal production-income $(pY)^*$ allows employing $L^* = \frac{\varepsilon(pY)^*}{w}$ individuals, a

number of people that is generally lower than the number of people looking for a job L_{fe} , as shown

in Figure 2. So, the fact that $I_0 < S_{fe}$ determines the formation of unemployment in the amount of

$L_{fe} - L^*$.

To conclude, it is worth stressing that the principle of effective demand is meaningless if the marginal propensity to consume is assumed to be equal to one. If this is the case, the monetary consumption expenditure is equal to the monetary production-income, i.e. $C = pY$, there are no monetary savings ($S = 0$) at every production-income level including $(pY)_{fe}$, no one dollar is left to be spent in investment goods ($I_0 = 0$), and the nominal aggregate demand $AD = C + I_0 = pY$ coincides with the nominal aggregate supply $AS = pY$ at every level of nominal production-income. Hence, every level of nominal production-income can be potentially achieved including the one corresponding to the full-employment level.

3. The principle of effective demand within the real wage vs. employment space

This section reviews the major contributions of the literature that tries to transfer Keynes's principle of effective demand from the standard Samuelson's space (in Figure 2) to the real wage vs. employment space. Since there are many different equilibrium values in the paper, we adopt the strategy of marking equilibrium values with both a star and a number. The number refers to a specific model. Particularly, we distinguish among five different models: 1) the Patinkin-Barro-Grossman's model, 2) the Davidson's model, 3) the Lavoie's model, 4) the extended Lavoie's

model, 5) the Kaleckian version of the extended Lavoie's model. The last two models are presented in Section 4 and constitute our main contributions to the teaching of Keynes's principle of effective demand within the real wage vs. employment space. Apart from the Patinkin-Barro-Grossman's model, all the other models presented in this manuscript either belong or are aimed to belong to the so-called post-Keynesian tradition which provides, in our view, the most appropriate translation of Keynes's ideas into the modern macroeconomic theory. Indeed, as we will argue in the next subsection, the Patinkin-Barro-Grossman's model involves a problematic interpretation, or even a misinterpretation, of the original Keynes's view.

Patinkin-Barro-Grossman's model

One of the first attempts of translating the principle of effective demand into the real wage vs. employment space is due to Patinkin (1956). Following the analysis of Patinkin, as summarized by Barro and Grossman (1971), the principle of effective demand translates into a labour-demand curve formed by two parts, as in Figure 3: a downward-sloping part, corresponding to the marginal labour-productivity schedule (MLP), and a vertical part intersecting the horizontal axis at the employment level L^* , as determined in the previous section.

Formally, this labour-demand curve is derived by assuming that the production sector maximizes monetary profits under the constraint that the monetary aggregate supply cannot exceed the monetary aggregate demand, i.e. the production sector solves the following problem:

$$\begin{aligned}
 & \text{Max } \Pi = pf(L) - wL \\
 & L \\
 (3) \quad & \text{s.t } AS \leq AD
 \end{aligned}$$

From an economic point of view, problem (3) means that the production sector hires labour units according to the profit-maximization rule $\frac{w}{p} = f'(L)$ until $L < L^*$ because the goods-market

constraint is not binding ($AS < AD$). However, at $L = L^*$, the constraint becomes binding ($AS = AD$) and the production sector cannot hire additional labour units because additional workers (or working hours) would imply additional production remaining unsold.

The equilibrium levels of employment and real wage, in the Patinkin-Barro-Grossman's model, are determined by the intersection between the labour demand and an upward-sloping labour supply, as shown in Figure 3. Let us label the equilibrium level of employment as L_1^* and the equilibrium level of the real wage as ω_1^* .

Note that, if the labour-supply schedule shifts towards right as in Figure 3, then the equilibrium employment becomes L^* and the equilibrium real wage becomes ω^* , i.e. it is not equal to the marginal labour productivity at L^* . Further, if the labour supply is assumed to be independent of the real wage and is modelled as a vertical line at the full-employment level L_{fe} , then the equilibrium employment is given by L^* and the excess of the labour supply pushes the equilibrium real wage down to the real value of the minimum wage.

It is worth stressing that the role played by the labour supply in determining the equilibrium levels of employment and real wage within the Patinkin-Barro-Grossman's model is closer to the neoclassical tradition than to the truly Keynesian one. In addition, the fact that the model admits the possibility of an equilibrium, say (ω^*, L^*) , where the real wage is not equal to the marginal labour productivity is at odds with the original Keynes's view.

Consistently with the true spirit of the Keynesian tradition, all the models of the next subsections and the models of Section 4 do not see any specific role played by the labour-supply curve in determining the equilibrium levels of employment and real wage, and, besides the Kaleckian version of the extended Lavoie's model, all of them consider that the real wage is equal to the marginal labour productivity.

Davidson's model

Davidson (1983, 1994, 1998), one of the fathers of the post-Keynesian tradition, closely follows the arguments that Keynes proposes in the Chapter 3 of The General Theory. This paper does not present Keynes's original view but the Davidson's model is a very good approximation of what is actually written in The General Theory.

In order to present the analysis of Davidson, let us again label the monetary wage as w and assume that the production function of the economy is specified as $f(L) = L^\varepsilon$ with $\varepsilon \in (0,1)$. Then, the level of employment is determined by the intersection, the so-called point of effective demand, between the real aggregate demand, expressed in units of money wages, i.e.:

$$(4) \quad \frac{AD}{w} = \frac{1}{w} cpL^\varepsilon + \frac{1}{w} I_0$$

and the real aggregate supply, also expressed in units of money wages³, i.e.:

$$(5) \quad \frac{AS}{w} = \frac{1}{\varepsilon} L .$$

Equation (4) is easily derived by (1). Indeed, expression (1) can be written as $AD = cpY + I_0$ which is equivalent to $AD = cpf(L) + I_0$, i.e. to $AD = cpL^\varepsilon + I_0$. Hence, dividing both sides by the nominal wage w , we get (4).

