

Inflation and Inside Debt: Tobin's Neo-Keynesian Model

Abstract

This paper applies Tobin's (1975) neo-Keynesian model of deflation to the issue of inflation. As with deflation, stability of inflation depends on the strength of the Tobin-Mundell effect. The paper introduces the concept of consumption and investment spending acceleration effects, which are the Keynesian analogue of increased velocity of money emphasized by monetarists. It also introduces Fisher debt effects, which increase the likelihood of instability. If the Fisher debt effect dominates the Pigou and Keynes money supply effects, inflation is unambiguously unstable. This has important policy consequences given today's high levels of indebtedness

Key words: inflation, inside debt, expenditure acceleration effects, Fisher debt effect.

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Thomas I. Palley
Economics for Democratic and Open Societies
Washington DC 20010
E-mail: Thomaspalley@starpower.net

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I Introduction

In a seminal paper published thirty years ago, the late James Tobin (1975) developed a neo-Keynesian model of deflation. The current paper uses Tobin's model to develop a Keynesian analysis of inflation, and it shows how inflations can be unstable and degenerate into hyperinflation.

A major innovation in the paper is the inclusion of inside debt effects. This is a feature that has become of increasing policy concern to monetary authorities in many countries – including the U.S., the U.K. and Australia – because household borrowing has financed consumer spending and property booms. Debt effects are key to explaining and understanding the recent pattern of monetary policy, especially in the U.S. Thus, in the recession of 2001 the Fed determinedly lowered short-term interest rates to avoid debt-deflation effects, and then reversed itself and determinedly raised short-term interest rates to avoid debt-inflation effects.

The Tobin model is embeds a demand-pull approach to inflation. Such an approach has not been popular with Post Keynesians, who have preferred a conflict/cost-push approach. Either – or thinking is misplaced. Both can be relevant depending on circumstances. In the 1970s and into the 1980s, when labor was stronger, a conflict/cost-push frame made sense. In today's economic environment, in which it is widely acknowledged that labor is weak, inflation is better explained in terms of demand-pull factors. This is particularly true for the United States.

In his original paper on deflation, Tobin emphasized the importance of the Tobin (1965) – Mundell (1963) effect whereby expected deflation encourages agents to hold money balances, thereby increasing money demand and real interest rates. This

mechanism is also important for analysis of the inflation process. Stability again depends upon the strength of the Tobin-Mundell effect. Inflation discourages agents from holding money, which reduces money demand, lowers real interest rates, and raises aggregate demand (AD), thereby adding to inflationary pressures. The stronger the Tobin-Mundell effect, the more likely that an inflationary process will spiral into hyperinflation.¹

The paper makes several analytical contributions. First, it shows how Tobin's model provides a simple framework for exploring the dynamics of inflation. Second, it introduces the notion of consumption and investment spending acceleration effects whereby inflation induces agents to accelerate purchases of consumption and investment goods. These acceleration effects can be viewed as the Keynesian analogue of increases in the velocity of money that have been emphasized in monetarist analyses of hyperinflation (Cagan, 1956).

Third, the paper introduces inside debt into the analysis of inflation. Whereas much attention has been paid to the effect of debt in deflations (Fiaher, 1933; Caskey and Fazarri, 1987), debt appears to have been ignored in analyses of inflation (Friedman, 1968; Lucas, 1973; Sargent, 1986). Inside debt increases the likelihood that inflation is unstable and will develop into hyperinflation.

This has important policy relevance in today's highly indebted financial environment. Increases in inflation erode the value of debt burdens, thereby stimulating AD and potentially accelerating inflation. In a highly indebted environment, monetary

¹ Groth (1993) examines the Tobin model without a Pigou effect or inside debt but with a non-linear money demand, and finds that non-linearity contributes to instability. His findings are a rediscovery of the liquidity trap. As the price level falls, the real money supply increases. However, non-linearity of money demand means that the interest rate decline is smaller, thereby shrinking the Keynes money supply effect on aggregate demand and increasing the likelihood of instability. However, non-linearity will be stabilizing under inflationary conditions. This is because non-linearity of money demand in combination with a shrinking real money supply will further increase interest rates, thereby eliminating excess demand. Deflation operates on the "flat" end of money demand: inflation operates on the "steep" end.

policy therefore needs to actively supplement the automatic monetary tightening, induced by a rising price level, with a leaning against the wind interest rate policy.

