Chapter 7: Monetary Dynamics and Aggregate Analysis

When the supply or demand for money shifts, changes in the money market exert effects on the goods market. While this provides a straightforward interpretation of changes in the money market, other dynamics are possible. Changes in real value produced by the economy also exert influence on money and financial markets. Further, innovations in financial market will impact demand for and the quantity of base money.

In this chapter we will consider the role of demand for money in influencing the production of money. Changes in demand for money take the form of either changes in demand to hold or in demand to spend money. Both of these will be understood by building upon the tools that we have developed in the previous chapters. The analysis here will be applied to past observations to explain fluctuations in prices and production of money and money like assets.

Economic Productivity and Demand for Money

The equation of exchange identifies two forms of demand for money: transactions demand for money and portfolio demand for money. The total quantity of money demanded between these two forms must match the quantity of money. Thus:

$$M_s \equiv Pyk$$

In chapter 5, we considered the effect of both kinds of demand on the quantity supplied of a resource, oats, that serves as money. However, we did not divide demand for money between transactions and portfolio demand. In chapter 6, we considered the effect of changes in the supply of money and portfolio demand for money on the market for non-money goods. Analysis employed a perfectly inelastic stock of money, however, to differentiate between changes in demand for money and changes in the quantity of money.

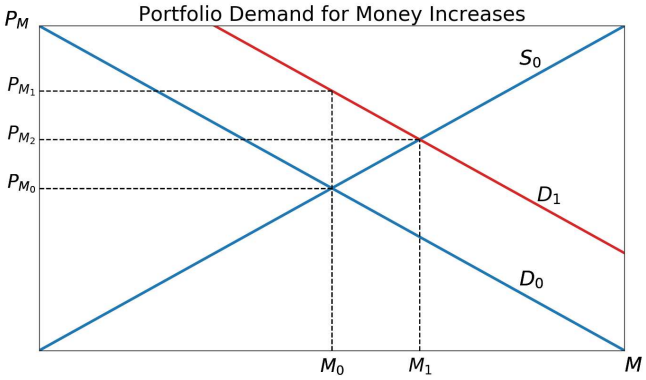
At different times in history and in markets for different kinds of money, the supply of money is relatively elastic, much as would be expected with any economic good for which there is a market. Chapter 5 showed, for example, that the quantity of oats responded to an increase in demand for oats once oats were adopted as money. We will generalize this phenomena as we continue to develop our analysis.

Increase Portfolio Demand and Endogenous Money

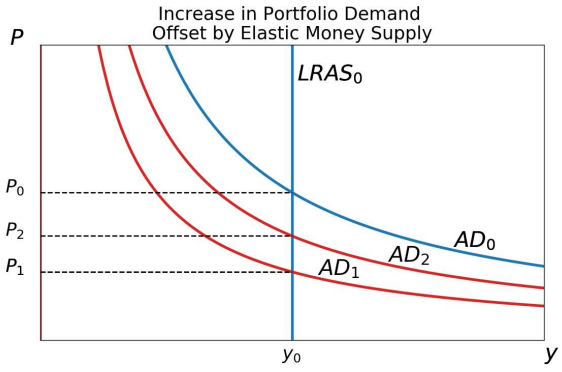
So far, analysis of the money market has only included the response of the price of money. Our use of a perfectly ineleastic supply curve has kept the quantity from responding to a change in demand for money. By using a relatively

elastic supply curve, we can show that, although prices bear the full weight of the response initially, they do not have to bear the full weight of changes in demand for money in the long-run.

Without consideration of a response from demand from the money market, one would consider a permanent fall in the velocity of money to lead to a permanent fall in aggregate demand. In the long-run, the price level would fall if not for the fact that producers of money will respond to an increase in the price of money. If the money referred to is a commodity money, this may take time, so the initial response in the goods market may be for the price level to fall further than it will in the long-run. The full distance of the fall in the price level would be represented in the money market by the rise from P_{M_0} to P_{M_1}. That is, for shorter time horizons the money supply curve is perfectly inelastic.