Equation (5), instead, is derived by the profit-maximization equality between price and marginal cost, i.e. $p = \frac{w}{\varepsilon L^{\varepsilon-1}}$, combined with (2). Specifically, $p = \frac{w}{\varepsilon L^{\varepsilon-1}}$ is equivalent to $pY = \frac{wY}{\varepsilon L^{\varepsilon-1}}$, which

³ Measuring a given nominal amount in units of money wages simply means dividing this nominal amount by the nominal wage rate w . The result is the real amount of labour units (either workers or working hours) that can be bought by a given monetary expenditure.

is in turn equal to $AS = \frac{wL^\varepsilon}{\varepsilon L^{\varepsilon-1}}$ and finally to $\frac{AS}{w} = \frac{1}{\varepsilon} \frac{L^\varepsilon}{L}$. Since L^ε cancels out, the latter expression becomes equal to (5).

The equality between (4) and (5) determines a unique equilibrium employment L_2^* in Figure 4, which does not necessarily coincide with the full-employment level L_{fe} .

As depicted in Figure 4, the real-wage level associated with L_2^* is determined by the marginal labour-productivity schedule, or the competitive market equilibrium curve (CMEC) as Davidson labels it, which gives the real-wage level implied by the level of employment determined by the point of effective demand, i.e. $\omega_2^* = \varepsilon(L_2^*)^{\varepsilon-1}$ where $\omega = \frac{w}{p}$ is the real-wage level. Note that this

real-wage determination rule comes implicitly from the construction of the real aggregate supply, which starts from the equality between price and marginal cost and, therefore, from the equality between real wage and marginal labour productivity.

Lavoie's model

Building on Davidson, Lavoie (2003) points out⁴ that the quantity of labour and the real wage, associated with the point of effective demand, can be simply determined by the intersection between the so-called notional demand for labour (NDL), i.e. the marginal labour-productivity schedule (MLP), given by:

$$(6) \quad \omega = f'(L)$$

and the so-called effective demand for labour (EDL), given by $f(L) = \omega L + A$ or:

⁴ We follow the presentation of Lavoie (2003), which is very similar to the presentation of Dalziel and Lavoie (2003).

$$(7) \quad \omega = \frac{f(L) - A}{L}$$

where A is real autonomous expenditure. Let us refer to the equilibrium pair of the Lavoie's model in Figure 5 as ω_3^* and L_3^* .

Expression (6), the notional demand for labour, is the standard profit-maximization condition stating that the real wage equals the marginal labour productivity. It is derived by assuming that the production sector optimally chooses the quantity of labour by maximizing nominal profits $\Pi = pf(L) - wL$ with respect to L .

Expression (7), the effective demand for labour, is derived by equating the aggregate supply in nominal terms $AS = pf(L)$, in turn derived by (2), to the aggregate demand in nominal terms, given by:

$$(8) \quad AD = wL + pA.$$

To make the model as simple as possible, Lavoie (2003, p. 169) assumes that the nominal aggregate demand (8) is made up of only two components: nominal wages (wL), which are entirely consumed (the propensity to consume out of wages is equal to one), and nominal autonomous expenditures (pA), which cover both investments (I_0) and consumption out of profits.

The aggregate demand (8) is therefore derived by (1) under the following three assumptions:

$$(A1) \quad C = C_w + C_\pi$$

$$(A2) \quad C_w = wL$$

$$(A3) \quad C_\pi + I_0 = pA$$

where C_w is the nominal consumption expenditure of wage-earners and C_π is the nominal consumption expenditure of profit-earners.

Note that, while assumption (A1) is a simple definition, (A2) is a behavioural equation stating that wage-earners do not save. Although less obvious than (A1), (A3) is also a definition stating that there are only two components of the aggregate nominal autonomous expenditure. One component is given by the consumption expenditure of profit-earners, which is not explicitly modelled (i.e. it is not modelled as a behavioural equation). All these assumptions guarantee that, in equilibrium, the nominal autonomous expenditures are equal to the aggregate nominal profits, i.e. that $AD = AS$ implies $pA = \Pi$. To see the latter, it is enough to note that, following Lavoie, $AD = AS$ implies $wL + pA = wL + \Pi$ because $AD = wL + pA$ and $AS = pY = wL + \Pi$. Therefore, in equilibrium, we obtain the famous Kaleckian dictum that “capitalists earn what they spend, and workers spend what they earn”. The next subsection examines a more-general Keynesian case where workers are allowed to save and the consumption function of profit-earners is explicitly modelled.

Under the additional assumption that $f(L) = L^\varepsilon$, the equilibrium pair of the Lavoie’s model is given by:

$$(9) \quad L_3^* = \left(\frac{A}{1-\varepsilon} \right)^{\frac{1}{\varepsilon}} \quad \text{and} \quad \omega_3^* = \varepsilon (L_3^*)^{\varepsilon-1},$$

meaning that the employment level is determined by the level of real autonomous expenditure A and by the labour elasticity of production ε .

From a pedagogical point of view, the Lavoie’s framework is useful because it allows to easily show that an increase in the real amount of autonomous expenditure A changes the location of the effective demand for labour (7) without modifying its shape. Particularly, the effective demand for labour shifts downward and intersects the notional demand for labour in a new point of effective

demand characterized by higher employment and lower real wage. Therefore, one can easily predict the labour-market effects of variations in the real autonomous expenditure, as defined by Lavoie.

In addition to the latter feature, the extended Lavoie's model proposed in the next section also allows to predict the labour-market effects of a change in the propensity to save (consume) of income-recipients, which is interesting and important for two main reasons: first, as discussed in Section 2, the principle of effective demand is meaningless if the marginal propensity to consume c of income-recipients is equal to one (i.e. the marginal propensity to save s is zero); second, as Figure 2 helps to show, variations of the propensity to consume (save) affect the slope of the nominal aggregate demand AD and imply variations of the nominal production-income level $(pY)^*$ as well as variations of the employment level L^* .

4. An extension of the Lavoie's model

This section contributes to the existing literature in two ways. On the one hand, we present an extended version of the Lavoie's model that takes into account the labour-market effects of variations in the marginal propensities to consume of different types of income-recipients. On the other hand, we propose a Kaleckian version of the extended Lavoie's model that allows a comparison with the textbook new-Keynesian model of the labour market (see Blanchard, 2000).

