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A KALDORIAN MONETARY MODEL OF THE BUSINESS CYCLE

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ABSTRACT

This paper presents a Kaldorian monetary model of the business cycle. Drawing upon the celebrated work of Kaldor, the paper derives nonlinear supply and demand curves for money as functions of the level of nominal income, with three short-run equilibrium points. Two of these points, corresponding to extreme values of income, are stable, and the more central point is unstable. In the long run, the demand and supply curves shift, causing nominal income to fluctuate between its extreme equilibrium values.

I. INTRODUCTION

In the celebrated nonlinear business cycle model of Kaldor (1940), the cyclical fluctuations in the level of economic activity are endogenously determined through the internal dynamics of the model. This is in contrast to many prevailing linear models, in which to overcome the tendency of these models to produce either damped or explosive behavior of national income, recourse is often made to either exogenous shocks (Frisch, 1933) or such exogenous artifacts as production ceilings and floors (Hicks, 1950; Duesenberry, 1958). While path breaking in its approach, the Kaldor model is, however, essentially a Keynesian model, with no role for the money supply in economic fluctuations. For Kaldor, prices remain fixed, and changes in the level of real income are needed to establish equilibrium in the market for goods and services. More specifically, the real income changes to equalize the aggregate levels of saving and investment in the economy. This paper shows that it is possible to apply the basic Kaldorian model to the monetary case where the fluctuations in the level of nominal income can be caused by the disequilibrium in the money market. Within this monetary model, nominal income adjusts to establish equality between the demand and supply for money. More specifically, it is stipulated that any excess of money supply over money demand will result in an increase in spending and, thus, an increase in the level of nominal income. Conversely, any excess demand for money will result in a decrease in spending and, thus, a decrease in nominal income. In addition, following the Kaldorian approach, we hypothesize the presence of nonlinear supply and demand curves for money as functions of nominal income that reflect the behavior of both economic agents and the banking system and arrive at a model with multiple equilibria. The short run stability conditions of these equilibria, together with the long run shifts in the supply and demand curves necessitated by market adjustments associated with extreme values of nominal income, can explain the cyclical behavior of the economy over time. Finally, our

monetary model assumes, in line with Kaldor (1970), that the money supply is endogenously determined, as banks extend credit to accommodate the growing demand for money in an expanding economy. This assumption, of course, is in contrast to the standard macroeconomic practice that often considers the money supply to be determined exogenously through the policy actions of the monetary authorities.

The rest of the paper is organized as follows. Section II summarizes our Kaldorian monetary model of the business cycle, and section III concludes.

II. THE MODEL

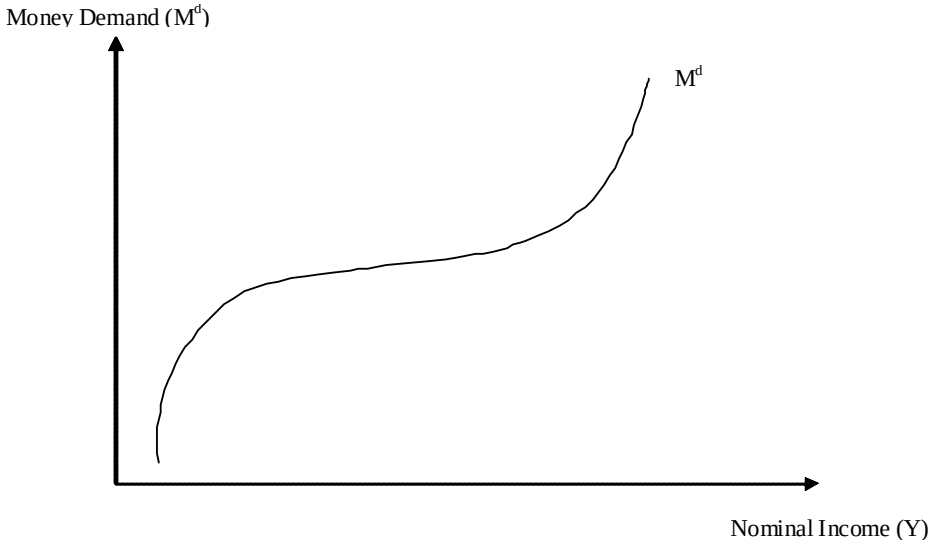
The cyclical model of money income behavior developed in this paper utilizes nonlinear demand and supply curves for money, both expressed as increasing functions of nominal income. The assumption of a positive relationship between the transactions demand for money and nominal income is one of the basic tenets of monetary economics, and perhaps needs little justification. As the level of economic activity expands, economic agents are simply assumed to hold more cash balances to close the gap between their receipts and payments. However, the assumption that the supply of money also depends positively on the level of nominal income is a bit more controversial. It is indeed customary in much of the earlier Keynesian and monetarist literature to assume that the supply of money is exogenously set by monetary authorities (Keynes, 1936; Friedman, 1956). In this paper, however, we follow Kaldor (1970) in assuming that the supply of money is largely endogenous and is determined through the lending activities of the banking system. As the pace of economic expansion picks up, the banking system simply accommodates the growing demand for credit by creating additional bank deposits.