Until the quantity of money supplied responds to the rise in the price of money, aggregate demand will remain depressed, as represented by AD_1. While some money markets may respond quickly to changes in demand for money - this is particularly true of financial markets - a commodity that serves as base money is typically slow to respond to a change in demand for money. If the quantity of money is unable to respond, the price of money must rise until the quantity of money can adjust to the new level of demand. Only once the quantity of money has increased to M_1 does the price of money settle at P_{M_2}.



Real Income Increase II

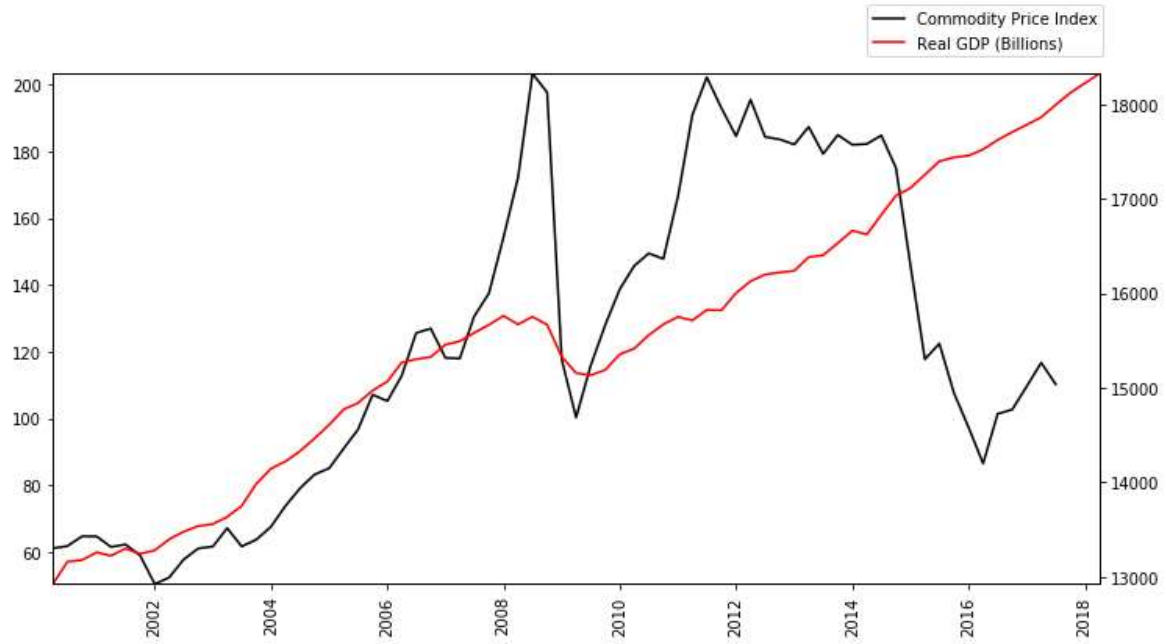
Suppose that M1 = 1000, V1 = 3000, P1 = 50, and y1 = 60. What will be the the new value of nominal income if the money supply increases to 1500?

LRAS Increase III

Suppose that M1 = 1000, V1 = 3, P1 = 50, and y1 = 60. What will be the new price level if the money supply increases to 1500?

Whether or not the commodity of interest is used as money, the same dynamics that operate concerning excess supplies and excess demands operate in this framing. With the initial increase in portfolio demand for money, there exists an excess demand for money that drives up prices. However, instead of moving to the new equillibrium price of money, P_{M_2}, immediately, the price of money would likely overshoot until the quantity of money can adjust. Over