Extended Lavoie's model

Using expression (1) and Lavoie's assumption (A1), the nominal aggregate demand can be written as follows:

$$(10) \quad AD = C_w + C_\pi + I_0.$$

In contrast with Lavoie's assumption (A2), we assume that wage earners do not entirely consume their salaries and that $c_w \in (0,1)$ is their marginal propensity to consume. In addition, we explicitly

model the consumption behaviour of profit-earners by the function $C_\pi = c_\pi \Pi$ where $c_\pi \in (0,1)$ is marginal propensity to consume of profit-earners. Hence, using (10), we get the following general version of the nominal aggregate demand $AD = c_w wL + c_\pi \Pi + I_0$ which in turn can be written as follows:

$$(11) \quad AD = (1 - s_w)wL + (1 - s_\pi)\Pi + I_0$$

where $s_w = 1 - c_w$ is the propensity to save of wage-earners and $s_\pi = 1 - c_\pi$ is the propensity to save of profit-earners. It is worth stressing that expression (11), based on Mott and Slattery (1994), is not disregarded by Lavoie (2003, footnote 1), although not fully explored.

By equating (11) to the nominal aggregate supply $AS = pY$ and using the definition of production function $Y = f(L)$, we obtain a general version of the effective demand for labour $pf(L) = (1 - s_w)wL + (1 - s_\pi)\Pi + I_0$, which can be re-written as follows:

$$(12) \quad \omega = \frac{s_\pi f(L) - \zeta_0}{(s_\pi - s_w)L}$$

where $\zeta_0 = \frac{I_0}{p}$ is real investment expenditure.

Expression (12) provides the locus of all the combinations of real wage and employment associated with the equilibrium in the market for goods. Regarding the shape of the effective demand for labour, let us again assume, for example, that $f(L) = L^\varepsilon$. Then, as depicted in Figure 6, the effective

demand for labour (EDL) reaches its maximum at $L = \left[\frac{\zeta_0}{(1 - \varepsilon)s_\pi} \right]^{\frac{1}{\varepsilon}}$, being upward-sloping for

$L < \left[\frac{\zeta_0}{(1 - \varepsilon)s_\pi} \right]^{\frac{1}{\varepsilon}}$ and downward-sloping for $L > \left[\frac{\zeta_0}{(1 - \varepsilon)s_\pi} \right]^{\frac{1}{\varepsilon}}$. Further, it is easy to show that that

every point in the area below the effective demand for labour is characterized by excessive supply ($AS > AD$), while every point in the area above is characterized by excessive demand ($AS < AD$). The intersection between the effective demand for labour (12) and the notional demand for labour (6) gives the point of effective demand, i.e. the following pair:

$$(13) \quad L_4^* = \left[\frac{\zeta_0}{(1-\varepsilon)s_\pi + \varepsilon s_w} \right]^{\frac{1}{\varepsilon}} \quad \text{and} \quad \omega_4^* = \varepsilon(L_4^*)^{\varepsilon-1} .$$

It can be easily shown that $\frac{\partial \omega_4^*}{\partial L_4^*} < 0$, $\frac{\partial L_4^*}{\partial \zeta_0} > 0$, $\frac{\partial L_4^*}{\partial s_\pi} < 0$ and $\frac{\partial L_4^*}{\partial s_w} < 0$. Hence, an increase in the real autonomous investment expenditure, an improvement of the ‘animal spirits’ of entrepreneurs, increases the employment level and decreases the real wage, while an increase in the propensity to save of either wage-earners or profit-earners decreases the employment level and increases the real-wage level.

Figure 6 provides a useful framework for a comparison between the theory of employment developed by Keynes and the standard neoclassical theory. The labour-market equilibrium, in the neoclassical model, is given by the intersection between the notional demand for labour and the labour-supply schedule, which is assumed to be vertical for sake of simplicity. This intersection determines the real-wage level ω_{fe} as well as the level of employment L_{fe} , which is characterized by the absence of unemployment. The formation of unemployment $L_{fe} - L_4^*$ is, instead, a specific feature of the Keynesian point of effective demand, given by the intersection between the notional demand for labour and the effective demand for labour.

Note that the formation of unemployment in this type of Keynesian model does not rely on any assumption of wage rigidity (neither nominal nor real), in contrast to what is often claimed about Keynesian models.

Finally, it is worth noting that the extended Lavoie's model is a good example of how world views shape analyses and policies. As stressed by Knoedler and Underwood (2003, p. 714), there are many types of economists who do not agree on many things. This disagreement reflects the fact the economic theory is not 'value-free' and that ideology affects analyses and conclusions. Different world views and different models predict different outcomes of the same policy. As a matter of example, let us consider Figure 6 and suppose that a policy stimulating the labour supply is implemented. In a neoclassical-type model, a shift towards right of the labour-supply schedule would increase the employment level and decrease the real-wage level. In contrast, in the extended Lavoie's model, such policy would increase the unemployment level without affecting the real-wage level. Another example of what Knoedler and Underwood (2003) call the values-vision-analysis-policy nexus is provided in the next subsection (opposite employment effects of the same increase in the average labour productivity in two different models).

Kaleckian version of the extended Lavoie's model

The last model of this section is more Kaleckian than Keynesian because the hypothesis, made by Keynes (and by the neoclassical approach), that the real wage equals the marginal labour productivity is abandoned. However, it still relies on Keynes's principle of effective demand and therefore belongs to the relevant literature that is summarized in this paper. Specifically, the model is a Kaleckian version of the extended Lavoie's model, mainly inspired by Harris (1974) and Asimakopulos (1975).

The real wage is fully determined through the so-called mark-up pricing rule $p = \frac{w}{\alpha}(1 + \mu)$, where α is the average productivity of labour and μ is a given mark-up⁵. Therefore, the level of the real wage is given by the following expression (MPR):

⁵ If total costs TC are given by salaries wL plus non-labour costs rK , i.e. $TC = wL + rK$, then the average output cost is given by $\frac{TC}{Y} = \frac{w}{\alpha}(1 + \eta)$ where $\eta = \frac{rK}{wL}$ is the share of non-labour costs over labour costs. Note that a sufficiently

$$(14) \quad \omega = \frac{\alpha}{1 + \mu}$$

and is independent of the employment level.