II The Tobin model applied to inflation

The impact of inflation on aggregate demand can be analyzed in the canonical Keynesian ISLM model given by

$$(1) y = E(i \overset{-}{\pi}^e, \overset{+}{M/p}, \overset{+}{Z})$$

$$(2) M/p = L(i, \overset{-}{\pi}^e, \overset{+}{y})$$

where y = level of income, $E(.)$ = aggregate demand function, i = nominal interest rate, π^e = expected rate of inflation, M = nominal money supply, p = price level, Z = autonomous expenditures, and $L(.)$ = real money demand function. Signs above arguments are the assumed signs of partial derivatives.

Equation (1) is the goods market clearing condition, and has output equal to AD. AD depends negatively on the expected real interest rate, and positively on the real money supply reflecting the operation of the Pigou (1943) real balance effect. Equation (2) is the money market clearing condition, and has real money supply equal to real money demand. The demand for real money balances depends negatively on inflation reflecting the Tobin - Mundell effect. Expected inflation reduces the demand for real money balances. This is because inflation reduces the real value of money balances, thereby prompting agents to shift the composition of their portfolios away from money.

Combining equations (1) and (2) yields a general reduced form given by

$$(3) y = E(i(\overset{-}{\pi}^e, \overset{-}{M/p}, \overset{+}{y}), \overset{+}{\pi}^e, \overset{+}{M/p}, \overset{+}{Z})$$

An increase in the rate of inflation raises AD and output because it reduces money demand, leading to lower real interest rates. A higher price level lowers AD and output via the Keynes real money supply and Pigou real balance effects.

The two static equilibrium conditions are supplemented by three dynamic equations of adjustment that govern the evolution of the state variables – output, inflation, and inflation expectations. The dynamic adjustment equations are given by:

$$(4.a) \quad \overset{+}{g_y} = A(E - y) \quad A_1 > 0$$

$$(4.b) \quad \overset{+}{\pi} = B(y - y^*) + \overset{+}{\pi^e} \quad B_1 > 0$$

$$(4.c) \quad \overset{+}{g_{\pi^e}} = C(\pi - \overset{+}{\pi^e}) \quad C_1 > 0$$

where g_y = rate of change of output, π = actual inflation, g_{π^e} = rate of change of inflation expectations, and y^* = full employment output. Equation (4.a) is an output adjustment equation, and has output responding positively to excess demand. Equation (4.b) is a natural rate Phillips equation in which inflation is determined as a function of the output gap and inflation expectations. Equation (4.c) determines the adjustment of inflation expectations according to an adaptive principle.

The long run steady state equilibrium is given by $y = y^*$, $p = p^*$, and $\pi = \pi^e = 0$. Appropriate substitution and manipulation, combined with linearization around steady state equilibrium values, yields the following set of linearized adjustment equations:

$$(5.a) \quad \overset{+}{g_y} \mid \overset{+}{A_1[E_1 - 1]} \quad \overset{+}{A_1E_2} \quad \overset{+}{A_1E_3} \mid [y - y^*]$$

$$(5.b) \quad \overset{+}{\Delta p} \mid \overset{+}{B_1p^*} \quad \overset{+}{\pi^e} \quad \overset{+}{p^*} \mid [p - p^*]$$

$$(5.c) \quad \overset{+}{g_{\pi^e}} \mid \overset{+}{C_1B_1} \quad 0 \quad 0 \mid [\pi^e - 0]$$

The condition for stability is $p^*E_2 + C_1E_3 < 0$. The term E_2 reflects the strength of the Pigou and Keynes money supply effects, while the term E_3 reflects the strength of the Tobin-Mundell effect. Stability requires that the Pigou and Keynes effects dominate the Tobin-Mundell effect.²

Equations (5.a) – (5.c) provide an analytical understanding of the model's stability. The stability properties of the model can also be understood through graphical analysis. Equation (3) can be represented as a set of iso-AD contours drawn in $[\pi^e, p]$ space, as is done in Figure 1. The slope of the contours is obtained by differentiating equation (3) with respect to p and π^e , yielding

$$\delta p / \delta \pi^e = [E_i i_{\pi^e} - E_i] / [E_i i_{M/p} + E_{M/p}] M / p^2 > 0 \quad \text{if } E_i i_{\pi^e} - E_i > 0$$

The condition $E_i i_{\pi^e} - E_i = E_3 > 0$ ensures that the Tobin-Mundell effect holds so that higher inflation lowers the real interest rate. The positive slope of the iso-AD contours reflects the competition between the Keynes and Pigou effects versus the Tobin – Mundell effect. A higher price level decreases AD via the Keynes and Pigou effects, so that holding AD constant calls for a stronger Tobin-Mundell real interest rate effect operating via more rapid inflation expectations. Lower iso-contours are associated with higher levels of AD, so that $AD_1 > AD_0$. The logic is that a lower price level, holding inflation expectations unchanged, increases AD via the Keynes and Pigou effects.

