

**A post-Keynesian alternative  
to the New consensus on monetary policy**

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### **Summary**

A common view is now pervasive in policy research at universities and central banks, which one could call the New Keynesian consensus, as can be found in Taylor (2000a) and Romer (2000). This new consensus relies on essentially three simple equations, one of which is the well-known Taylor rule. These equations end up reproducing accepted dogma among neoclassical economists [*la pensée unique*], i.e., expansionary fiscal policy only leads to higher inflation rates and higher real interest rates in the long run, while more restrictive monetary policy only leads to lower inflation rates in the long run. The sole novelty of the current literature is that the emphasis has moved out from money supply targeting to real interest rates targeting.

The paper provides a simple graphical apparatus to represent the above, and it shows that simple modifications to the new consensus model are enough to radically modify received doctrine as to the likely effects of fiscal and monetary policies. The same graphical apparatus is used to provide these alternative effects. The alternative model is based on the well-known notion of hysteresis, which was already used in the debate on the natural rate of unemployment. Since there is really nothing new with the new consensus, one should not be surprised that there is really nothing new with its critique! The paper concludes with a section that shows that the new Keynesian consensus framework, despite exhibiting some similarities with some key post-Keynesian ideas, just cannot encompass the post-Keynesian research programme, in contrast to what has been claimed by some disillusioned heterodox economists.

## **A post-Keynesian alternative to the New consensus on monetary policy**

### **1. Introduction**

There is a new consensus that seems to arise among mainstream macroeconomists, a consensus developed essentially by New Keynesians. This new consensus is being heralded by John B. Taylor (2000a: 90), who claims that “at the practical level, a common view of macroeconomics is now pervasive in policy-research projects at universities and central banks around the world.... It differs from past views, and it explains the growth and fluctuations of the modern economy; it can thus be said to represent a modern view of macroeconomics”. Allsopp and Vines (2000: 3) also believe that there is an emerging New Keynesian “consensus-type model”, where policy reaction functions are “an essential part of the macroeconomic system”. This consensus model, as already pointed out by Blinder (1997), sets aside the IS/LM model. “The main change is that it replaces the assumption that the central bank targets the money supply with an assumption that it follows a simple interest rate rule” (Romer 2000: 154). According to the new consensus view, “there is really no dispute that the control instrument of the central bank is a short-term interest rate and that this influences the behaviour of commercial banks by determining the *price* at which they lend”, as claimed by Allsopp and Vines (2000: 7). However, these new consensus models “include no reference to any monetary aggregate” (Taylor 2001: 145). One can always argue, as do Allsopp and Vines (2000: 7), that “the interest rate instrument can affect the amount of money, which is endogenous”, and hence one could add a money demand relation, but such an equation “would be superfluous” (Taylor 2001: 146).

Notwithstanding its appealing features to all those concerned with teaching macroeconomics, this consensus model is of particular interest to post-Keynesian economists, because it eschews discussions centred around a given money supply or a given growth rate of the money supply. In this sense the post-Keynesian view of the money supply, i.e., the argument that it is endogenous and demand-led, seems to have been accepted by the better-known New Keynesian economists, those that give advice to central bankers, although they will never mention past writings of Kaldor or other post-Keynesians. These same New Keynesians now argue in terms of central-bank determined

interest rates, going so far as to argue that central banks have the power to determine real interest rates. There is thus little difference between these claims and the long-standing claims of many post-Keynesians, to the effect that interest rates ought to be regarded as the exogenous element in economic models, being understood that central banks would set interest rates on the basis of their desired goals and on the basis of realized and anticipated fluctuations in the main economic variables.<sup>1</sup>

One could conjecture at length as to the reasons which have led to this change of view among mainstream economists. Obviously, as claimed by Woodford (1998: 174), the inability of neoclassical economists to establish a stable demand-for-money function, even when economists could agree on the proper definition of money, seems to be a valid reason. Perhaps the direct involvement with monetary policy of some well-known New Keynesian economists like Alan Blinder also led to the abandonment of the money-supply led macroeconomic models. A further reason, perhaps, is that in many countries like Canada compulsory reserve requirements have been abolished, demonstrating the absurdity of the standard money multiplier model. In addition, many central banks have set up explicit and public procedures through which they target the interbank day-to-day loan rate (the overnight rate), thus demonstrating that they could attain, with almost perfect success, the target rate of their choice, without paying much, if any, attention to monetary aggregates. As Meyer (2001: 3), the specification proposed in the models of the new consensus “has the advantage of more accurately capturing the prevailing operating procedures at central banks around the world”. In addition, changes in the overnight rate are most often achieved without any required change in high powered money (without conducting open-market operations); the change is made just by changing what is considered by financial participants to be the normal rate. Indeed, in the pedagogical package that intends to simulate the procedures followed by the Federal Reserve when making decisions as to the target interest rate, there is no mention whatsoever of monetary or credit

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<sup>1</sup> On other grounds, however, Rochon (1999: ch. 7) explains in great detail why the monetary theory views of New Keynesians are still very different from the more radical views entertained by post-Keynesians.

aggregates.<sup>2</sup>

While post-Keynesian economists can rejoice that the new fad among mainstream economists gives comfort to their long-held views on endogenous money supply and exogenous interest rates, the other features of the new consensus among New Keynesian economists simply look as old wine in a new bottle. This new consensus relies on essentially three simple equations, one of which is the well-known Taylor rule. These equations end up reproducing accepted dogma among neoclassical economists, *la pensée unique* as the French say. With the new consensus, as in the old one, expansionary fiscal policy leads to higher inflation rates and higher real interest rates in the long run, while it has no impact on real activity; more restrictive monetary policy leads to lower inflation rates in the long run, without any (long run) impact on real interest rates and economic activity.