The second part of the model is based on the effective demand for labour (12), which, under the assumption that the production function of the economy is $f(L) = \alpha L$, becomes:

$$(15) \quad \omega = \frac{\alpha s_{\pi}}{s_{\pi} - s_w} - \frac{\zeta_0}{L(s_{\pi} - s_w)} .$$

If we assume that $s_{\pi} > s_w$, then expression (15) is upward-sloping in the real wage vs. employment space and can be depicted as in Figure 7. Note that the real-wage level in (15) becomes asymptotic to $\frac{\alpha s_{\pi}}{s_{\pi} - s_w}$ as L tends to infinity.

The equilibrium of the model is simply given by the intersection between the MPR (14) and the EDL (15). A unique equilibrium employment always exists provided that the condition of $\mu \geq 0$ holds. Indeed, the curve implied by (15) becomes asymptotic to (14) as μ converges to $-\frac{s_w}{s_{\pi}}$,

which never happens to the extent that μ is a non-negative number.

In addition, there is no general reason for the unique equilibrium to be characterized by full employment. If, for simplicity, we consider a rigid labour supply L_{fe} as in Figure 7, we can note that a full employment position may not be reached to the extent that the mark-up is non-negative. For instance, if we consider the minimum mark-up case, $\mu = 0$, then the equilibrium real wage ω_5^* is equal to a given labour-productivity level α . However, it is still possible that ω_{fe} is higher than

high mark-up, higher than η , guarantees a positive profit per unit of real output because $\mu > \eta$ implies $p > \frac{TC}{Y}$. So, the mark-up level can be divided in two components: a cost-recovering component η and a pure profit margin λ , such that $\mu = \eta + \lambda$.

α and, therefore, higher than ω_5^* . If the case is the latter, then the equilibrium employment L_5^* is lower than L_{fe} .

By combining (14) and (15) as in Figure 7, the equilibrium employment is given by the following expression:

$$(16) \quad L_5^* = \frac{\zeta_0(1+\mu)}{\alpha(\mu s_\pi + s_w)}$$

where $\frac{\partial L_5^*}{\partial \zeta_0} > 0$, $\frac{\partial L_5^*}{\partial s_w} < 0$, $\frac{\partial L_5^*}{\partial s_\pi} < 0$, $\frac{\partial L_5^*}{\partial \mu} < 0$ and finally $\frac{\partial L_5^*}{\partial \alpha} < 0$.

The model suggests that an increase (decrease) in the equilibrium employment, due to either an increase (decrease) in the autonomous real investment expenditure or a decrease (increase) in the propensities to save, does not imply a change in the equilibrium real wage, which is an interesting result, consistent with some existing empirical evidence (Kniesser and Goldsmith, 1987, p. 1258).

As in the standard new-Keynesian framework, a decrease in the mark-up level increases both the equilibrium employment and the real wage. However, unlike the standard new-Keynesian model, an increase in the average labour productivity does not determine an increase in the employment level. Specifically, a labour-productivity rise causes a decrease in the employment level. This non-orthodox result is due to the fact that, in a Kaleckian-type model, a labour-productivity increase affects both the MPR schedule, the price-setting curve in the new-Keynesian terminology, and the effective demand for labour. The latter is disregarded by the new-Keynesians who replace it with the so-called wage-setting curve, which is upward-sloping in the real wage vs. employment space and is independent of the labour-productivity level. Therefore, a labour-productivity rise just determines an equilibrium shift along the wage-setting curve, increasing both employment and real wage (see Blanchard, 2000, p. 119)⁶. In summary, we have another example of the values-vision-

⁶ Note that the MPR schedule shifts upward if the average labour productivity increases.

analysis-policy nexus advocated by Knoedler and Underwood (2003): opposite employment effects of the same increase in the average labour productivity due to different world views.

Another interesting point is about the effect of money-wage reductions on the employment level. A decrease in the nominal-wage level, if α and μ do not change, proportionally decreases the price level, and the real-wage level remains unchanged. Hence, the MPR schedule in Figure 7 does not shift. Therefore, the issue is whether or not the EDL curve shifts and, if it does, how it does. Putting it differently, the question is whether or not a money-wage reduction, involving a price reduction, affects the variables that can shift the EDL curve. The answer is that no one can a-priori say if and

how these variables change. For instance, let us consider $\zeta_0 = \frac{I_0}{p}$. It may seem that the real-

investment level increases because the price level (p) decreases. However, Keynes suggests that a money-wage reduction may have negative consequences on monetary investments (I_0) because a lower price level implies a higher real burden of existing entrepreneurs' debts (entrepreneurs are typically borrowers) and because a situation of social tension due to wage-earners' discontent may depress the 'animal spirits' of entrepreneurs. So, at the end of the story, ζ_0 may even decrease rather than increase. This argument supports the Keynesian claim that money-wage reductions may not increase the employment level⁷.

An additional note is about the equilibrium production, which can be derived by using (16) and the production function $Y = f(L) = \alpha L$. After some simple algebra, the equilibrium production turns out to be the following one:

$$(17) \quad Y_5^* = \frac{1 + \mu}{\mu s_\pi + s_w} \zeta_0$$

⁷ Note that the argument that a money-wage reduction does not necessarily imply an employment increase, proposed by Keynes in the famous Chapter 19 of The General Theory, is more complex than the one presented above for several reasons including the fact that Keynes does not use a mark-up pricing rule. A discussion of this issue within the framework proposed by Dalziel and Lavoie (2003) can be found in Andini (2006).

where $\frac{1+\mu}{\mu s_{\pi} + s_w}$ is a non-standard expression for the Keynesian multiplier. Note that, by assuming

$s_{\pi} = s_w = s$, we obtain the standard Keynesian multiplier $\frac{1}{s}$.