Figure 2 shows a set of iso-AD contours with three different price adjustment paths. The economy is initially located on the iso-contour AD_0 , which corresponds to a position of excess demand ($AD_0 > y^*$). One path has prices rising infinitely fast with no impact on inflation expectations. This path corresponds to what Tobin terms Walrasian

² The stability condition is taken from Tobin (1975). Bruno and Dimand (2006) have recently produced a manuscript that formally derives this condition.

price adjustment. The jump in the price level decreases AD, closing the output gap and the economy moves instantaneously to non-inflationary full employment. This price adjustment effect can be captured in the static ISLM model, and corresponds to the case where a higher price level shifts the IS schedule down and the LM schedule up through the Pigou real balance and Keynes money supply effects respectively.

The middle price path has prices increasing and inflation expectations rising gradually. The effect of a rising price level causes AD to fall so that the economy moves to a lower iso-AD contour. Falling AD closes the gap between AD and output, causing inflation to eventually decline and the economy again moves toward non-inflationary full employment. Along this second path the contractionary effect of a higher price level, operating via the Pigou and Keynes effects, dominates the expansionary effect of higher inflation expectations operating via the Tobin-Mundell effect. Consequently, the inflation process remains stable.

The third price path has inflation expectations rising rapidly as the price level increases. Now, the economy moves to higher iso-AD contours. Consequently, the output gap increases, moving the economy further above full employment. This is the case where inflation spirals into hyperinflation. The reason is that the Tobin-Mundell inflation expectations effect dominates the Pigou and Keynes price level effects. The economic logic behind the spiral into hyperinflation is that the jump in inflation expectations lowers money demand and real interest rates (the Tobin-Mundell effect), raising AD and increasing inflationary pressures. Though the nominal money supply is fixed, inflation can continue to accelerate because the decrease in real money demand exceeds the

decrease in real money supply resulting from higher prices, thereby creating the monetary space for further inflation and a higher price level.

It should be noted that the above analysis is based on the assumption of a fixed nominal money supply – that is the monetary authority sits on its hands. This has higher prices automatically lowering the real money supply, thereby contributing to lower AD and reducing inflationary pressures. A fixed nominal money supply therefore automatically chokes off inflationary pressures and is stabilizing.

Post Keynesian theory of endogenous money emphasizes that the monetary authority really controls the nominal interest rate. In this case, assuming a fixed nominal interest rate, the nominal money supply will automatically increase to prevent nominal interest rates from rising owing to price level erosion of the real money supply. This neutralizes the Keynes money supply effect (i.e. reduces the absolute value of E_2), making it more likely that the Tobin-Mundell effect will dominate and that the inflation process is unstable and degenerates into hyperinflation. In terms of figure 2, a fixed nominal interest rate steepens the slope of the iso-AD contours, expanding the set of price adjustment paths that are unstable. This can be seen by inspection of the expression $\delta p / \delta \pi^e$, where setting the term $E_1 i_{M/p}$ equal to zero makes the denominator smaller and raises the absolute value of the expression.

A third possibility is that the monetary authority follows an interest rate rule that has the nominal interest rate increase with inflation. This rule serves to increase the absolute value of E_3 , making it more likely that the stability condition is met. The logic is that the interest rate rule counters the Tobin-Mundell effect. Thus, increases in inflation are expansionary via the Tobin-Mundell effect, but this expansionary effect is offset by

the interest rate rule. If the interest rate rule is sufficiently vigorous, the term E_3 may become negative and the economy is unambiguously stable. The logic is higher inflation, resulting from excess demand, generates a sufficiently strong nominal interest rate response from the monetary authority that real rates and AD fall.

III Consumption and investment demand acceleration effects

The above analysis has inflation expectations impacting money demand (the LM schedule), but goods demand (the IS schedule) is only impacted indirectly through the induced LM effect on the real interest rate. However, increases in the rate of inflation expectations may give agents an incentive to accelerate their consumption and investment expenditures in order to avoid higher future prices. The microeconomics of such substitutions have been explored by Neary and Stiglitz (1983) in a fix-price inter-temporal general dis-equilibrium model with rational expectations.