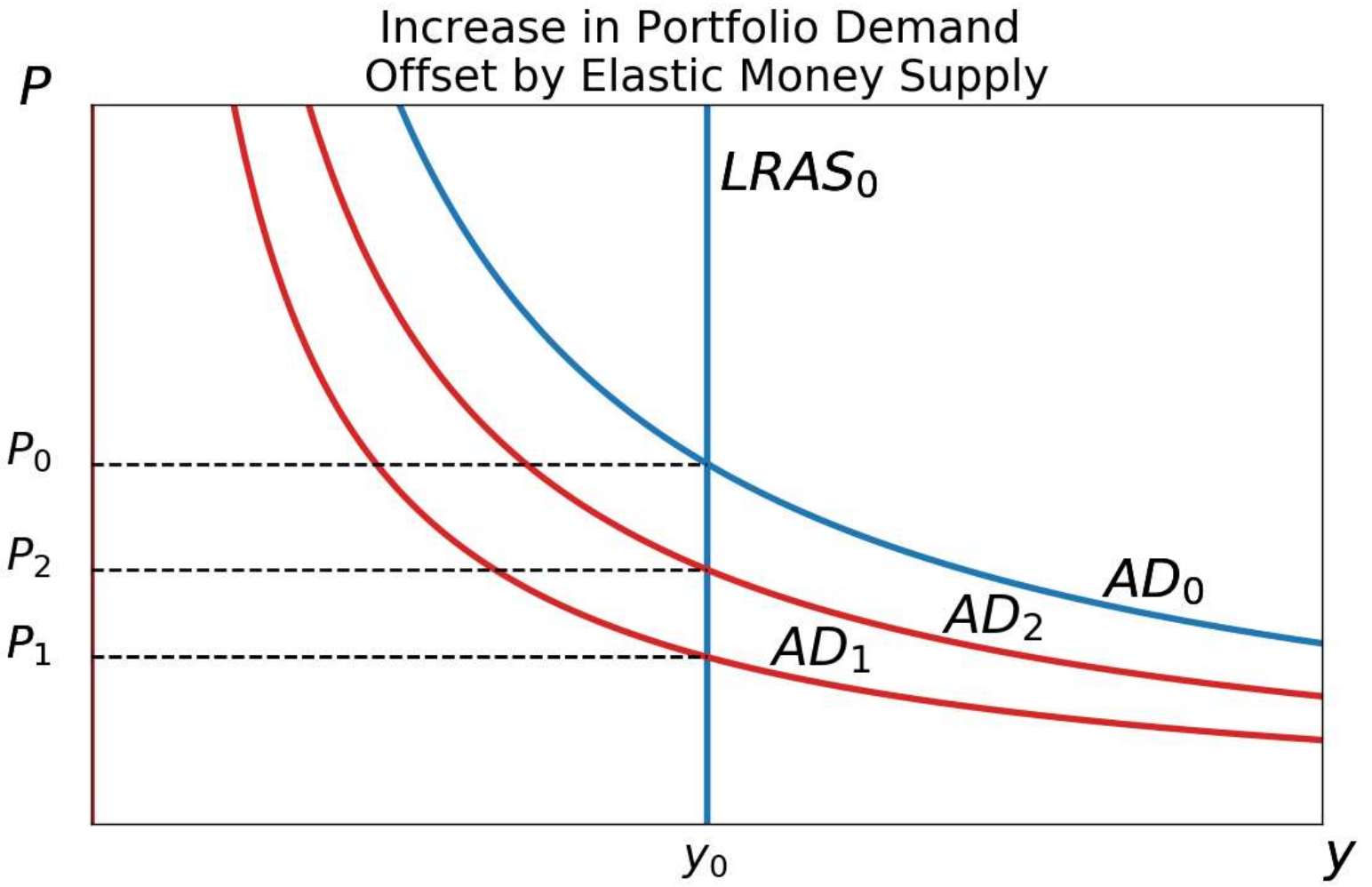
relatively short time-horizons, the supply of commodities is relatively inelastic. This is true even if investors expect that there will eventually be an increase in the quantity of the commodity of interest.



Starting in 2008, we saw precisely this dynamic. A move to electronic trading and a desire for liquidity incentivized investors to increase demand for commodities. The price of commodities surged and, after recovering from a brief dip that occurred in the latter part of the 2008 recession, remained mostly elevated for several years. Eventually production was able to adjust to the new level of demand for commodities and reverse the general increase in the prices of commodities.