5. Discussion

Some Keynesian purists may disagree with the argument that the principle of effective demand can be taught using the real wage vs. employment space as underlying framework. We share the view that the best way for teaching Keynes's theory of employment consists of using The General Theory as main textbook reference for students, although this exercise is unlikely to be an appropriate exercise at undergraduate level.

Table 1 provides a simple comparative analysis of the five models presented in the previous sections. The analysis is based on five Keynesian criteria, i.e. five features that, in our view, Keynes would like to see in a model on his principle of effective demand.

Note that the best model is the one proposed by Davidson, partly because the author is more concerned about being consistent with the original Keynes's view than with translating the effective-demand principle into the real wage vs. employment space. It is even likely that Davidson would question the relevance of the latter exercise, even from a pedagogical point of view.

Anyway, provided that an instructor has an interest in comparing the standard neoclassical theory with the theory of employment developed by Keynes within the standard neoclassical space, which is the starting point of both this paper and an article by Dalziel and Lavoie (2003), the extended Lavoie's model looks the most appropriate model among those presented in this manuscript.

Finally, it is worth stressing that the Kaleckian version of the extended Lavoie's model provides a useful framework for comparing another mainstream approach, the new-Keynesian theory of employment, with a less orthodox view of the labour market, the Kaleckian one. Although the abandon of the equality between real wage and marginal labour productivity implies a lower degree

of consistency with the Keynes's original view, it also implies a step towards a more realistic representation of the labour market as characterized by imperfect, rather than perfect, competition.

Because of the level of sophistication of the analysis, this paper should not be recommended in introductory-level courses. It is likely to be a useful reading for undergraduate students of economics with some knowledge of derivatives and optimization.

The material can be thought in an advanced undergraduate course in macroeconomics. Particularly, it can be used to present the post-Keynesian view of the labour market to students who are already familiar with both the basic neoclassical view (notional demand for labour and labour-supply schedule) and the new-Keynesian one (price-setting equation and wage-setting equation). Because of the emphasis on the labour market, the material can also be used in an advanced undergraduate course in labour economics. Finally, the manuscript is suitable for use, at graduate level, in a specific course on Keynes's principle of effective demand.

Although the paper follows the post-Keynesian tradition (it is built upon earlier works by Lavoie), not all post-Keynesians may like it. One reason is that there is an open debate on what post-Keynesianism is and who is post-Keynesian⁸ (for instance, Davidson argues that Lavoie is not post-Keynesian). Another reason is that the manuscript aims at reaching a broader audience than the post-Keynesian one. Indeed, as stressed in Section 1, the paper has been primarily written to be useful for mainstream economists who do not really know what is actually written in The General Theory (the audience is likely to be large) and therefore are prone to accept the Patinkin-Barro-Grossman's (mis)interpretation of the labour demand (and, very often, the Hicks's synthesis of the whole Keynes's book). Hopefully, the paper will help open-minded mainstream instructors to bring true heterodox insights into mainstream models of the labour market, thus strengthening students' critical and comparative skills.

A relatively long list of concepts can be thought using this paper as baseline reference. First of all, Section 1 reviews the neoclassical model of the labour market and derives the so-called notional

⁸ See King (2005), Davidson (2005) and Lavoie (2005).

demand for labour (NDL). In equilibrium, it can be shown that a shift towards right of the labour-supply function increases the employment level. Every level of employment can be potentially achieved by appropriately expanding the labour supply of the economy, including the full-employment level.

Section 2 explains why monetary savings must be seen as lack of effective demand and underlies the importance of the level of monetary investments. A level of monetary investments lower than the level of full-employment monetary savings implies that the nominal production level is lower than the full-employment level (see Figure 1). The Samuelson's model in Section 2 clarifies that, given the aggregate propensity to save (consume) of the economy, a rise in monetary investments increases the nominal production level and so the employment level (see Figure 2).

In the neoclassical model, monetary investments are always equal to full-employment monetary savings because the interest rate guarantees this equality (the so-called Say's law). Keynesians reject this view by arguing that the interest rate is determined in the money market (equilibrium between money demand and money supply) and that monetary investments do not really react to the changes in the interest rate. Other, more important factors affect the level of monetary investments, including psychological factors such as the 'animal spirits' of entrepreneurs.

Section 3 presents the Patinkin-Barro-Grossman's view of the labour demand and highlights the important role played by the labour-supply schedule in determining the employment level (see Figure 3). The latter is an important analogy with the neoclassical model and is inconsistent with the original Keynes's view (according to which the labour-supply function does not play any role in determining the employment level). In addition, it is shown that the equilibrium real wage can be outside the marginal labour-productivity schedule, which is also inconsistent with the original Keynes's view (see Figure 3).

The Davidson's model, in Section 3, clarifies how to measure nominal quantities in units of money wages, the unit measure used by Keynes in The General Theory, and determines the so-called point of effective demand as intersection between the aggregate demand curve and the aggregate supply

curve, both measured in units of money wages, i.e. both functions of the aggregate employment level (see Figure 4).

The Lavoie's model, in Section 4, introduces students to a new and important concept, the so-called effective demand for labour (EDL), although its construction is based on the restrictive assumption that wage-earners do not save and the consumption function of profit-earners is not explicitly modelled. The Lavoie's model allows instructors to elaborate on the employment effects of changes in both labour elasticity of production and real autonomous expenditure, defined as real autonomous investments plus consumption out of profit.

The extended Lavoie's model, in Section 4, provides a generalized version of the EDL (see Figure 6) and allows students to clearly distinguish between a Keynesian-type equilibrium with involuntary unemployment (intersection between the NDL and the EDL) and a neoclassical-type equilibrium characterized by full employment (intersection between the NDL and the labour-supply function). Unlike the basic Lavoie's model, it also allows to analyze the employment effects of variations in the marginal propensity to save (consume) of both wage-earners and profit-earners. Finally, it clarifies the employment effect of real investments, independently of real consumption out of profit.

The Kaleckian version of the extended Lavoie's model, in Section 4, reviews the mark-up pricing rule, i.e. the basic price-setting equation of the standard new-Keynesian model, and provides the analytical form of the EDL when the average productivity of labour is assumed to constant (see Figure 7). It shows that a unique equilibrium employment exists if the mark-up level is non-negative and that money-wage changes do not necessarily imply employment changes. Finally, it highlights the employment effects of variations in both the mark-up level and the average labour-productivity level, underlying the differences with the standard new-Keynesian approach to imperfect competition. A non-standard version of the Keynesian multiplier is also presented.