In the next section of the paper I present the equations that drive the model of the new consensus. In the third section, I provide a coherent graphical apparatus that reflects that simple model. In the fourth section, I discuss how the new consensus model could be modified to reflect post-Keynesian concerns. These modifications are introduced in the fifth section, where it is shown how simple modifications to the new consensus model are enough to radically modify received doctrine as to the likely effects of fiscal and monetary policies. The same graphical apparatus is used to provide these alternative effects. The amended model is based on the well-known notion of hysteresis, which was already used in the debate on the relevance of the concept of a natural rate of unemployment. Since there is really nothing new with the new consensus, one should not be surprised that there is not much new with its critique! This shows that the new Keynesian consensus framework, despite exhibiting similarities with some key post-Keynesian ideas, just cannot encompass the post-Keynesian research programme, in contrast to what has been claimed by some disillusioned heterodox economists.

## **2. The simple model of the new consensus and its graphical representation**

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<sup>2</sup> See the Federal Reserve Bank of New York web site, [www.newyorkfed.org/pihome/education/fomcsim.html](http://www.newyorkfed.org/pihome/education/fomcsim.html)?

*The new consensus model*

As pointed out in the introduction, the new consensus model is based on essentially three equations. These are an aggregate demand equation; a price, or rather, an inflation equation, and an interest rate rule. More equations can be inserted into the model, or complications can be added, but they only decorate the main model, and are there to answer some specific questions. For instance, as does Pollin (2000: 89), we could add an equation that determines inflation expectations, and introduce these expectations in a nominal interest rate rule. We could also introduce lags, that add some degree of realism to the model, and which complicate the task of finding the optimal policy rule for the monetary authorities. Or we could add a term for expected aggregate demand as in Meyer (2001) and McCallum (2001). But as argued by Krugman (2000), there is some virtue in using small and simplified models. Hence this is what I shall do. The model to be discussed is the one to be found explicitly in Allsopp and Vines (2000) and Taylor (2000a), and the model that arises from the graphical analysis provided by Romer (1999, 2000). This simplified new consensus model comes down to the following three equations.

$$(1) \quad g = g_0 - \beta r + \epsilon_1$$

This is the aggregate demand equation, or rather the IS relationship. We assume the growth rate of output demand  $g$  is of concern, as Pollin (2000) does, but  $g$  could as well stand for the level of output demand, as is the case in Romer (2000) or in (Allsopp and Vines 2000). The term  $g_0$  covers all autonomous growth components, including the impact of fiscal policy. Aggregate demand, or more precisely the growth rate of output demand, is assumed to respond negatively to increases in the real rate of interest  $r$ ; the term  $\epsilon_1$  represents temporary changes in aggregate demand.

$$(2) \quad d\pi/dt = \gamma(g - g_n) + \epsilon_2$$

Equation (2) describes the behaviour of inflation. It is either called the price equation (Fair 2000: 2) or the aggregate supply equation (Allsopp and Vines 2000:10). As before  $\epsilon_2$  stands for a

temporary shock to inflationary forces (due to expectations or a cost shock), while  $g_n$  is the natural growth rate of output, or the growth rate of potential output, which is equal to the sum of the labour force growth rate and the rate of technical progress. The rate of price inflation is given by  $\pi$ , and hence equation (2) says that the *change* in the inflation rate is positive whenever the growth rate of output demand exceeds the natural growth rate or when there is some kind of inflationary shock. This equation, as is clearly pointed out by Allsopp and Vines (2000:10) and Taylor (2000a: 92) is a variant of the vertical Phillips curve – the standard expectations-augmented Phillips curve; it can be considered as the equivalent of the NAIRU, as shown by Arestis and Sawyer (2000: 536). It is the *accelerationist* equation, since the inflation rate will *accelerate* whenever the growth rate of demand exceeds the natural rate of growth.

$$(3) \quad r = r_0 + \alpha(\pi - \pi^T)$$

Equation (3) is the central bank reaction function. This reaction function is an integral part of the model. It is defined in terms of the real interest rate, on the assumption that central banks have the capacity to set real interest rates because of their absolute control over the shortest nominal rates. Equation (3) is the simplest such reaction function. It says that higher inflation rates generate higher real interest rates as a response. The reaction function here incorporates a target inflation rate  $\pi^T$ , and hence when the target rate is achieved, the real rate equals  $r_0$ .

An alternative to equation (3), or rather an extension of this equation, is equation (4) below, which corresponds to the so-called Taylor rule. With this modified reaction function, the level of the real interest rate is also influenced by the discrepancy between the actual growth rate of demand and the natural growth rate of the economy as perceived by the central bank, which we may denote as  $g_n^e$ , and which may be different from the actual natural growth rate  $g_n$ .

$$(4) \quad r = r_0 + \alpha_1(\pi - \pi^T) + \alpha_2(g - g_n^e)$$

*A fully-enclosed graphic representation of the new consensus view*

It is possible to represent all three equations (1) to (3) in an entirely self-contained four-quadrant diagram. This is done in Figure 1. The first quadrant (north-east) represents the *IS* relationship; the second quadrant (south-east) represents the aggregate demand function *AD*, that is, the relationship between growth and the inflation rate; the third quadrant, with its 45-degree line, just moves the inflation rate from a vertical to an horizontal axis; and finally the fourth quadrant (north-west) features the central bank reaction function *RF*.

As long as the central bank reaction function only depends on the inflation rate, the real rate of interest  $r$  is a constant seen from the perspective of the *IS* curve. The monetary policy of the central bank can thus be represented by a horizontal line *MP* in the first quadrant, which is not unlike the horizontal *LM* curve that would arise from the horizontal money supply or credit supply curves advocated by Horizontalist post-Keynesians. The advantage of such a simplified presentation is that it gives rise to a fully recursive model. First the rate of inflation is given historically from the third quadrant; this determines the real rate of interest in the fourth quadrant; the intersection of the real interest rate with the *IS* curve determines demand growth in the first quadrant, allowing to close the model coherently in the second quadrant.