Consumption and investment demand acceleration effects can be readily included in the ISLM model by re-specifying the goods market clearing condition as follows

$$(1.a) \quad y = E(i - \pi^e, \pi^e, M/p, Z)$$

The expected rate of inflation now enters as a separate argument in the AD function, with increases in the expected rate of inflation raising AD. This treatment of inflation expectations remedies a logical failing in the standard ISLM model that dichotomizes and treats as independent portfolio stock choices and spending flow decisions. Stock and flow choices are part of a unified utility maximization problem and are taken simultaneously.

This implies that arguments influencing stock demands (i.e. the demand for money) also influence flow demands (investment and consumption decisions).³

The macroeconomics of expenditure acceleration effects is easily understood in terms of the familiar ISLM diagram. A jump in inflation expectations will increase investment and consumption spending and reduce saving, shifting the IS up. This expenditure acceleration effect supplements the standard Tobin-Mundell effect that shifts the LM schedule down.

With regard to the earlier mathematical stability analysis, expenditure acceleration effects change the stability properties of the model by changing the parameter E_3 . After incorporating spending acceleration effects E_3 becomes $E_i i_{\pi e} - E_i + E_{\pi e}$, which is larger in absolute value, therefore increasing the likelihood of instability. This proclivity to increased instability can be understood graphically using the iso-AD contour diagram. Expenditure acceleration effects steepen the slope of the iso-AD contours, which now becomes

$$\delta p / \delta \pi^e = [E_i i_{\pi e} - E_i + E_{\pi e}] / [E_i i_{M/p} + E_{M/p}] M / p^2 > 0 \quad \text{if } E_i i_{\pi e} - E_i + E_{\pi e} > 0$$

The slope increases because $E_{\pi e} > 0$, which increases the value of the numerator. The economic logic of the steepening of the iso-AD contours is that increased inflation expectations now have a stronger positive impact on AD, so that maintaining a constant level of AD along an the iso-contour calls for a higher price level.

Steepening the iso-AD contours makes instability more likely as some price adjustment paths that were previously stable become unstable. The stability of the inflation process therefore depends significantly on the responsiveness of consumption

³ This analytic shortcoming of the conventional ISLM model is emphasized by Tobin (1982) in his end-of-period multi-asset ISLM model in which portfolio stock and spending flow decisions are part of a unified choice decision.

and investment spending to expected inflation. The greater that responsiveness, measured by the magnitude $E_{\pi e}$, the greater the likelihood of instability.

Consumption and investment acceleration effects can be viewed as the Keynesian analogue of monetarist constructions of the impact of inflation expectations that operate through the black box of the velocity of money (Cagan, 1956: Friedman, 1956).

Monetarists emphasize how inflation induces agents to reduce their demand for money, which in turn is equivalent to an increase in the velocity of circulation. From a Keynesian perspective, agents reduce their money holdings and increase their investment and consumption expenditures, with the latter being equivalent to a decrease in saving.

Monetarists analyze inflation through the Fisher equation of exchange. Increases in expected inflation raise the velocity of circulation as agents reduce their money holdings and accelerate their spending decisions to avoid the inflation tax. This is exactly the same logic as reducing money demand and accelerating consumption and investment spending decisions. In the monetarist model, these changes can lead to hyperinflation if the increase in velocity triggers a cumulative process of higher inflation that further raises velocity. This hyperinflationary monetarist outcome corresponds to an unstable price adjustment path such as is shown in Figure 2. In the current Keynesian model, increased inflation expectations drive increased spending, which raises the output gap and further raises inflation expectations.

Finally, with regard to monetary policy, such consumption and investment acceleration effects provide the rationale for the Taylor rule principle that interest rates should be adjusted slightly more than the change in inflation. Thus, if inflation

accelerates, the nominal interest rate should be raised proportionately more to offset resulting consumption and investment acceleration effects.

