Chapter 6: Aggregate Demand

Macroeconomics is the study of all economic activity. This includes compleixities that arise in the course of production and exchange. It also includes analysis using statistics that represent the sum of all economic activity or activity in different sectors and of different kinds.

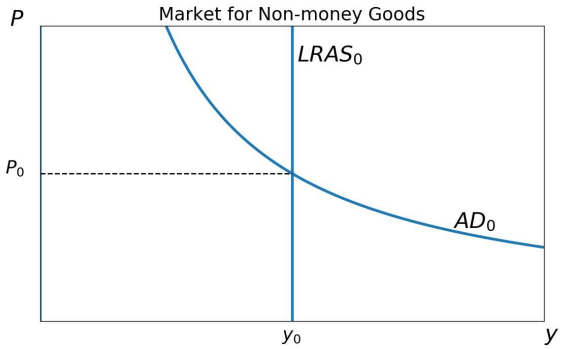
Although the economy cannot be reduced competely to different aggregates without losing information, aggregates themselves contain infromation that is unavailable at the level of analysis of particular events. Consderation of aggregate values allows one to consider the details of macroeconomic equilibrium, as well as macroeconomic disequilibrium.

The Money Market and the Goods Market

The equation of exchange is a golden key that unlocks the secrets of the macroeconomy. It links changes in the money market to changes in the market for non-money goods, and vice versa, by defining aggregate demand as MV. The aggregate demand curve assume a given level of expenditures. It is defined according to different combinations of P and y whose product is equal to the value of aggregate demand and is downoward sloping across P-y space.

In this chapter, we will use it to understand how changes in the goods market lead to changes in the market for non-money goods. For simplicity sake, we will assume that there is only one good that acts as money. We will discuss in a later chapter that analysis can include other moneys, but there existence is not directly captured in the variable representing the quantity of base money, M_B.

In the previous chapter we discussed changes in the two aggregate variables that influence aggregate demand: the supply of money and portfolio demand for money. For simplicity we start with a market whose supply of money is perfectly inelastic, as compared with a commodity money whose supply is elastic. A perfectly inelastic money supply allows us to consider money as a choice variable, much as base money is the result of the policy of a monetary authority. Changes in the price of money will therefore not affect the quantity of money supplied to the market. With an perfectly inelastic supply of money, M, which could otherwise reference an a function is simply the quantity of money. Portfolio demand for money is the inverse of the average velocity of money:



$$k = \frac{1}{V}$$

A change in M or a change in k, therefore represents a shift in aggregate demand.

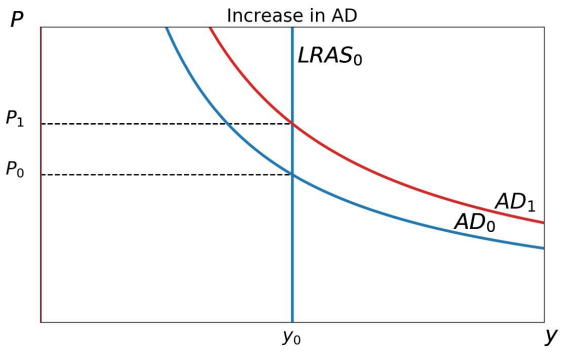
Our graph of the market for non-money goods includes the long-run aggregate supply curve ($LRAS$) and the aggregate demand (AD) curve. Following the implication of the Solow model, the LRAS is given, only capable of being moved if "total factor productivity" - i.e., technology - changes.[1] We will focus here on the effect of changes in AD.

Long-run Dyanamics

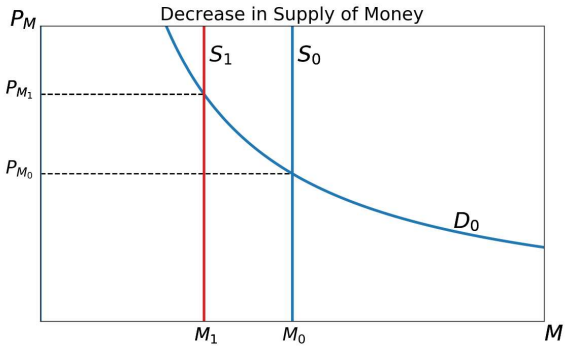
The distinction between long-run and short-run is critical for understanding dynamics that develop between the money market and the non-money goods market. In the long-run, the price level fully reflects changes in AD, whether the shift in AD is a result of a change in M or a change in V. In the short-run, changes in real income absorb changes in AD. While long-run changes are essentially inevitable, short-run changes do not ever need to occur. If they are observed, they occur only in the short-run.[2] After investigating long-run dynamics, we will consider short-run dynamics.

Case 1: Aggregate Demand Increases

An increase in AD represents an increase in the value of total expenditures across the economy (Figure 2). By definition, this value of total expenditures matches the value of nominal income. In the long-run, an increase in AD will lift the price level from P_0 to P_1. Notice that this results in an increase in nominal income from a value of $P_0 y_0$ to $P_1 y_0$. This increase in nominal income does not entail an increase in real income in the long-run. This would only happen if the long-run aggregate supply shifted to the right and would be represented by a y_1 whose value is greater than y_0.