However, if the central bank reaction function is given by equation (4), then, for any given inflation rate, the higher the actual growth rate the higher the real interest set by the central bank. In this case, as is shown in Figure 2, to each historically-given inflation rate will correspond an upward-sloping monetary policy curve *MP* in the first quadrant. This will generate the same simultaneity that was observed with an upward-sloping *LM* curve. It should be pointed out however that there is nothing natural or inevitable with real rates of interest moving up with higher growth rates of output demand: the higher interest rates are entirely the result of a discretionary policy decision by the monetary authorities, as Horizontalists usually argue. “[The rate of interest] is not the result of a market equilibrium; it necessarily arises as an act of economic policy” (Creel and Sterdyniak (1999: 528)).

The main feature of the upward-sloping *MP* curve, compared to its flat version, is that shifts in effective demand, as symbolized by changes in  $g_0$  or  $\epsilon_1$ , will lead to smaller variations in the realized growth rates; as a result variations in inflation rates will also be of smaller amplitudes. Thus the fact that the central bank takes into account both the inflation rate and the so-called output gap

reduces cyclical fluctuations.

### 3. The effects of shifts in effective demand and inflation targeting

#### *A shift in effective demand*

Let us now consider the effects of these shifts in effective demand. Let us consider a permanent shift in effective demand, as symbolized by an increase in the  $g_0$  coefficient of equation (1). This could arise either as a result of a permanent change in fiscal policy, or as a result of more optimistic entrepreneurs or consumers. This shift is represented in Figure 3 by a rightward shift of the  $IS$  curve, and hence by a similar rightward shift of the  $AD$  curve. We assume we start from a fully-adjusted position, point A in Figure 3, where the natural and the actual growth rates are equal,  $g_1 = g_n$ , and where the inflation rate is  $\pi_1$  so that the real interest rate is  $r_1$ .

The increase in effective demand is assumed to have no impact on the inflation rate initially, so that the inflation rate remains at  $\pi_1$  on the inflation-adjustment line  $IA$ , while the growth rate of output demand moves on to  $g_2$ , as shown by the short-run equilibrium point B. In the next period however, equation (2) gets into operation, and the positive discrepancy between the actual and the natural growth rate pressures up the inflation rate, which starts to rise. The economy moves along the BC segment in the first and second quadrants, as inflation rates keep rising while the central bank reacts by increasing real rates of interest.

The new long-run equilibrium is illustrated by point C of Figure 3. In the new equilibrium, the rate of growth of output demand is back to its natural growth rate,  $g_3 = g_n$ . However, the inflation rate is now higher, at  $\pi_3 > \pi_1$ , and the real interest rate is higher than its initial level as well, at  $r_3 > r_1$ . The ‘new consensus’ model allows to retrieve all the desired results. Expansionary fiscal policy leads to no faster growth rate in the long run; it can only lead to faster inflation and higher real rates of interest, thus crowding out private expenditures. Similarly, if the shift in effective demand is attributed to less thrifty consumers, the fall in saving propensities simply induce a rise in interest rates, as it would in the famous Solow neoclassical growth model, which seems to be the starting point of New Keynesian intermediate macroeconomics.

*Shifts in the reaction function of the central bank*

It should be noted that, although the central bank is assumed to react to differentials between the actual inflation rate and its target inflation rate  $\pi^T$ , as is clear from equation (3), in general the central bank will be unable to achieve its target inflation rate. This peculiar feature of the new consensus model – the inability of the central bank to achieve its target inflation rate if it overestimates or underestimates the *natural* real interest rate – has been underlined by several authors (Pollin 2000: 92; Arestis and Sawyer 2002: 542). In the instance just given, we could assume that the initial inflation rate  $\pi_1$  is the target inflation rate  $\pi^T$ . Therefore, any time that the economy would be subjected to a positive and permanent demand shock, the realized inflation rate would be higher than the targeted rate. The economy would only come back to the target inflation rate set by the central bank in the case of a temporary demand shock, symbolized by  $\epsilon_1$  in equation (2), or in the case of a temporary supply shock, symbolized by  $\epsilon_2$  in equation (2).

In the case of a permanent increase in demand, as occurred in Figure 3, the central bank would need to take further action and revalue its reaction function. For the central bank to achieve its target inflation rate, the parameter  $r_0$  cannot be a constant when the economy is faced with permanent demand shocks. The parameter must take a special value, which we shall call  $r_{nT}$ , to reflect the fact that this is the value that the real interest rate must take for the target inflation rate  $\pi^T$  to be achieved when the growth rate of demand  $g$  is equal to the natural rate of growth  $g_n$ .

In general, putting together equations (1) and (3), and setting the actual growth rate of demand equal to the natural growth rate, we obtain;

$$(5) \quad \pi = \pi^T + (g_0 - g_n - \beta r_0) / \alpha \beta$$

This implies that the  $\pi = \pi^T$  in long-run equilibrium when the term in parentheses is set equal to zero. This means that the  $r_0$  parameter must be such that:

$$(6) \quad r_0 = r_{nT} = (g_0 - g_n) / \beta$$

If the  $r_0$  parameter is set in accordance with equation (6), then in the long-run equilibrium the actual and the target inflation rates will be equal. Looking back at equation (3), this implies that  $r_{nT}$  is the real rate of interest that central banks should set in the long-run equilibrium. Clearly, this *natural* real interest rate depends on the slope of the *IS* curve, and it depends positively on the strength of growth demand  $g_0$  and negatively on the natural growth rate  $g_n$ .