This last point also bears on the issue of regulation that nominal interest rate ceilings, a policy known as financial repression that was once popular. Such ceilings make the model more prone to instability by increasing the parameter E_3 . When inflation rises, nominal interest rate ceilings serve to hold down the real interest rate, thereby increasing AD and causing inflation to accelerate.⁴

IV Inflation and inside debt effects

The above analysis ignores the presence of inside debt effects operating on debtors and creditors, the implicit assumption being that these simply wash out. Fisher (1933) analyzed the effects of deflation in the Great Depression, and argued that lower prices affected debtors and creditors asymmetrically. Lower prices increase real debt burdens of debtors while increasing the real value of debts owed to creditors by an identical amount. However, because debtors have a higher marginal propensity to spend than creditors, this lowers AD. As a result, the Fisher debt effect can offset the positive effect of a lower price level on AD operating via the Pigou real balance and Keynes money supply effects. The net result is that a lower price level may lower AD.

Tobin (1980) and Palley (1999) have analyzed the implications of the Fisher debt effect for conditions of deflation. However, Fisher debt effects also operate in an environment of inflation and rising prices. Now, a higher price level reduces the debt service burden of debtors, positively impacting AD owing to the higher marginal propensity to spend of debtors. If the Fisher debt effect dominates the Pigou and Keynes

⁴ In symmetric fashion, nominal interest rate floors exacerbate proclivities to instability in conditions of deflation by preventing the real interest rate from falling (Palley, 2004).

real money supply effects, a higher price level can increase AD. This situation is captured in the ISLM diagram shown in Figure 3. Now, a higher price level shifts the LM upward (the Keynes effect), but it also shifts the IS upward as the Fisher debt effect dominates the Pigou real balance effect. If the IS shift is sufficiently strong, AD and output rise.

The incorporation of a Fisher debt effect can dramatically alter the analysis of inflation. The inclusion of inside debt changes the AD function, which is now given by

$$(1.b) \quad y = E(i-\pi^e, \pi^e, M/p, D/p, Z)$$

where D = level of nominal inside debt. The partial derivative with respect to nominal debt, E_D , is negative reflecting the Fisher debt effect. With regard to mathematical stability analysis, including Fisher debt effects changes the parameter E_2 which becomes $[E_i i_{M/p} + E_{M/p}]M + E_D D\}/p^2$. This is smaller in absolute value, making instability more likely. In terms of economic analysis, the Fisher debt effect offsets the stabilizing Pigou and Keynes effects, making instability more likely.⁵

Once again the question of stability can be analyzed with the help of the iso-AD diagrams, and there are two cases to examine. Combining equation (1.b) with equation (2) then yields

$$(6) \quad y = E(i(\pi^e, M/p, y) - \pi^e, \pi^e, M/p, D/p, Z)$$

Totally differentiating with respect to π^e and p yields the slope of the iso-AD contour, which is given by

⁵ Inside debt effects can be modeled in a number of ways. The current specification is the simplest and is in terms of real debt, D/p . A second possibility is in terms of debt service burdens, $V = i(p,..)D/p$. Because a lower price level can lower the nominal interest rate, the Fisher debt effect requires $\delta V/\delta p < 0$. Alternatively, debt must be fixed rate. A third possibility is in terms of the debt service-to-income ratio, $i(p,..)D/py$. Assuming the Fisher debt effect holds, then inflation and deflation can be even more prone to instability. This is because excess (deficient) demand leads to inflation (deflation) and output expansion (contraction), and the output adjustment worsens the Fisher debt effect.

$$\delta p / \delta \pi^e = [E_i i_{\pi e} - E_i + E_{\pi e}] / \{ [E_i i_{M/p} + E_{M/p}] M + E_D D \} / p^2 > < 0$$

where if $E_i i_{\pi e} - E_i + E_{\pi e} > 0$ and $\{ [E_i i_{M/p} + E_{M/p}] M + E_D D \} > < 0$.

There are two cases to be considered. The first is when the Fisher debt effect is dominated by the Pigou and Keynes effect. The second is when the Fisher effect dominates the Pigou and Keynes effects.

In case one, the Fisher debt effect is non-dominant so that $[E_i i_{M/p} + E_{M/p}] M + E_D D > 0$ and the iso-AD contour remains positively sloped. However, since $E_D D < 0$, the denominator is smaller and the absolute value of the derivative is larger, so that the slope is larger. The reason why the iso-AD contour is steeper is that higher prices have a smaller restraining impact on AD owing to the Fisher debt effect, so that any increase in inflation expectations (which increases AD) needs a larger increase in the price level to hold AD constant along the iso-contour. A steeper slope in turn means that the set of stable price adjustment paths shrinks. The inclusion of inside debt therefore renders the model more prone to instability. Moreover, the likelihood of instability depends on the level of inside debt, D , which enters in the expression for the slope of the iso-AD contour.