Clearly, both the demand and supply of money are influenced by changes in other determinants such as interest rates and wealth levels. As to interest rates, following Kaldor (1940), we posit that they are themselves largely dependent on the level of economic activity, and thus their influence is incorporated via national income in our demand and supply functions for money. As to the role of wealth, we consider it to be more of a long term influence, causing long term shifts in the money demand and supply schedules. As we show later in the paper, these long term shifts play an important role in the internal dynamics of the model and are crucial to cyclical fluctuations in nominal income.

As stated earlier, the key feature of the Kaldorian business cycle model which is exploited here is the assumption that the money demand and supply schedules are nonlinear. The demand for money schedule is shown in Figure 1. As the figure shows, the demand curve is positively sloped, reflecting the tendency of economic agents to hold more cash balances for transactions purposes at higher income levels. The figure also shows that this curve is nonlinear, being relatively steep at very low and very high incomes, corresponding to depressed and booming levels of economic activity. This demand curve is steep at the lower end of the curve, showing that at very low incomes, economic agents accelerate their money holdings as the economy recovers from depressed conditions and the volume of transactions expands rapidly. In particular, as economic recovery gains momentum, businesses open new lines of credit with the banking system in anticipation of their growing working capital needs. Likewise, the demand curve is relatively steep at the higher end of the curve, reflecting once again an accelerated increase in

money holdings as the economy enters its boom phase and the demand for borrowed funds increases sharply to meet both the growing transactions needs in an inflationary environment and the desire to finance a buildup of inventories to beat the rising prices.