Figure 4 illustrates this change in the behaviour of the central bank. Start from point C that was previously achieved as a result of the permanent shift in demand. The inflation rate  $\pi_3$  given by the new long-run equilibrium at point C is then higher than the target inflation rate  $\pi^T$ . The central bank must then modify its monetary policy, by setting a higher  $r_0$  parameter, that will be compatible with the new demand conditions and its target inflation rate. Therefore, at the existing inflation rate, the central bank now decides to increase the real interest rate from  $r_3$  to  $r_4$ . This induces a fall in the growth rate of demand, which moves down to  $g_4$ . Note that while the shift in the reaction function generates no shift of the *IS* curve, in contrast the *AD* curve must shift down since to a given inflation rate now corresponds a higher interest rate and hence a lower growth rate of demand. The economy thus moves to points D in the first and the second quadrants.

This is only a short-run equilibrium however. Since, the actual growth rate is now below the natural rate, the inflation rate falls, and so does the real interest rate set by the monetary authorities. The economy moves along the DC segment along the  $IS_2$  curve, and along the DA segment of the  $AD_1$  curve, until it hits point C of the first quadrant and point A of the second quadrant. Ultimately, in the new long-run equilibrium, the economy is back to a growth rate which equates the natural rate of growth, and the target inflation rate  $\pi^T$  is met. As to the real rate of interest it is back to  $r_3$  – the real rate of interest that was consistent with the long-run equilibrium generated by the permanent positive demand shock. The natural real interest rate is thus  $r_{nT} = r_3$ .

This exercise thus demonstrates another core feature of mainstream dogma – that monetary policy only impacts on the rate of inflation in the long-run. In the short-run, the desire of the central bank to lower the actual inflation rate towards its target rate leads to high real interest rates, a slowdown of the economy, and a reduced growth rate of output. However, in the long run, this restrictive monetary policy has no impact on the growth rate of the economy, and it has no impact either on the equilibrium real interest rate. At the new equilibrium, given by point C of the first

quadrant, the real interest rate is still  $r_3$ , as it was in the previous long-run equilibrium with the same demand conditions. Thus monetary policy is *neutral*, in the sense that it has no impact on the long-run value of the real interest rate and no impact on long-run output demand. The only long-run impact of monetary policy is on the inflation rate. Thus, as Dalziel (2002: 523) recalls, the bedrock of the new consensus, already to be found in monetarism, is preserved: “monetary policy does not affect the long-run growth of output”.

*The hidden equation of the new consensus*

Now, if this was the entire story behind the neoclassical model, one would wonder why central banks should ever get concerned with inflation. We are told that whatever the level of inflation, the actual growth rate of output is identical to the natural growth rate. But there must be something else to the neoclassical story. Imbedded in the mainstream view is the belief that a lower inflation rate creates better conditions for the economy. What neoclassical economists have in mind is that there is an additional relation that must be taken into account when setting up economic institutions. Neoclassical economists believe that the additional relation exists:

$$(7) \quad g_n = g_{n0} - \mu |\pi|$$

where  $|\pi|$  is the absolute value of the inflation rate, and where  $\mu$  becomes zero when the inflation zero is near zero and positive.

This implies that the aggregate supply curve, which was represented by a given natural growth rate, is not a vertical line. Rather the aggregate supply curve is generally *downward sloping*, becoming a vertical only at near-zero positive rates of inflation, as suggested in Figure 5. Another way to put it is to argue that money is not super-neutral. High rates of growth of the money supply which are presumably associated with high inflation rates generate slower rates of natural growth. This means that with low rates of inflation, the natural growth rate is higher than otherwise. Ones suggested in Figure 5, one could even say that the aggregate supply curve is backward bending. The natural growth rate declines both for high rates of inflation and for rates of deflation, since changing

prices confuse signals procured by relative prices, thus leading to a decline in productivity growth. There is no doubt that central banks have adopted this relationship, at least when attempting to justify their obsession with low inflation rates, as shown by Seccareccia and Lavoie (1996), despite the fact that the empirical evidence looks so thin when dealing with industrialized countries with single-digit inflation (Stanners 1996; Thirlwall and Sanna1996).

My summary view of the new consensus is the following. The new consensus is simply a variant of monetarism, but without any causal role for money. The crucial ideas embraced by Milton Friedman can be found in his Nobel Lecture (Friedman 1977). There Friedman reiterates his belief in the natural rate of unemployment and the validity of the vertical Phillips curve, which is essentially equation (2) of the new consensus model. He also proposes a *positively-sloped* Phillips curve, which is essentially equation (7) of the new consensus, which asserts that high inflation rates hurt the natural growth rate. As to the equilibrium real rate of interest that drives the new consensus system, as given by equation (6), it is no different from Wicksell's natural rate of interest to which Friedman (1977: 458) refers approvingly. The only truly new element in the new consensus is the rejection of the exogenous supply of money, and the replacement of a money growth rule for a real rate interest targeting rule. But as early as 1981, some New Keynesian authors were already advocating such a rule, as a replacement for the standard monetarist money supply rule (Blinder 1981).

#### **4. Proposing a post-Keynesian alternative**

What could be a post-Keynesian alternative to the above model? One possibility is provided by the macroeconomic model constructed by Wynne Godley (1999), to which one could add a central bank reaction function such as equation (3) or (4). The advantage of Godley's model is that the supply of, and demand for, various assets is explicitly modelled. The financial side and the real flows are fully integrated, wealth and debt effects are taken into account, and the model is stock-flow consistent. I shall not pursue this avenue for now, however, because Godley's model needs to go far beyond three equations, even in reduced form. I shall instead accept the new consensus model as a useful approximate representation of the economy, but a representation that requires an important

amendment to make it more realistic and more akin to the core of post-Keynesian theory. What I shall thus do in this section is to suggest an *amended new consensus model*.