Case 2 is when the Fisher debt effect, $E_D D$, dominates the Pigou and Keynes effects so that $[E_i i_{M/p} + E_{M/p}] M + E_D D < 0$. In this case the slope of the iso-AD contours changes and becomes negative. In addition to reversing the slope of iso-AD contours, the Fisher debt effect also reverses their rank ordering so that higher iso-contours are associated with lower levels of AD. The logic is that a lower price level raises debt burdens and lowers AD so that a higher rate of expected inflation is needed to induce a more expansionary Tobin – Mundell effect.

Figure 4 shows the case where the Fisher debt effect dominates so that the iso-AD contours are negatively sloped. In this case, the inflation process is unambiguously unstable, with all price adjustment paths leading to higher iso-AD contours. Even if there is Walrasian-style instantaneous price adjustment with the price level rising without any impact on inflation expectations, the economy still moves to a higher iso-AD contour and the process of price adjustment remains unstable.⁶

V Policy implications

The inclusion of the Fisher debt effect has important policy implications for understanding inflation and it highlights problems posed by today's high levels of inside debt. In highly indebted environments, increases in the price level actually increase AD through erosion of debt burdens, and this can cause the inflation process to accelerate rapidly.⁷

Analytically, if the Fisher debt effect is non-dominant, then the region of instability is increased with its inclusion. If it is dominant, the inflation process is unambiguously unstable. Furthermore, the likelihood of instability also increases with increases in the level of inside debt, D .

The exact same reasoning applies to the deflation process (Palley, 2004). If the Fisher debt effect is dominant, the deflation process is unambiguously unstable. If it is

⁶ The current analysis assumes that inside debt stocks are fixed, consistent with short-period macroeconomics. Longer run analysis requires modeling inside debt, which requires modeling the demand and supply of credit. Inflation will likely increase credit demand, which will increase the money supply according to Post Keynesian monetary theory. That can have additional AD effects, increasing proclivities to instability. The reverse holds for deflations. Some progress has been made on these issues by Chiarella et al (2000) and Asada (2004), and introducing debt stock adjustments paves the way for cyclical fluctuations. However, their focus is deflation. Additionally, the modeling technique is at an even higher level of aggregation relying on extreme reduced form analysis. That obscures economic insights provided by Tobin's framework regarding the causes of instability and the distinction between "price level" and "inflation" effects.

⁷ If debt is floating rate, then higher nominal interest rates that move with inflation will negate the Fisher debt effect.

non-dominant, it increases size of the set of deflation price adjustment paths that are unstable.

These features mean that large debt burdens will tend to make the conduct of monetary policy more complicated and volatile. The reason is as follows. When in the deflation zone, the monetary authority must react quickly to head off the prospect of an unstable deflationary price adjustment path. But if it is successful in heading off deflation and moving to an inflationary adjustment path, monetary policy must then react quickly to head off the prospect of an unstable inflationary price adjustment path. In effect, monetary authorities may find themselves on a “knife-edge,” maneuvering between an unstable deflationary path and an unstable inflationary path.

Such analysis helps explain recent U.S. Federal Reserve policy. The U.S. economy has much higher inside debt ratios than in the past, and this may signal that the economy is now prone to both unstable inflationary and unstable deflationary processes. When deflation threatened in the period 2001 – 2003, the Fed lowered interest rates much more sharply than historically warranted according to headline macroeconomic numbers in order to stave off a potentially unstable deflation. However, it was so successful that it may have triggered the possibility of an unstable inflation, and hence the need for the Fed to shift into rapid interest rate raising mode over the period 2004 - 2006.

Looking to the future, such analysis suggests that monetary policy will be more volatile owing to the new environment of high inside debt levels. The danger is, that given the knife-edge character of a highly indebted economy, there is less room for error with regard to inflation and deflation. If the monetary authority gets it wrong, either by raising rates too much or not enough, there can be rapid takeoff of deflation or inflation.

Price level adjustment no longer acts as an automatic stabilizer, choking off demand under inflationary conditions and increasing demand under deflationary conditions. Instead, price level adjustment becomes an automatic de-stabilizer by either eroding debt burdens in inflationary times or augmenting them in deflationary times. In this environment monetary authorities need to be ultra-timely in responding to both incipient inflation and incipient deflation. This is a difficult task.