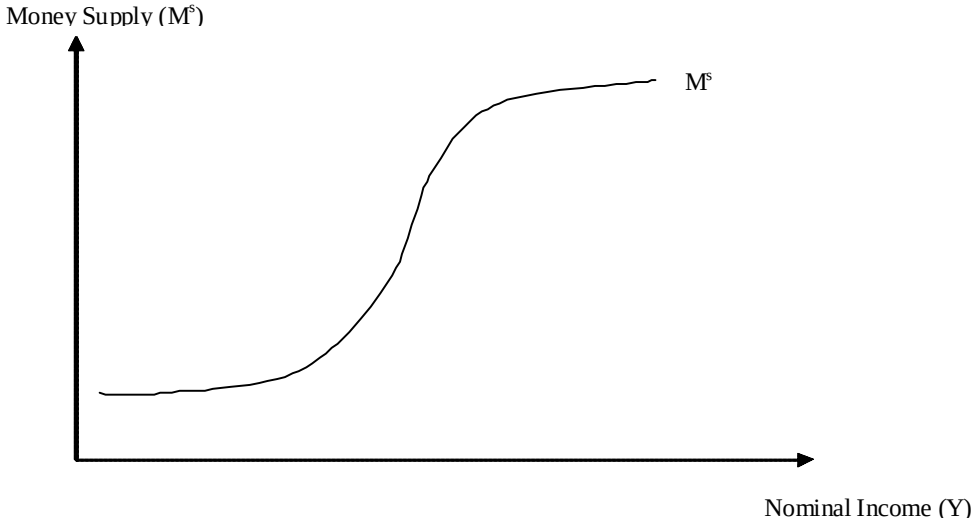
Figure 1: The Demand for Money



The money supply schedule is shown in Figure 2. As the figure shows, the supply curve is positively sloped, reflecting the tendency of the banking system to grant more loans to finance the transactions needs of their clients in an expanding economy. The figure shows that this curve is also nonlinear, being relatively flat at very low and very high incomes, corresponding to depressed and booming levels of economic activity. This supply curve is relatively flat at the lower end of the curve, showing that at very low incomes, banks increase their lending operations cautiously as the economy recovers from depressed conditions. Likewise, the supply curve is relatively flat at the higher end of the curve, reflecting once again slow increases in the money supply as the economy enters its boom phase and the private banking system begins to exercise greater prudence in lending activities.

To determine the equilibrium level of nominal income, we bring the money demand and supply curves together, as in Figure 3. As the figure indicates, the demand and supply curves intersect at 3 points, A, B, and C, resulting in three short run equilibrium values for money income. Clearly, the equilibrium at the center, point B, is unstable. To see this, assume the actual income lies to the right of B. At this point, the quantity of money supplied exceeds the quantity demanded, which would result in higher spending as a way of disposing of unwanted cash balances. This will, in turn, drive income upward and away from B, towards C. Similarly, to the left of B, the quantity of money demanded exceeds the quantity supplied, resulting in lower spending in order to accumulate desired cash balances. This will cause income to fall toward A. In contrast, points A and C are stable. To see this, assume the prevailing income lies to the right of, say, the uppermost intersection point, C. At this point, excess demand for money

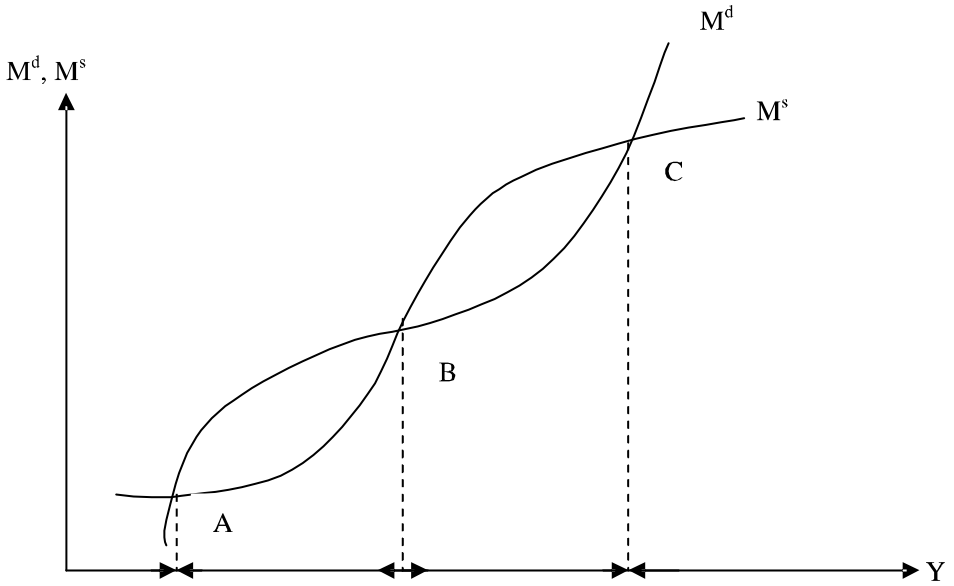
Figure 2: The Supply of Money



would result in reduced spending as a way of building up cash balances. This will, in turn, drive income lower until it settles at equilibrium point C. Under these conditions, money income will tend to move away from the center equilibrium point B and settle at the extremes A and C for extended periods of time.

