Introductory Macroeconomics

Pre-Tutorial #5
Week Starting 12th April 2021

The Tutorial. This week's tutorial provides more background material on monetary policy concepts.

Note that your tutor is under no obligation to go through the answers to the pre-tutorial work in detail. The focus in the tutorial will be on the tutorial work itself – the questions here are preparatory.

Reading Guide. You should look carefully over your lecture notes for Week 5. You may also find Chapters 10 and 11 of BOFAH useful.

Key Concepts. Monetary policy. Monetary neutrality. Quantity theory of money. Quantity equation.

Background Material. The well-known economist Milton Friedman once wrote:

> "The fact is that **inflation is always and everywhere a monetary phenomenon.** There has never been an inflation in the course of history which has not been produced by an excessively rapid rate of increase in the quantity of money. The quantity of money has gone up faster than total output and the result inevitably has been a rise in prices."

In this quote, Friedman is articulating the *quantity theory of money*.

To understand this theory, first note that a given amount of money can be used to execute mutiple transactions per period. We refer to this number as the *velocity* of money, it is defined by

$$V \equiv \frac{PY}{M} \tag{1}$$

where P denotes the price level, Y denotes real GDP (so PY is nominal GDP) and M denotes a measure of the money supply. A higher V means a given amount of money is used to execute more transactions per period. Often written $MV = PY$ and known as the *quantity equation*, see below.

So far, this is just a definition. To get the quantity theory of money, we need to add three assumptions.

(i) In long-run, *money is neutral*, real GDP equals potential, $Y = Y^*$, independent of the amount of money in circulation.

(ii) Velocity is constant, $V = \bar{V}$, say.

(ii) Money supply M is controlled by the central bank.

We can then write the price level in the long run as

$$P = \frac{M\bar{V}}{Y^*}$$

Since the growth rate of a product is the sum of the growth rates, we can write inflation, i.e., the growth rate of the price level as

$$\pi = g_M + g_V - g_Y^*$$

where g_M denotes the growth rate of the money supply etc. Since we assumed velocity constant, $V = \bar{V}$, its growth rate is $g_V = 0$ so we are left with

$$\pi = g_M - g_Y \tag{2}$$

In short, the quantity theory of money predicts that we have inflation, $\pi > 0$, when the money supply grows faster than potential output, $g_M > g_Y^*$.

In this sense, inflation is a monetary phenomenon.

Problems/Tasks.

1. Suppose potential GDP is growing at 2% per year and velocity is stable. According to the quantity theory of money, a central bank that wants to target 2% inflation should expand the money supply at what rate?

2. Suppose the central bank thinks potential GDP is growing at 2% but it is actually growing more slowly at 1%. Will this tend to increase or decrease inflationary pressue in the economy? Explain.

3. Consider a financial crisis where people stop spending money and hence *velocity falls*. In particular, suppose velocity falls by a factor of 1/2, $g_V = -0.50$. Suppose potential GDP remains growing at 2%. If the central bank still wants 2% inflation in the long run, by how much should it expand the money supply in this financial crisis?

4. Read the speech by former RBA Governor Ian McFarlane entitled "Monetary Policy Regimes: Past and Future", available on Canvas under Tutorial 5. Especially read the section "The Move to Monetary Targeting" pages 24–26.

Solutions to Pre-Tutorial Work.

1. The *quantity equation* says $MV = PY$ and under the assumptions of the quantity theory of money $M\bar{V} = PY^*$ so

$$g_M = \pi + g_Y^*$$

So if potential output is growing at $g_Y^* = 0.02$ and the central bank wants $\pi = 0.02$ then it should set $g_M = 0.04$ or 4% per year.

As we will see, it's not so easy in practice.

2. If the central bank thinks $g_Y^* = 0.02$ and sets $g_M = 0.04$ thinking it will deliver $\pi = 0.02$ it will be mistaken becase actual inflation will be

$$\pi = g_M - g_Y^* = 0.04 - 0.01 = 0.03$$

or 3% per year, where we have subtracted the actual growth in potential GDP $g_Y^* = 0.01$. In short, slower growth in potential GDP tends to increase inflationary pressure (for a given growth in the money supply).

On learning its mistake, the central bank could of course reduce g_M to 0.03 to get back to $\pi = 0.02$.

3. Here velocity is *not constant*, $g_V \neq 0$. The quantity equation now leads to

$$g_M + g_V = \pi + g_Y^*$$

or

$$g_M = \pi + g_Y^* - g_V$$

If the central bank still wants $\pi = 0.02$ and potential GDP still grows at $g_Y^* = 0.02$ then the 50% fall in velocity means the central bank will have to increase the money supply by

$$g_M = 0.02 + 0.02 - (-0.5) = 0.54$$

or 54% per year. In other words, because of the large fall in velocity, even a large increase in the money supply has only modest inflationary effects.


Il répond oui !
La réponse de Milton Friedman est que l'Etat ne poursuit pas d'autre but que l'intérêt de l'Etat lui-même, ou pour être plus précis, les gestionnaires de l'Etat ne poursuivent que leur critère propre. Non qu'ils soient pervers, mauvais ou égoïstes, mais parce que la logique de situation dans laquelle ils se trouvent dicte leur comportement.
MENLO PARK
CALIFORNIA
MV=PY
ROGER PENSKE
"À QUOI SERT L'ÉTAT ? À RIEN !"
Pour Milton Friedman, la guerre a commencé entre deux « cultures » : celle de l'Etat contre celle du marché.