Aggregate Demand and Portfolio Demand

Mark the combination of price level and real income that represents the macroeconomy before money production responds to an increase in portfolio demand for money



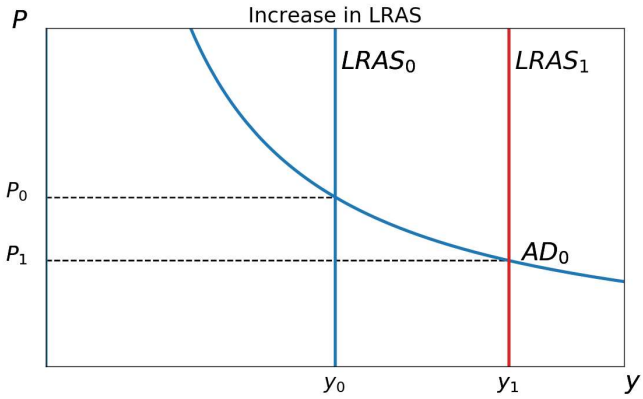
Long-run Aggregate Demand and the Money Market

Portfolio demand is only one of two types of demand for money. The other form of demand is transactions demand, defined by nominal income (Py). Since the price level is ultimately an effect, not a cause, of economic change, in the long-run changes in transactions demand are driven by changes in y.

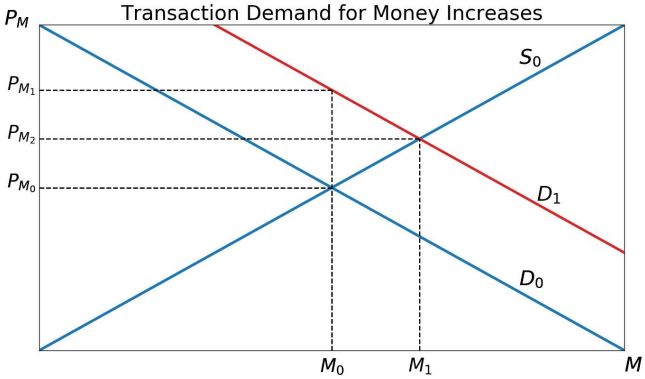
If the money stock was perfectly static, there would actually be no change in the value of nominal income as an increase in transactions demand is offset by a fall in P. If aggregate demand remains constant, a change in the rate of growth of y must be perfectly offset by the rate of growth of P. However, we do not observe a fixed money stock or a fixed growth

rate of nominal income. This is due partly to a growing credit stock and partly due to a growing stock of base money. In this chapter we will consider the growth of the base money stock.

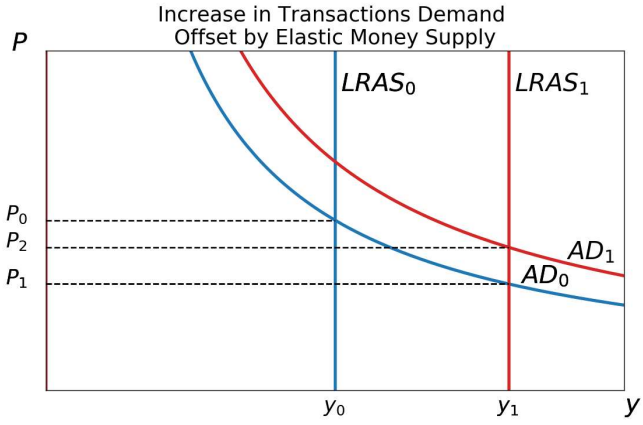
Suppose that real income increases such as to shift the long-run aggregate supply from y_0 to y_1. In order for all available goods to be sold, either the price must fall from P_0 to P_1 or the aggregate demand must increase, intersecting with the original price level, P_1. There is no reason to expect that aggregate demand will shift, at least not before the price level falls.



A fall in the price level will is ultimately the effect of an increase in demand for money. Before, the increase in demand was the result of a preference to hold more money than before. This time, the increase in demand for money is the result of an increase in real goods available for sale. As in the case where portfolio demand increased, demand for money increases in response to the greater quantity of goods available.



Instead of reversing a previous fall in aggregate demand, however, the increase in demand offset the fall in prices that results from the rise in income. As new money is produced, the quantity increases from M_0 to M_1. As a result of movement along an upward sloping money supply curve, aggregate demand also increases. Since prices move before the structure of production can fully adjust to the change in demand, the price level first increases to P_1. The rise in moderated by an increase in the quantity of money, moving the price level to P_2.