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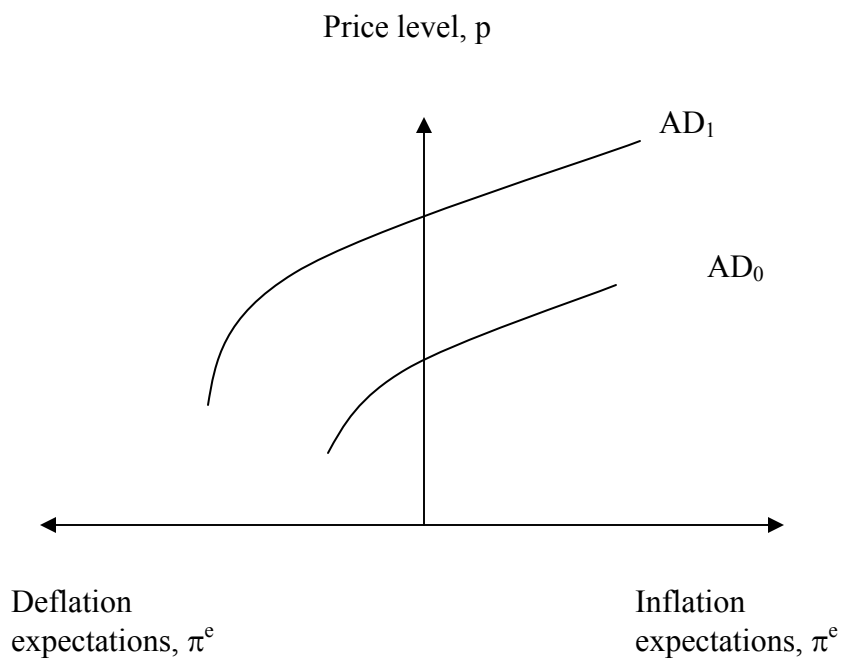


Figure 1. Iso-AD contours in which there is a positive Pigou and Keynes effect and a negative Tobin-Mundell effect. $AD_0 > AD_1$.

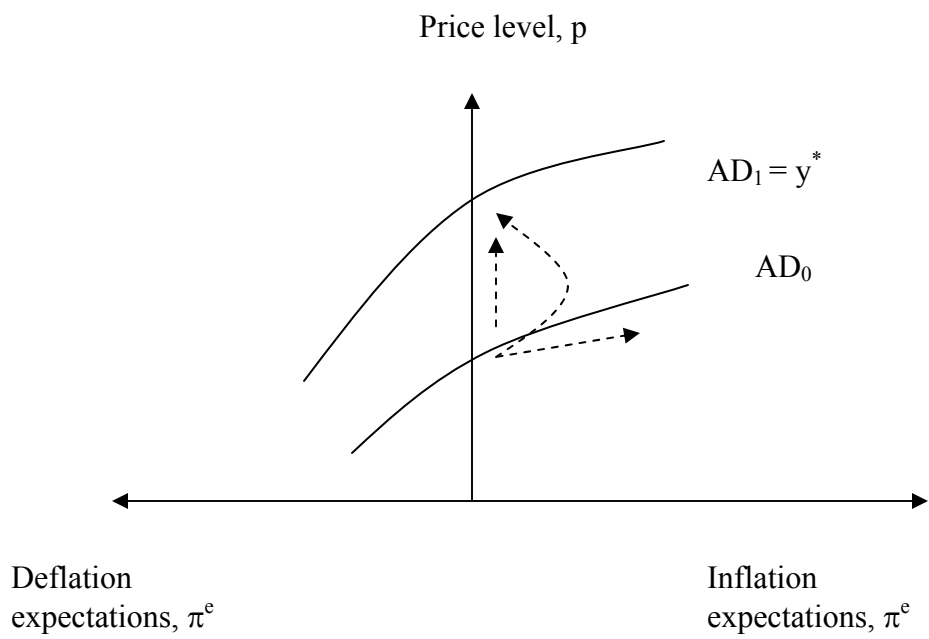


Figure 2. Three different price adjustment paths. AD decreases along the two steep paths where the price level increases with little impact on inflation expectations. AD rises along the third path. $AD_0 > AD_1$.

