Section 9.5 Combining the Policy Rate, the Fisher Equation and the EAPC

The Expectations Augmented Phillips curve is: $\pi t = \pi t (exp) - \Theta (Ut - U^*t)$

The Fisher equation is: $Rt = r^* + \pi t (exp)$

However, as Friedman stressed "The similarity is not coincidental." His approach is basically classical. One can make a stronger statement. The Fisher equation can be somewhat thought of as the economic 'dual', in a linear programming sense, of the expectations augmented Phillips curve (EAPC). Corresponding to the natural rate of unemployment (U*), in LRE there is a natural rate of interest (r*). The Fisher equation was completely ignored in Keynesian analysis for three decades, but was revived by Friedman in December 1967.

Friedman's analysis reconciles the Keynesian and the classical theory of interest by integrating the short run and the long run influences upon the interest rate in real time. This chapter explains this correspondence and depicts algebraically the process that he verbally sketched out, while leaving out money growth, which was his policy variable. [5]

Start in Long Run Equilibrium with aftOR (Adjusted for trend Output Ratio) = 100. The central bank sets the nominal rate R, and depending upon what ? (exp), there is a certain expected real rate, r(exp). In equilibrium r is at r* (assumed = 4 here) and aftOR is 100. As we saw in Chap __, one of the factors that drives the investment component of GDP is the interest rate – more precisely the expected real rate r. Thus when r exp

[5] By contrast, most texts which start with the IS/LM model, introduce flexible prices and then the dynamic AD/AS curves, fail to integrate the short and long run in a consistent manner. They deal with the Fisher equation and the EAPC in separate chapters.

falls, investment goes up and so does aftOR. There may be some multiplier effect i.e. GDP goes up by more than the rise in investment[6]. This will be discussed later in Chapter 11. But the magnitude of this multiplier effect, if any, only affects the transmission coefficient from the interest rate to output. It does not alter the labour market and other processes outlined here.

For numerical simplicity, consider the simplest investment function: a one percentage point fall in r raises aftOR by one percentage point: the 'transmission coefficient' is one. Assume to begin with, π and π (exp) are also 6% and so R = 4 + 6 is 10%. The economy is in Long Run Equilibrium (LRE) in period 0 and Period 1 (see simulation on next page).

Then suppose in Period 2, the central bank lowers the (nominal) policy rate from 10% to 8%. This simultaneously lowers r (exp) to 2% and raises aftOR to 102. From previous labour market analysis of the EAPC (expressed in terms of aftOR , instead of unemployment) inflation goes up. Again, for simplicity, we take the simplest functional response: a one percentage point in aftOR raises inflation by the same amount, so Pie rises to 8%. This in turn raises π (exp). Once again, we choose the simplest functional form: π (exp) = π (t - 1).

Realizing that the economy has overheated and that inflation has risen, and/or pressured to keep inflation in check, the central bank raises the policy rate sharply to

[6] As factories and houses get built in response to lower interest rates, suppose the newly hired workers in these sectors spend income on consumer goods. In response, over time, the output of consumption goods rises more than the initial rise in investment. Total GDP will thus rise by a multiple of the initial rise in investment. The theoretical basis and empirical validity of Keynes multiplier are discussed in Chap 11.

11% in period 3. It may not know what exactly Π (exp) i.e. the public's expectations is. However, this is not enough to stabilize inflation. It takes three more increases in the policy rate up to 14.5% before the economy stabilizes back at aftOR =100. This can be seen in the simulation below. The initial lowering of the policy rate has to be reversed and the economy ends up with a higher rate, as can be seen below.

Easy Money Policy

				Actual	Expected Infl
	Policy Set		Output Ratio	INFLATION	1.0*E8
Period	Nominal	real	**aftOR** =	π = π(exp)	π (exp)
	Rate	r(exp)	100 +(r*-re)	+ (aftOR-100)	= π (t-1)
					in this case
0	10	4	100	6	6
1	10	4	100	6	6
2	**8**	2	102	8	6
3	11	3	101	9	8
4	12	3	101	10	9
5	13.5	3.5	100.5	10.5	10
6	14.5	4	100	10.5	10.5
7	14.5	4	100	10.5	10.5

Tight Money Policy

Period	Nominal	r (exp)	aftOR =	π = π (exp)	π (exp)
	Rate		100 +(r*-re)	+ (aftOR-100)	= π (t-1)
0	10	4	100	6	6
1	10	4	100	6	6
2	12	6	98	4	6
3	9	5	99	3	4
4	8	5	99	2	3
5	6.5	4.5	99.5	1.5	2
6	5.5	4	100	1.5	1.5
7	5.5	4	100	1.5	1.5

Conversely if the central bank started by raising rates, it would end up with lower interest rates, as the second simulation shows. The simulation and numerical example illustrates what I call the <u>monetarist paradox "An easy money policy leads to high</u>

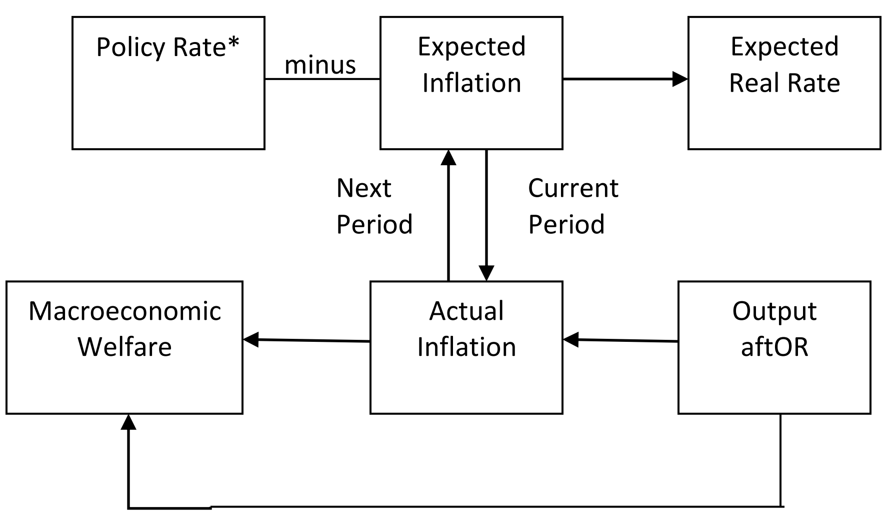
interest rates." The inspiration for the expression 'monetarist paradox' derives from a sentence in Friedman,

"Paradoxically, the central bank can assure low nominal interest rates. But to do so, it would have to start out in the opposite direction, by raising them.. (December 1967)" [7]

Expressed rhetorically, it can be stated as "How do you raise rates? You lower them" and vice versa. It is one of the most robust, non trivial, and from the view point of macro economic welfare, useful conclusions in macro economics. Yet most people, including many supposedly knowledgeable economists, are unaware of this paradox. They notice the liquidity effect (downward shift of LM) curve which results from discrete policy changes. It is very visible (central banks announce it on TV), but it is temporary and cumulatively small. By contrast, the Fisher effect in the financial markets is less visible, usually gradual but cumulatively large.

Flow Chart for Monetarist Paradox Model

Links between Macroeconomic Variables leading to the Monetarist Paradox Model



Policy rate is changed in response to Inflation , Output and Macroeconomic Welfare.

[7] The expression itself I first used in a study (Moorthy, Singh and Dhal, DRG Study, RBI 2000) of India's debt stability under bond financing, in which the above process has been simulated. The above simulation is a simpler version of the debt model used in that study. A section of this study is included later in this chapter.