To summarize, Table 1, commented above, stresses that the Davidson's model is the closest to the original Keynes's view while the Patinkin-Barro-Grossman's model is the most distant.

From an economic-policy point of view, several interesting concepts can be thought. Although, for reasons of space, the paper does not cover the role that the Government and other institutions (such as the Central Bank) can play in supporting employment (which is material for an entire new paper), we wish to provide a short list of teachable policy insights: depressing the ‘animal spirits’ of entrepreneurs is not employment beneficial; increasing (decreasing) the marginal propensity to save (consume) of income recipients may decrease the employment level; shifting the labour-supply schedule towards right may increase the unemployment level; increasing the average labour-productivity level may not increase the employment level; reducing the mark-up level to zero may not guarantee a full-employment equilibrium; reducing money wages may not reduce the unemployment level.

To conclude, it is worth stressing that the most important economic-policy intuition of Keynes’s principle of effective demand can be summarized by the following statement: if the level of private monetary investments is not sufficient to guarantee full employment, then public monetary investments can fill the gap. Note that an increase in public investment expenditure does not necessarily generate budget deficits because, by expanding the nominal aggregate-demand level, it increases nominal income and therefore tax revenues.

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Figure 1. Nominal savings as lack of effective demand

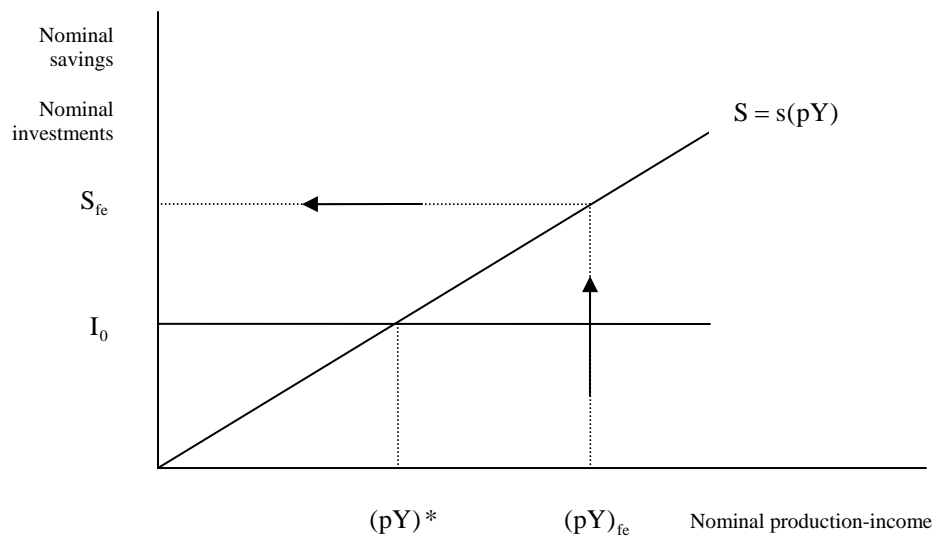


Figure 2. Samuelson's model

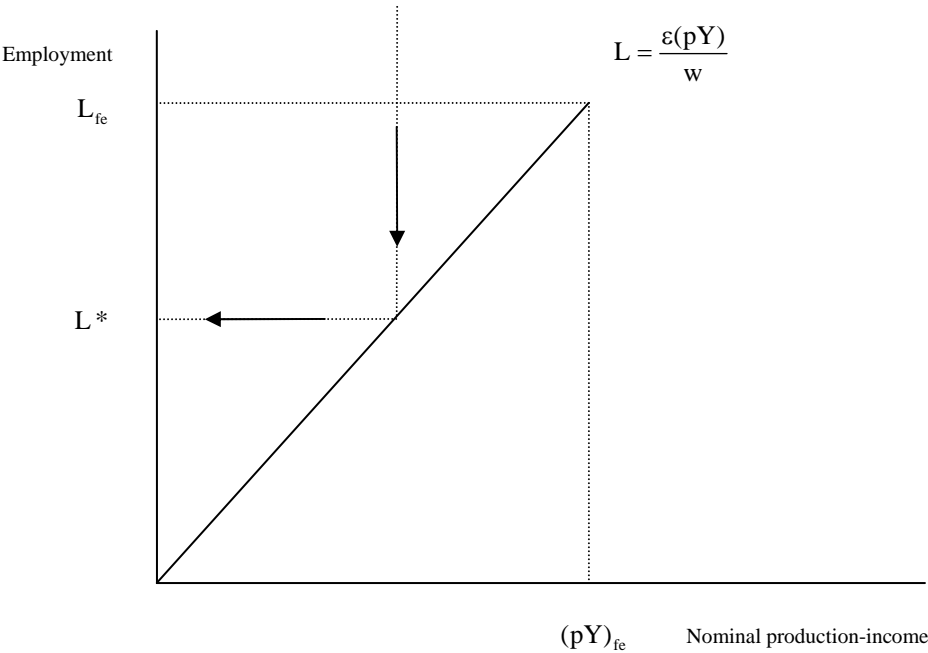
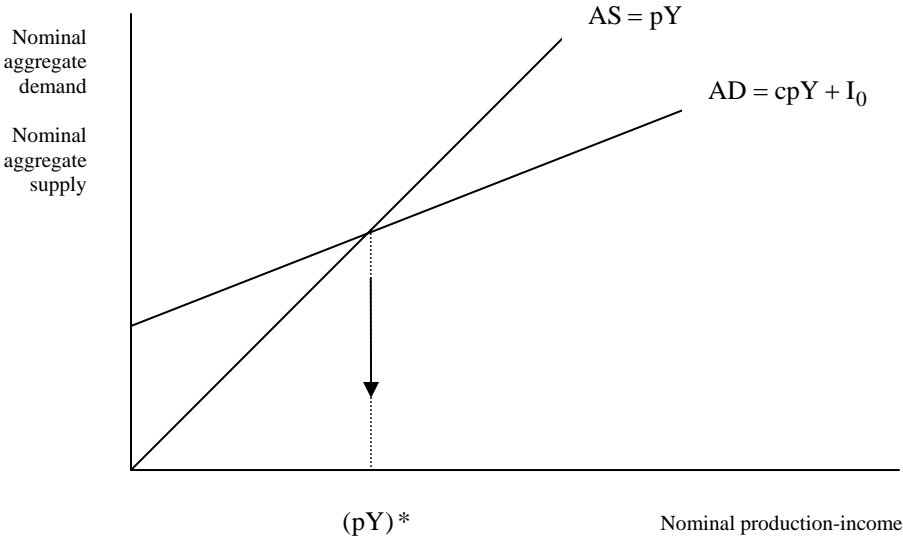