I shall thus keep equation (1), which asserts that high real interest rates do have a negative impact on the economy. Although empirical evidence still appears to be unconvincing to a large number of economists (Taylor 1999), such a negative impact appears intuitive and it has been observed in post-Keynesian empirical models of the economy (Semmler and Franke 1996; Gordon 1997). The standard central bank reaction functions, as given by equations (3) and (4), also look reasonable to me. Several post-Keynesian or Sraffian authors – such as Skott (1989: 57), Ciccone (1990: 455), Lavoie (1996a: 538) – have assumed pegged real interest rates or have argued that, by setting nominal rates of interest in a world of sticky prices, central banks are able to set the real interest rates of their choice, and as a result one would be hard-pressed to criticize these reaction functions.

We are left with the issue of the vertical Phillips curve, which arises from equation (2). This accelerationist view of inflation is a crucial aspect of the model, for without it there could be a long-term trade-off between output growth and inflation. Some New Keynesian economists such as Akerlof (2002), claim that empirical data shows that such a long-term trade-off does exist at low rates of inflation, and therefore they reject the vertical Phillips curve. But for the sake of discussion, let us accept this core assumption of the new consensus model: the inflation rate rises as long as the growth rate of output demand exceeds the natural rate of growth. What is there left to amend?

As recalled in the previous section, the new consensus model in fact requires four equations, not three. I have already pointed out that the concern for inflation of central bankers can best be understood with an additional relationship, the one linking high inflation rates to low natural growth rates. But in general, the new consensus models simply assume that the natural growth rate is determined exclusively by supply-side factors that have nothing to do with demand. In fact, in some of the new endogenous growth models, higher propensities to save are conducive to higher natural growth rates, a result obtained by ignoring demand-side effects. In the simplified consensus model, the following equation is an important feature:

$$(8) \quad g_n = \bar{g}_n$$

As pointed out by Fontana and Palacio-Vera (2002: 560), implicit to the new consensus literature, following on the steps of mainstream theory in general, is the assumption that “potential output is independent of the level of aggregate demand”. Now, a key organizing principle underlying post-Keynesian economics is the principle of aggregate effective demand (Palley 1996: 16). The distinguishing feature of post-Keynesian theory is the core belief that effective demand plays a role, not only in the short run, as is recognized by many other schools of thought, but also in the long run. This impact of effective demand on long-run results is I believe the main feature that distinguishes post-Keynesian theories from Marxist macroeconomic theories that also take effective demand and profit realization seriously (Lavoie 1996b).

Colander (2001) thinks that post-Keynesians should forsake the expression “effective demand” and should replace it with “effective supply”. He believes that “telling the Post Keynesian story using effective supply rather than effective demand would make a big difference” (2001: 375). In a sense, this is what I shall do here. Colander’s own view on the matter, which he called the *post-Walrasian view*, is that “disequilibrium adjustment paths can affect equilibrium outcomes” (1996: 60), leading to multiple equilibria and to path-dependent equilibria, where “equilibria arrived at are dependent on the disequilibrium adjustment paths that led to those equilibria”.

The post-Walrasian approach that Colander advocates resembles the long-standing tradition in post-Keynesian growth theory described by Setterfield (2002). He argues that: “the essence of macrodynamic analysis is to begin with the short run, and to understand the long run as a historical (path-dependent) sequence of these short-run outcomes” (2002: 5). Setterfield does not see the long run as a predefined position; instead he believes it is an ongoing process. Setterfield argues that the natural rate of growth is not a strong attractor in demand-led growth models. “The natural rate of growth is ultimately endogenous to the demand-determined actual rate of growth” (2002: 5). This will constitute our amendment to the new consensus model.

Several reasons could be offered for this phenomenon. Fast growth rates of demand imply fast growth rates of output; the latter encourages learning by doing but also a fast pace of capital accumulation, which on its own drives up the rate of technical progress; faster growth rates also encourage potential workers to enter the workforce, and they also encourage foreign workers to

immigrate to the area where growth proceeds at a faster pace. The two main components of the natural rate of growth, the growth rate of the labour force and the rate of technical progress, are thus positively linked to the rate of growth of demand, as was also argued by Hargreaves-Heap (1980: 616).

Whether such mechanisms indeed exist can be said to lie “at the heart of the debate between neoclassical growth economists on the one hand, who treat the rate of growth of the labour force and labour productivity as exogenous to the actual rate of growth, and economists in the Keynesian/post-Keynesian tradition, who maintain that growth is primarily demand driven because labour force and productivity growth respond to demand growth” (León-Lesdema and Thirlwall 2002: 441-2). Kaldor (1957), with his technical progress function, very clearly established such a relationship at the theoretical level: he assumed that higher capital accumulation per head would generate a faster rate of growth of output per head, and hence a faster rate of technical progress. This is also tied with an empirical variant of Kaldor’s technical progress function, Verdoorn’s law, which has been verified in various incarnations (McCombie and Thirlwall 1994).

More recently, in a study based on a sample of fifteen developed countries over the post-war period, León-Lesdema and Thirlwall (2002) have shown that the natural rate of growth is endogenous to the rate of growth of output demand, and hence that it is a mistake to treat the natural rate of growth as an exogenous supply-side determined variable. They show that the natural rate of growth rises in booms, and falls in recessions. As they say, “growth creates its own resources in the form of increased labour force availability and higher productivity of the labour force” (2002: 452). Thus these empirical results give some justification to my amendment to the new consensus model. This amendment consists in replacing equations (7) or (8) with equation (9) below:

$$(9) \quad dg_n/dt = \phi(g - g_n) + \epsilon_3$$

Equation (9) says that whenever short-run demand growth diverges from the natural rate of growth it generates a change in the natural rate of growth that pulls this rate towards the rate of demand growth. As before,  $\epsilon_3$  represents possible temporary shocks that would otherwise affect the evolution of the natural rate of growth. Within the context of the new consensus model, equation (9)

introduces the possibility of multiple equilibria, that make long-run supply forces dependent on short-run disequilibrium adjustment paths induced by effective demand. The implications are thus quite substantial.

