# SGPE Summer School
# Macro Problem Set 2

*Money and Inflation*
*Mankiw, Ch 4*

$31^{st}$ July 2013

## Question 1

(a) Take the natural logarithm of the quantity equation $MV = PY$.

(b) Totally differentiate this logarithmic version and derive the percentage change rule for small percentage changes.

(c) Use the percentage change rule to show that the quantity theory holds (approximately) if $V$ is constant.

## Question 2

Suppose that money demand is represented by the equation $(M/P)^d = i^{-0.1}Y$.

(a) Use calculus to compute the income elasticity of money demand, which is the elasticity of the quantity of money demanded with respect to output $Y$.

(b) Use calculus to compute the interest elasticity of money demand, which is the elasticity of the quantity of money demanded with respect to the interest rate $i$.

## Question 3

Suppose that the money demand function takes the form

$$(M/P)^d = L(i, Y) = Y/(5i)$$

(a) If output grows at rate $g$, at what rate will the demand for real balances grow (assuming constant nominal interest rates)?

(b) What is the velocity of money in this economy?

(c) If inflation and nominal interest rates are constant, at what rate, if any, will velocity grow?

(d) How will a permanent (once-and-for-all) increase in the level of interest rates affect the level of velocity?

## Question 4

Suppose that consumption depends on the level of real money balances (on the grounds that real money balances are part of wealth). Show that if real money balances depend on the nominal interest rate, then an increase in the rate of money growth affects consumption, investment, and the real interest rate. Does the nominal interest rate adjust more than one-for-one or less than one-for-one to expected inflation?
This deviation from the classical dichotomy and the Fisher effect is called the Mundell–Tobin effect. How might you decide whether the Mundell–Tobin effect is important in practice?

## Question 5

In the Cagan model, if the money supply is expected to grow at some constant rate $\mu$ (so that $Em_{t+s} = m_t + s\mu$), then Equation $(A9)$ on p118 of Mankiw can be shown to imply that $p_t = m_t + \gamma\mu$.

(a) Interpret this result.

(b) What happens to the price level $p_t$ when the money supply $m_t$ changes, holding the money growth rate $\mu$ constant?

(c) What happens to the price level $p_t$ when the money growth rate $\mu$ changes, holding the current money supply $m_t$ constant?

(d) If a central bank is about to reduce the rate of money growth $\mu$ but wants to hold the price level $p_t$ constant, what should it do with $m_t$? Can you see any practical problems that might arise in following such a policy?

(e) How do your previous answers change in the special case where money demand does not depend on the expected rate of inflation (so that $\gamma = 0$)?

## Bonus Question

During World War II, both Germany and England had plans for a paper weapon: they each printed the other's currency, with the intention of dropping large quantities by airplane. Why might this have been an effective weapon?