Figure 3. Patinkin-Barro-Grossman's model

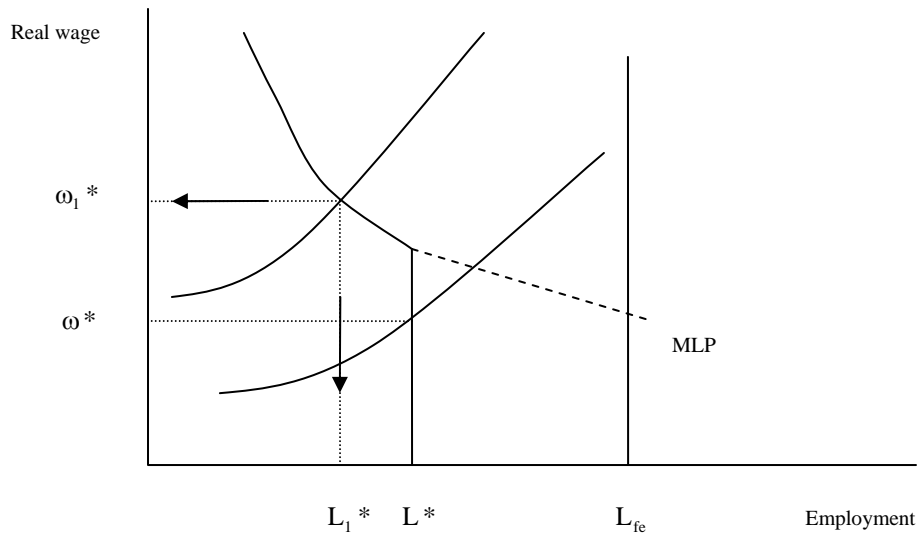


Figure 4. Davidson's model

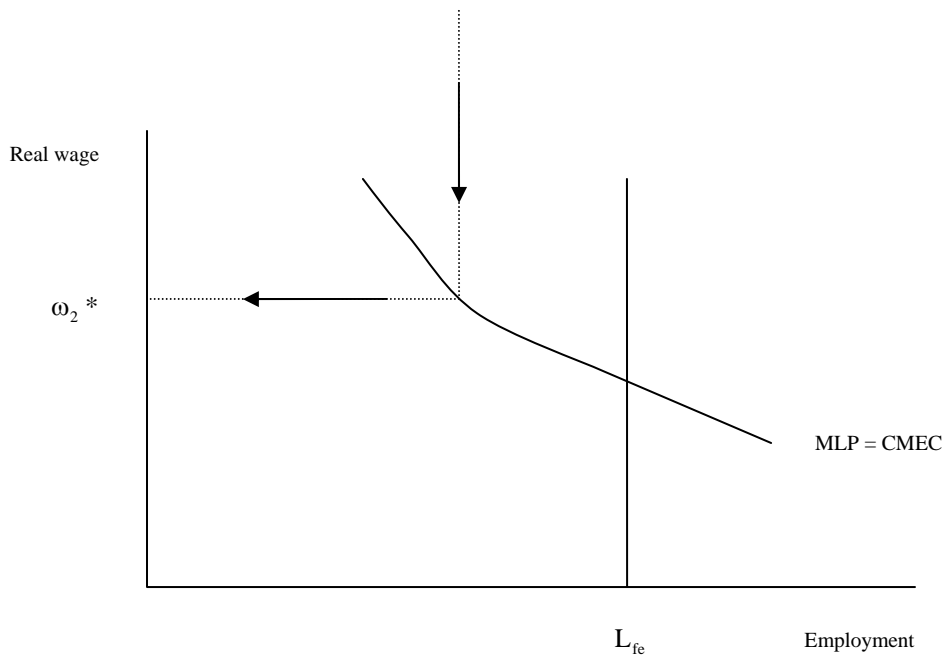
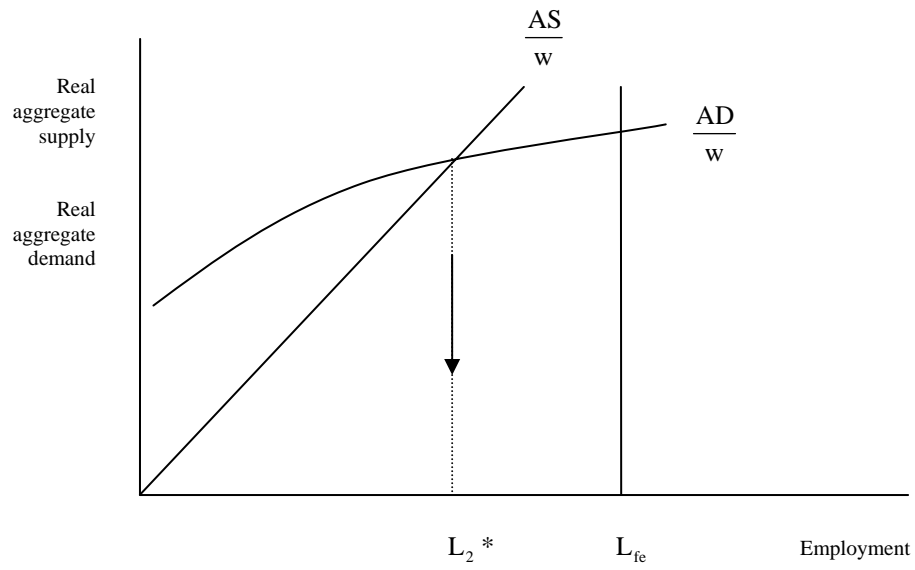