As pointed out in the introduction, this amendment to the new consensus model brings little that is really new. The consensus model of the 1970s, based on rational expectations and vertical Phillips curve, was precisely criticized on similar grounds. Both Hargreaves-Heap (1980) and Cottrell (1984-85) have argued that an obvious way to question the strong policy implications of rational expectations, the vertical Phillips curve and the natural rate of unemployment, or its NAIRU equivalent, is to introduce the following simple equation:

$$(10) \quad dU_n/dt = \phi(U - U_n) + \epsilon_3$$

where  $U$  is the current rate of unemployment and  $U_n$  is the natural rate of unemployment, bringing the notion of an hysteresis-augmented natural rate of unemployment.

## 5. Implications of the post-Keynesian amendment to the new consensus model

### *The amended new consensus model*

Let us analyse the behaviour of the following system of equations which we repeat here for convenience:

$$(1) \quad g = g_0 - \beta r + \epsilon_1$$

$$(2) \quad d\pi/dt = \gamma(g - g_n) + \epsilon_2$$

$$(4) \quad r = r_0 + \alpha_1(\pi - \pi^T) + \alpha_2(g - g_n)$$

$$(6) \quad r_0 = r_{nT} = (g_0 - g_n)/\beta$$

$$(9) \quad dg_n/dt = \phi(g - g_n) + \epsilon_3$$

Equations (1) and (2) are no different from what they were in the consensus model of section 2. We assume an upward-sloping *MP* function with the reaction function of equation (4), and assume in it that central banks are able to assess correctly the natural rate of growth as well as the natural real rate of interest, through equation (6). Nothing of importance in the dynamics of the model would change if we were to assume instead that the central bank is unable to assess the natural rate of growth correctly in equations (4) and (6): the target rate of inflation just would not be achieved. On the other hand, with respect to equation (6) we need to be careful: we shall assume that any permanent increase in effective demand, denoted by a higher  $g_0$ , is initially perceived by the central bank as a temporary shock of the  $\epsilon_1$  type. Only in the next period would the central bank recognize that the presumed  $\epsilon_1$  temporary shock is in fact a permanent one, which must be incorporated in the  $g_0$  term. Hence it is only in the next period that the central bank would adjust the  $r_0$  term in its reaction function, to make it compatible with the appropriate real natural rate of interest  $r_{nT}$ , to be found in equation (6). This lag is required, for otherwise any permanent shock to demand would be instantaneously wiped out by an increase in real interest rates, and the actual growth rate of demand could never depart from the natural rate when there is a permanent shift of the IS curve. In other words, without the assumption of a lag, the model could not get to point B in the standard new consensus model illustrated in Figure 3.

Putting together equations (1), (4) and (6), we arrive at the following expression for the short-run value of the rate of growth of demand:

$$(11) \quad g = g_0 - \beta(g_0 - g_n)/\beta - \alpha_1\beta(\pi - \pi^T) - \alpha_2\beta(g - g_n) + \epsilon_1$$

Taking the total differential of this equation, we obtain:

$$(12) \quad dg/dt = \{(1 + \alpha_2\beta)(dg_n/dt) - \alpha_1\beta(d\pi/dt) + (d\epsilon_1/dt)\}/(1 + \alpha_2\beta)$$

With the help of equation (2) and (9), equation (12) becomes:

$$(13) \quad dg/dt = \{\phi - \alpha_1\beta\gamma/(1 + \alpha_2\beta)\}(g - g_n) + \{(d\epsilon_1/dt) + \epsilon_3 - \epsilon_2\}/(1 + \alpha_2\beta)$$

We thus have a system of two differential equations, given by equations (9) and (13), both of which depend on the discrepancy between  $g$  and  $g_n$ . In matrix form, these two equations can be rewritten as:

$$\begin{bmatrix} dg/dt \\ dg_n/dt \end{bmatrix} = \begin{bmatrix} \frac{\phi(1 + \alpha_2\beta) - \alpha_1\beta\gamma}{1 + \alpha_2\beta} & \frac{-\phi(1 + \alpha_2\beta) + \alpha_1\beta\gamma}{1 + \alpha_2\beta} \\ +\phi & -\phi \end{bmatrix} \begin{bmatrix} g \\ g_n \end{bmatrix} + \begin{bmatrix} \frac{\epsilon_3 - \epsilon_2 + (d\epsilon_1/dt)}{1 + \alpha_2\beta} \\ \epsilon_3 \end{bmatrix}$$

The dynamics of this system are pretty straightforward, because the determinant of this system is zero, as can easily be computed, and because its trace, given by the sum of the two terms in the main diagonal, is always negative since it is given by:

$$\text{tr} = -\alpha_1\beta\gamma/(1 + \alpha_2\beta)$$

### *Path dependence and hysteresis*

Because of the zero determinant, our amended new consensus model displays a continuum of equilibria. The model is said to contain a zero root. We no longer have a point of equilibrium, as in the new consensus model; rather, the locus of equilibria is a line. This line is given by the set of all combinations where  $g = g_n$ , because both  $dg$  and  $dg_n$  become zero when that equality is reached. From any given initial state, we know that the model converges to this line of equilibria, and hence that the model is stable, since its trace is always negative. This model has remarkable features that resemble the Kaleckian growth models with hysteresis which have been proposed by Lavoie (1996), Dutt (1997) and Bruno (1999). The dynamic characteristics of the present amended model are quite similar to those outlined in the passage reproduced below.