Clearly, these tendencies are consistent with the historical behavior of the economy, in which nominal income, deviating from its normal level, can remain either at a depressed or a boom level for extended periods. The task of our model, then, is to explain why money income,

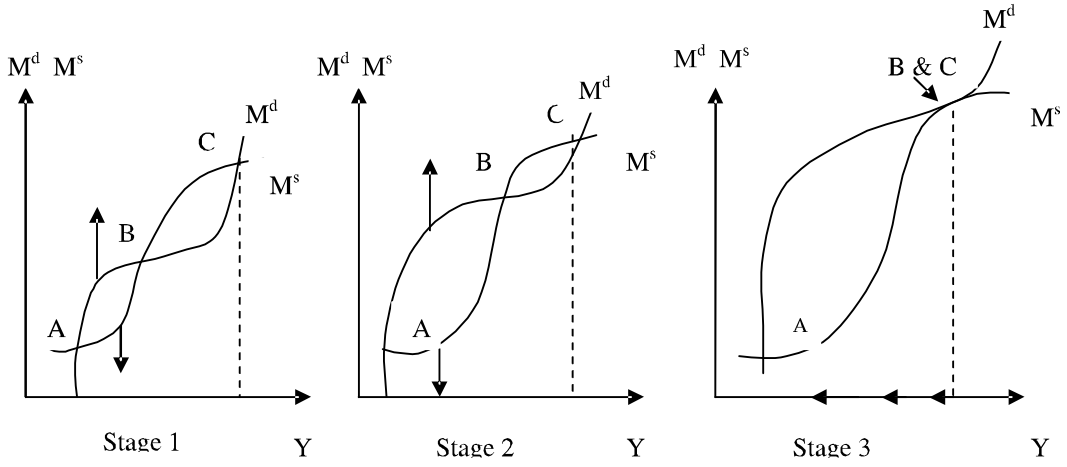
Figure 3: The three Equilibrium levels of Nominal Income



having reached one of the extreme equilibria, which are essentially short run equilibrium positions, departs from these points in the long run. The mechanism that triggers the departure of income from its short run equilibrium points is the shifting of the money demand and supply curves in the long run. These shifts in the demand and supply curves are assumed to occur in response to long run changes in such fundamentals as wealth levels and the status of monetary policy, as discussed below.

Suppose first that the economy is in a boom mode so that nominal income has risen to its short run equilibrium level given by point C in Stage 1 of Figure 4. At this elevated equilibrium level, the increases in business and consumer spending tend to push the economy towards its full employment position, causing a range of asset prices from homes to equities to increase sharply. The rising asset prices will then serve to increase the portfolio demand for money via the wealth effect. The effect of this rising preference for liquidity will be an upward shift of the money demand curve, As depicted in Stage 2 of Figure 4. At the same time, at the high levels of income, as price pressures intensify, the monetary authorities will launch restrictive monetary actions to curb the growth of the money supply. Such actions will in turn serve to shift the money supply curve downward, as shown also in Stage 2 of Figure 4.

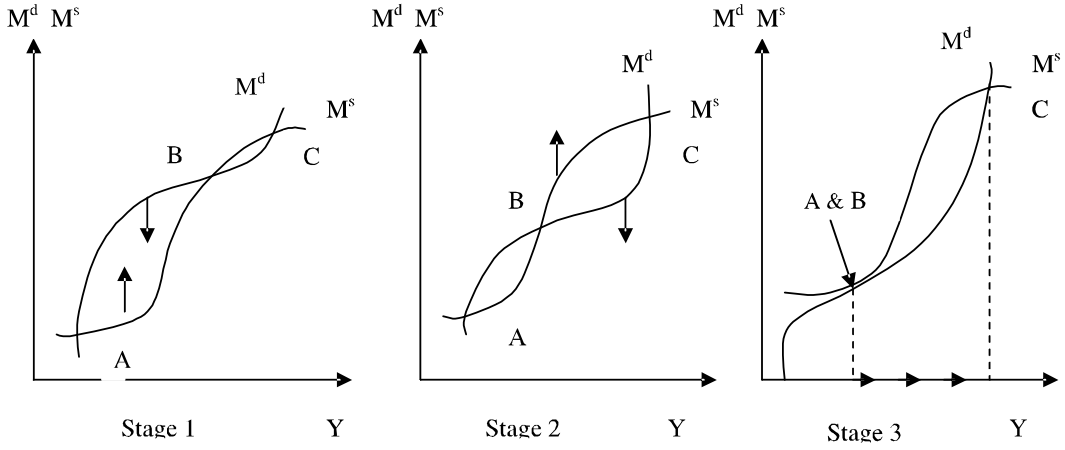
Figure 4: Stages of the Downward Phase of the Business Cycle