Figure 5. Lavoie's model

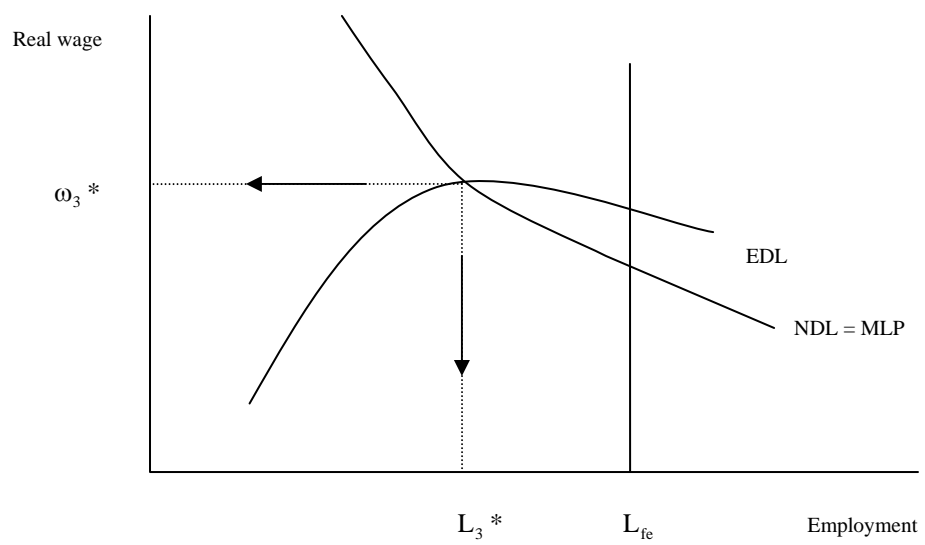


Figure 6. Extended Lavoie's model

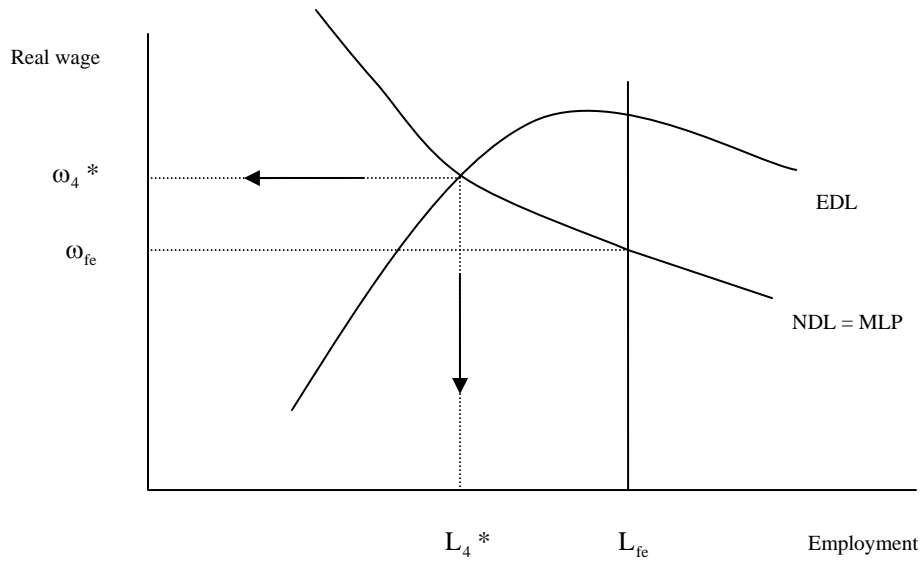


Figure 7. Kaleckian version of the extended Lavoie's model

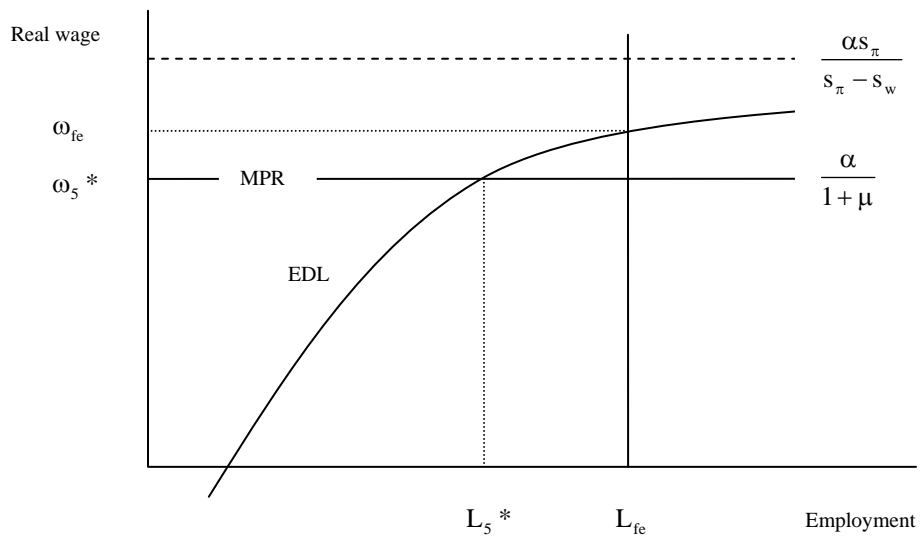


Table 1. A summing up

Model Keynesian criteria	Patinkin Barro Grossman	Davidson	Lavoie	Extended Lavoie	Extended Lavoie / Kaleckian version
No role played by the labour supply in determining the equilibrium values of employment and real wage		X	X	X	X
Labour market effects of variations in the 'animal spirits' of entrepreneurs	X	X	X	X	X
Labour market effects of variations in the propensities to save (consume) of income-recipients	X	X		X	X
Real wage always equal to marginal labour productivity in equilibrium		X	X	X	
Real quantities measured in units of money wages		X			