As the long-run equilibrium is not predetermined anymore, the steady-state rate of accumulation now depends on transitional dynamics, which cannot be ignored: short-run events have a qualitative impact on long-run equilibria. It is common to speak of ‘path-dependence’ for such a characteristic. It is possible to show that this kind of model displays hysteresis in the sense of a ‘permanent effect of a transitory shock’. Indeed, consider an initial equilibrium .... Any transitory shock ... would instantaneously displace the economy to a new state that can be [a] non-equilibrium state. The dynamics of adjustment of the system that take place immediately would then lead the economy to a final equilibrium state that will be different from the first one. Consequently the model displays hysteresis .... In order to know the current position of the system one needs knowledge of the chronicle of the exogenous shocks. Moreover, a transitory shock not only initiates an adjustment process, but it also changes the equilibrium finally selected in the continuum of equilibria, i.e., the system does not go back to its initial position. (Bruno 1999: 133-4).

In the present model, a temporary shock, denoted by the occurrence of a non-zero  $\epsilon_2$  or  $\epsilon_3$  that would only occur for one period would lead to a permanent change in the long-run equilibrium: the new natural real rate of interest and the new natural rate of growth would not be the same any more. For instance, a temporary increase in the rate of price inflation that would arise independently of excess demand pressure would have permanent effects on the natural rate of growth and the natural real rate of interest. This is particularly relevant for post-Keynesian authors, since they believe that a large proportion of the inflation rate remains unexplained by demand pressures, and must be attributed to cost inflation, as in the conflicting-claims inflation approach (Lavoie 1992, ch. 7; Cassetti 2002).

It should be noted however that if the  $\epsilon_2$  or  $\epsilon_3$  shocks reverse themselves, meaning that they take the same amplitude, but of reverse signs, then the economy returns to its starting position. In this sense, we can say that there is reversibility in the present model (Setterfield 1995: 5). One way to bring back irreversibility and full hysteresis is to assume that the reaction parameters such as  $\gamma$  and  $\phi$  (or even the  $\alpha$ 's) are time-dependent or vary depending on whether the shock is positive or

negative, which is not totally unreasonable, given that some researchers have found evidence about the non-linearity of the short-run Phillips curve.

In the case of the  $\epsilon_1$  parameter, things are slightly more complicated as can be guessed from our discussion of equation (6) at the beginning of the present section. When the change in  $\epsilon_1$  represents a permanent change in effective demand, its permanent effect remains. On the other hand, when the  $\epsilon_1$  parameter represents a truly temporary shock on effective demand, so that in the next period  $\epsilon_1 = 0$ , the effect on the long-run equilibrium will reverse itself, since it is the term  $d\epsilon_1/dt$ , negative when  $\epsilon_1$  goes back to zero, that enters the differential equation (13).

### *Graphical representation of the path-dependent phenomenon*

The phase diagrams of the system given by equations (9) and (13) are shown in Figures 6 and 7, since two distinct situations can arise. In both cases, the demarcation curves corresponding to the long-run equilibrium, given by  $dg/dt = 0$  and  $dg_n/dt = 0$ , are both to be found on the 45-degree line, where  $g = g_n$ . In both cases we have  $dg_n/dt > 0$  whenever  $g > g_n$ , which explains the northward-pointing directional arrow arising from point A in both Figures 6 and 7, as well as the southward-pointing directional arrow arising from point B. As to the eastward and westward directional arrows, let us first focus our attention on Figure 6. This figure corresponds to the case where:

$$(14) \quad \phi < \alpha_1 \beta \gamma / (1 + \alpha_2 \beta)$$

so that  $dg/dt < 0$  whenever  $g > g_n$ , so that the directional arrow is pointing towards the west from point A and all such points to the right of initial steady state E (and hence pointing towards the east from point B and all such points to the left of E).

In this first case, as shown in Figure 6, whenever a shock pushes up the short-term rate of demand growth, the new natural rate of growth in its new long-run equilibrium ends up being higher as well, somewhere between its old level and the temporary growth rate of demand. In Figure 6, the initial long-run equilibrium natural growth rate is shown by  $g_n$ . Whenever a shock occurs, whether it is a permanent one or a temporary one, the actual growth rate of demand is initially pushed out,

along the horizontal line representing the natural growth rate. The directional arrows are shown with solid arrows while possible phase trajectories of the economy, or streamlines, are shown with dashed arrows. For instance, when demand growth has increased, so that the rate of growth of demand is given by  $g_A$  in the short run, the economy moves from point A to point A\* during the rest of the transition, as shown by the heavy dashed streamline. Point A\* is the new *long-run* equilibrium, where the growth rate of the economy and the natural growth rate are once more equal.

With an initial fall in demand growth, down from  $g_{nE}$  to  $g_B$ , the economy moves from point B to point B\* during the rest of the transition. Note that, at points A\* and B\*, the actual inflation rate would be exactly equal to its target rate  $\pi^T$ , since we have assumed that the central bank would always be able to find the natural real interest rate.

Figure 6 would also illustrate the case where the central bank refuses to recognize any change in the natural rate of growth. It can be shown that when  $g_n^e$  – the natural rate of growth acknowledged by the central bank – is a constant, then equation (13) becomes:

$$(15) \quad dg/dt = \{-\alpha_1\beta\gamma/(1 + \alpha_2\beta)\}(g - g_n)$$

so that this expression is always negative when  $g > g_n$ . With such central bank behaviour, the actual long-run natural rate of growth would tend to remain closer to its initial equilibrium level.

The second case is shown with the help of Figure 7. In the case of Figure 7,

$$(16) \quad \phi > \alpha_1\beta\gamma/(1 + \alpha_2\beta)$$

so that the directional arrow is pointing towards the east from point A and all such points to the right of initial steady state E, and hence in this case the changes in the natural rate of growth induced by short-run developments are so large that the initial shock on  $g$  is amplified.