As shown in Stage 3 of Figure 4, the opposite shifts in the supply and demand curves will cause the equilibrium point C to approach the equilibrium point B. Eventually, the continuing shifts in the supply and demand curves will bring the curves to a condition of tangency, as shown in Stage 3 of Figure 4, where the points C and B coincide. When this occurs, the market moves into a different phase of the cycle. The point of tangency, represented by both B and C, is an unstable equilibrium, characterized by excess demand for money on both sides of the equilibrium point. Consequently, from here, the market can only continue to adjust downward, seeking a stable equilibrium level, which it finds at point A. The new equilibrium income at A resides at a stable equilibrium, where it will remain for an extended period of time.

As was the case with the equilibrium at point C, however, eventually long run adjustments, triggered this time by reduced demand for money caused by a negative wealth effect of falling asset prices in a weak economy, as well as an expansionary monetary policy to revive the economy, reverse the movement in nominal income, with the economy now cycling back upward from short run equilibrium point A toward point B. Specifically, as shown in Stages 1 and 2 of Figure 5, the supply and demand curves will shift again, but in directions opposite to those described earlier. These adjustments now bring equilibrium points A and B closer together. Eventually, the equilibrium point A coincides with B, represented graphically by the tangency of the supply and demand curves in Stage 3 of Figure 5. As before, the point of tangency represents an unstable equilibrium, although it is now characterized by excess supply for money. Consequently, the market continues its upward movement, seeking a stable equilibrium point, which it finds at point C. The new equilibrium level of nominal income will remain at point C as originally depicted in Stage 1 of Figure 4 for a prolonged time period. Eventually, this short run equilibrium is again disturbed by long run forces, which will cause money income to once again cycle downward to point A in Stage 1 of Figure 5.

Figure 5: Stages of the Upward Phase of the Business Cycle



The foregoing discussion thus provides a rationale for the observed tendency of aggregate income to move cyclically over time. Each of the equilibrium points at both A and C are stable short run equilibrium levels of nominal income. Neither of them, however, is stable in the long run. The accumulation of long run forces over time, such as changes in wealth levels and the stances of monetary policy, will eventually generate cyclical movements of income between its values at the short run equilibrium points A and C.

III. CONCLUSION

This paper models the fluctuations in aggregate nominal income which occur over time, using a Kaldorian monetary model of the economy. The nonlinear supply and demand curves for money give rise to stable short run equilibria which lie above and below the normal range

of the levels of nominal income. Unlike linear models of the business cycle, the model requires no frequent extraneous shocks or such artifacts as output floors and ceilings to produce regular cycles in the behavior of nominal income over time. The model also implies that prudent monetary policy actions may interfere with the cyclical behavior of income. In particular, the prompt and timely actions of monetary authorities to change the money supply can serve to reverse the shifts in the money demand and supply curves, thereby preventing nominal income from displaying excessively large and extended swings in its cyclical behavior. More specifically, the model suggests that the central bank can shorten the span between equilibrium points A and C by preemptively changing the money supply before income reaches its extreme levels.

To prevent aggregate income from reaching an extreme equilibrium point such as C in Figure 3, the central bank must decrease the money supply preemptively as income begins to depart from the unstable equilibrium at point B. The lower money supply would shift the supply curve downward, moving point C nearer to B. This would limit the increase in the level of nominal income. The central bank could do the opposite as income falls toward the lower equilibrium point A.

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