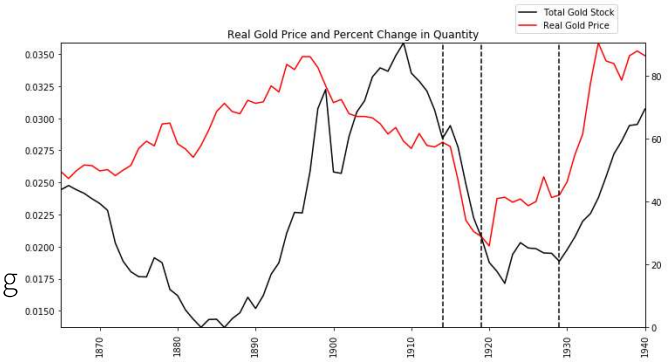


Evidence from the Gold Standard

During the years of the international gold standard, the quantity of gold produced changed, often in the same direction as demand. In the first decade of the 20th century, the supply of gold was still finishing its adjustment to the cyanide process, which began to be more broadly implemented in gold production by the mid 1890s. By the start of the 1910s, this increase in supply was about complete. No major innovation in gold production or major, unexpected sources of gold were discovered followed in the time period of consideration. The supply of gold was relatively stable during this period. Consequently increases in quantity in this period were driven by changes in demand.

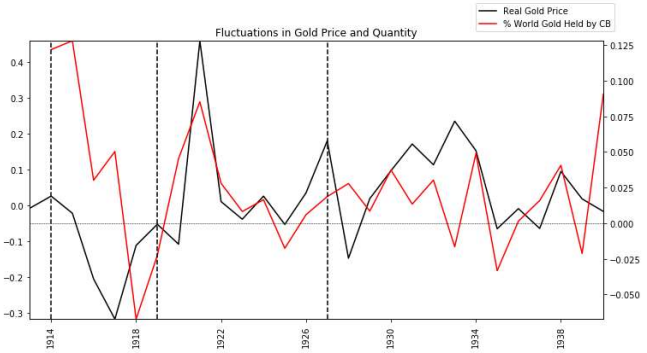
The development of the cyanide process was itself in response to an elevated level of demand for gold that followed the adoption of the international gold standard. The increase in demand came just as the supply of known gold sources

were dwindling. Cyanide process was discovered in 1887. It would take nearly a decade for the upward trend in the price of gold to finally reverse as the rate of increase of the gold stock improved.



The year 1914 marked the start of the first world war. Soon after the start of the war, most nations abandoned the gold standard, delinking their money from gold. This change represented a substantial decrease in demand for gold. Changes in supply no longer drove the price of gold. For the next few decades, the quantity of gold produced would mostly depend upon changes in monetary policies.

Throughout the early 1900s, central banks accumulated an increasing share of the gold stock. At the start of the war, central banks held the majority of the world's monetary gold and around 30% of all gold. Central banks became the predominant and only major source of demand for monetary gold by the start of the 1930s, holding over 90% of the world's monetary gold and over half of all existing gold.



This period, then provides a unique opportunity to directly observe the effect of changes in demand for gold on the price of gold and, likewise, to observe changes in the price of gold on the quantity of gold produced. Changes in central bank demand for gold, identified by the holding's portion of all existing gold, clearly drove changes in the price of gold throughout the two decades following. Fluctuations in central bank demand for gold were ultimately responsible for the fluctuations in prices that drove dominated the changing magnitudes of gold production.

Conclusion

Aggregate analysis useful, not only for understanding direct effects of changes in M an V, but also by their implication of second order effects. A change in demand for money leads not only to change in the price of money in the same direction. It also produces a change in the quantity produced of money. This is a hopeful fact for scenarios where the economy suffers from an excess demand for money. If the quantity of money did not adjust to an increase in demand, the price of money, and by implication the price level, would have to bear the full brunt of the change in demand for money. A recession thus stimulates money production.

In an age where discretion by monetary authorities determines the quantity of base money, the regulation of the money stock in accordance with the factors of supply and demand by profit seeking entrepreneurs has become a forgotten artifact by most. In reality, the forces govern not only the quantity of base money under a commodity standard, but also the quantity of credit and near moneys in financial markets. These patterns are especially apparent in bonds markets as well as future claims to commodities that make up a great portion of assets provided by exchange-traded funds. We will revisit this fact and nuances surrounding it in later discussions of financial markets and business fluctuations.