Looking at the illustration provided by points A and A\*, the figure shows that the new long-run natural rate of growth  $g_{nA}$  (and the new growth rate of demand) is larger than the short-run value  $g_A$  taken by the rate of growth of demand as a result of the shock. Symmetrically, a small negative shock would end up producing an even larger negative impact on long-run growth rate values. This

would be likely to happen if the economy were not sensitive to changes in the real interest rate (low  $\beta$ ), if the inflation rate was not really affected by excess demand (low  $\gamma$ ), and if the central bank was not reacting to high inflation (low  $\alpha_1$ ).

### *Inflation targeting in the amended model*

We now come back to the issue of inflation targeting. Recall that, in the new consensus view, targeting lower rates of inflation only had negative short-run effects on the rate of growth of the economy. In the long-run, the economy is back to its given natural rate of growth – the move from C to D to A in the south-east quadrant of Figure 4 would correspond to a horizontal move from E to B and back to E in a revised Figure 6 that would reflect an unchanging natural rate of growth.

In the post-Keynesian alternative being provided here, the temporary higher real interest rates imposed to achieve lower inflation targets would move the economy to point B in Figures 6 and 7, and hence they would induce a permanent fall in the natural rate of growth and in the actual growth rate, as the economy would gradually move to point B\* in these two graphs. Monetary policy in this case has detrimental long-run effects on the real economy. In addition, since the new long-run equilibrium growth rate  $g_B^*$  would be lower than the initial natural growth rate  $g_n^*$ , this implies, by checking equation (1), that the new long-run real interest rate  $r_B^*$  would have to be permanently higher than the initial natural real rate of interest, which existed before the central bank decided to launch its low-inflation policy. This seems to be consistent with what most industrialized economies have experienced throughout the last twenty years of the 20<sup>th</sup> century: high real rates of interest and slow growth rates relative to the rates observed the first thirty years that followed World War II.

This last effect on interest rates is illustrated with the help of Figure 8, which corresponds to the case illustrated with Figure 6 on the basis of condition (14) – the case where the new long-run natural rate of growth remains between its old value and the new value taken in the short-run by the growth rate of demand. To simplify the graphs, we assume that reaction function (3) is the relevant one, so that the *MP* curves are horizontal, as in Figures 1, 3 and 4. We assume that the starting position is a steady state equilibrium, point E given by the growth rate  $g_{nE}$ , the real interest rate  $r_E$ , and the inflation rate  $\pi_E$ . We then assume that the central bank is unhappy about this steady state

inflation rate, and decides to target a lower inflation rate, given by  $\pi^T$ , as shown in the second quadrant of Figure 8.

To do so, the central bank sets a higher real rate of interest,  $r_B$ , in line with its new reaction function  $RF_2$ , and under the assumption that the central bank believes that the natural rate of growth will remain constant at  $g_{nE}$ . The growth rate of demand is then pulled down to  $g_B$  as a result of the restrictive monetary policy. If the central bank were unable to take note that its high interest rate policy has induced a reduction in the natural rate of growth, that is  $g_n^e = g_{nE}$  in Figure 8, then the new inflation target  $\pi^T$  set by the central bank would not be achieved, and the economy would settle in a new long-run equilibrium at point C, with a natural rate of growth  $g_{nC}$ , a real interest rate  $r_C$ , and an inflation rate  $\pi_C$ .

The monetary authorities would thus realize that further, tougher, action is needed, and more restrictive monetary policies would be imposed. A second round of high real interest rates would need to be administered. Eventually, the reaction function would have to move as far as  $RF_3$ , and the economy would end up in its new equilibrium, given by point B\* in Figure 8. At this point, the natural real rate of interest would be achieved and it would stand at  $r_B^*$  – a higher rate than the initial natural rate; the new lower target inflation rate  $\pi^T$  would also be achieved; and the growth rate of demand and the natural rate of growth would be equal at  $g_{nB}^*$  – a smaller rate than the initial natural rate.

## 6. Conclusion

The authors of the new consensus models contend that monetary policy and inflation targeting only have short-run effects on real variables. In the long run, New Keynesian authors and other mainstream economists assert, monetary policy and inflation targeting have no impact on real interest rates and real output, nor on real growth rates. These assertions are usually said to be based on a simple three-equation model, which has been illustrated here with the help of a closed four-quadrant diagram.

The results of the new consensus are based however on a fourth equation, which asserts that the natural rate of growth depends exclusively on supply-side effects. This fourth equation is

replaced by another equation – the amendment to the model – which asserts that the natural rate of growth is itself influenced by the actual rate of growth of demand, besides being influenced by supply-side factors.

Such a simple amendment has substantial implications. The post-Keynesian alternative model embodies path-dependence and hysteresis. It implies once more that governments cannot avoid a long-run trade-off between inflation and economic growth. It shows that monetary policy affects more than the inflation rate: zero-inflation or low-inflation targeting has a negative impact on the real economy, bringing in high real rates of interest and low real rates of growth. Path-dependence is illustrated with graphs, in particular by drawing on the same four-quadrant figure that was used to show the effects of the new consensus model.

The new economy approach advocated by several New Keynesians seems to accept the fact that money is essentially endogenous and that monetary policy is conducted by setting interest rates. This approach certainly shares many aspects with the post-Keynesian approach on money and credit. However, the new consensus model still reflects the view that while aggregate demand is important in the short run, it plays no role in the long run. By contrast, a core belief of post-Keynesian authors is that aggregate demand plays a role both in the short and the long run. Monetary policy does have an impact on real variables in the long run. The constructed amended model, which I believe is sufficiently simple to be used as a pedagogical tool along with the suggested graphs, reflects this fundamental belief.

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