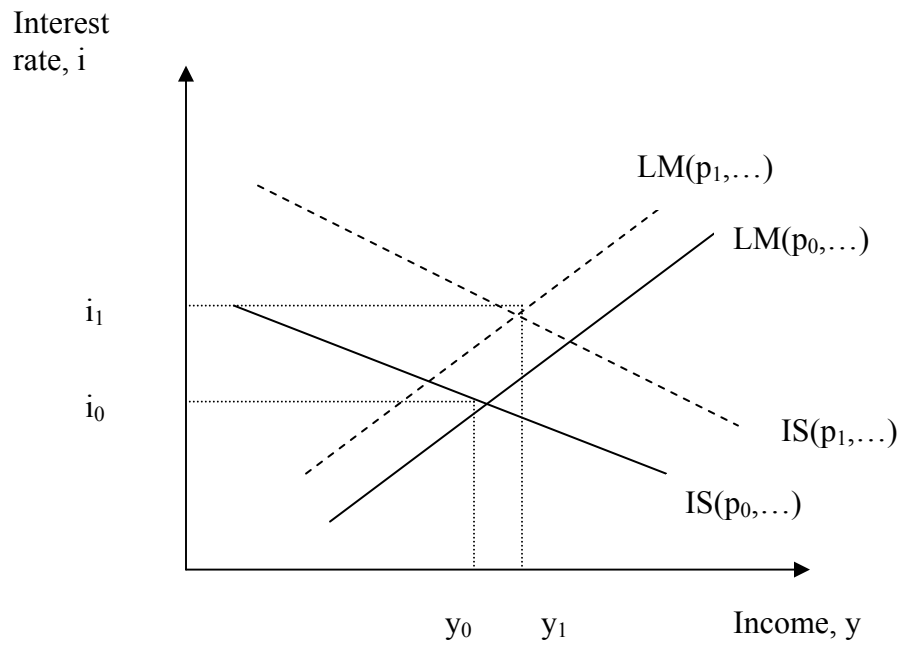


Figure 3. The effect of a higher price level ($p_0 < p_1$) in the ISLM model when the Fisher debt effect dominates the Pigou and Keynes effects.

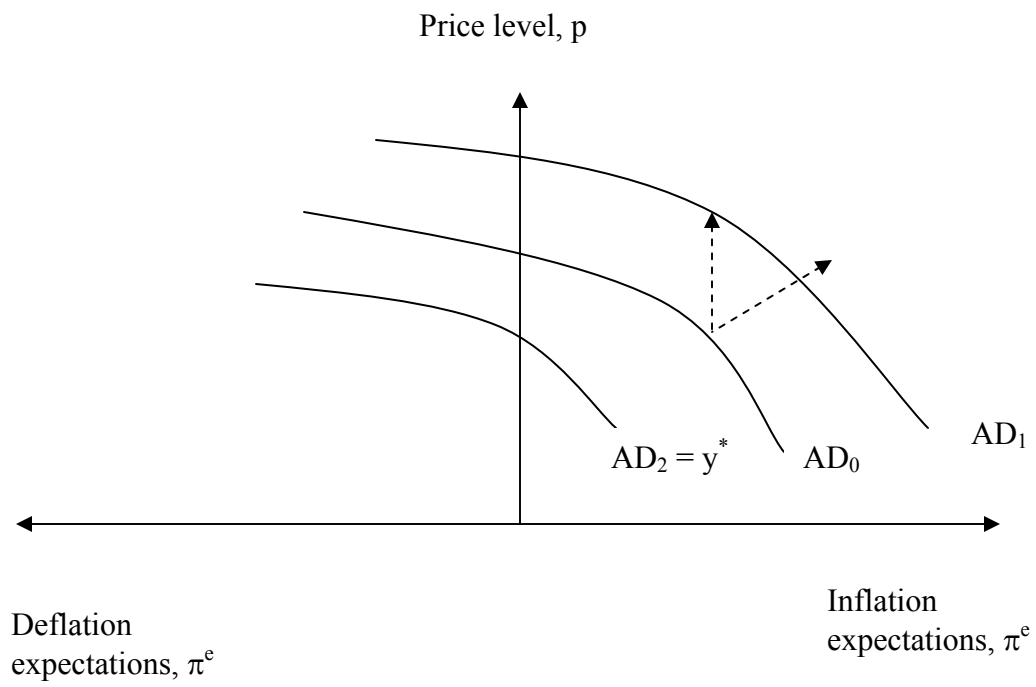


Figure 4. Iso-AD contour map when the Fisher debt effect dominates the Pigou and Keynes effects. $AD_2 < AD_0 < AD_1$.