The increase in AD can come from one of two sources: either an increase in the quantity of money, M, or an increase in portfolio demand, k. We will consider the more intuitive case of an increase in M first. If the increase in the quantity of money occurs when the economy is already in equilibrium, the shift will most obviously change the price of money, P_m. Since $P_m = \frac{1}{P}$, the a change in the average price of money is simply the corollary to amovement of the price level in the opposite direction.



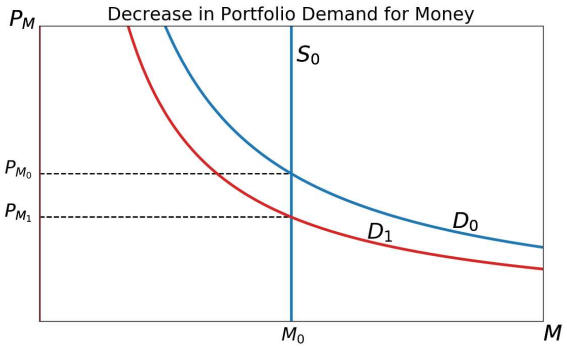
The increase in the quantity of money represents a movement along the demand curve. This demand curve includes both portfolio demand, k, and transactions demand, Py. For now, we assume that these sources of demand remain constant. Thus, the increase from M_0 to M_1 translates directly to a fall in P_m from P_{m_0} to P_{m_1}.

AD 1

Suppose that the money stock increases from $100 to $150 and that the velocity of money is 10. What is the change in aggregate demand? (Do not include a $)

AD2

Suppose that the money stock increases from $100 to $150 and that the velocity of money is 10. Suppose that real income measured in constant dollars is $20. What is the new price level? (Do not include a $)



Only a shift in k represents an inverse change in portfolio demand as k represents the portion of the money stock that individuals choose to hold throughout the period under consideration. Since k is the inverse of V, so long as V is greater than 1, then k is a fraction less than 1. As with the increase in M, a fall in k leads to a fall in the P_m from P_{m_0} to P_{m_1}. This coincides with an increase in P from P_0 to P_1. Thus, a fall in the value of money is tantamount to a rise in the price level. This fall in the price level means that the new value of nominal income, $P_1 y_0$ is less than the old value, $P_0 y_0$.

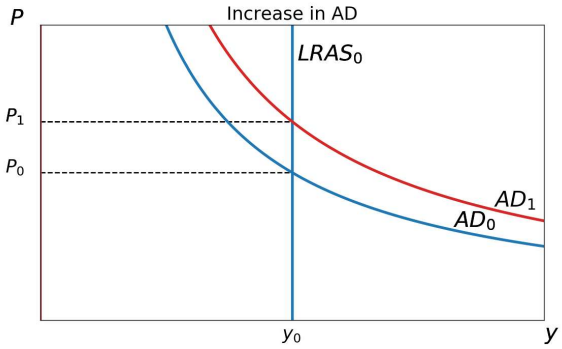
Portfolio demand

Suppose the velocity of money is 10. What is the value of portfolio demand for money?

A	100
B	.001
C	.01
D	.1

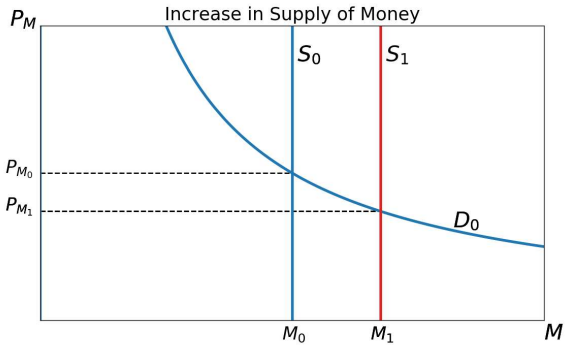
Case 2: Aggregate Demand Falls

A fall in AD represents an decrease in the value of total expenditures across the economy (Figure 6). This results in a fall in nominal income. In the long-run, an fall in AD will depress the price level from P_0 to P_1. Notice that this results in a decrease in nominal income from a value of $P_0 y_0$ to $P_1 y_0$. The long-run level of real income, y_0, remains

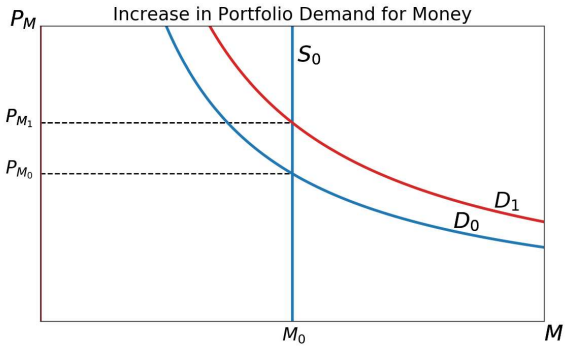


unaffected. Just as a rise in M increases AD, a fall in AD may occur due to a shrinking of the money stock. With less money in the economy, the previous equilibrium level of prices could only be sustained if individuals tended to decrease their cash holdings in response. For clarity, we consider cases where only one of the variables comprising aggregate demand changes.

The decrease in the quantity of money exerts a positive impact on the price of money, P_m. The new equilibrium value of money moves from P_{M_0} to P_{M_1}. Because there is less money availble to be spent, the previous level of prices cannot be sustained. In order to sell all available goods, firms must reduce their prices. This is reflected by a fall in average prices from P_0 to P_1.

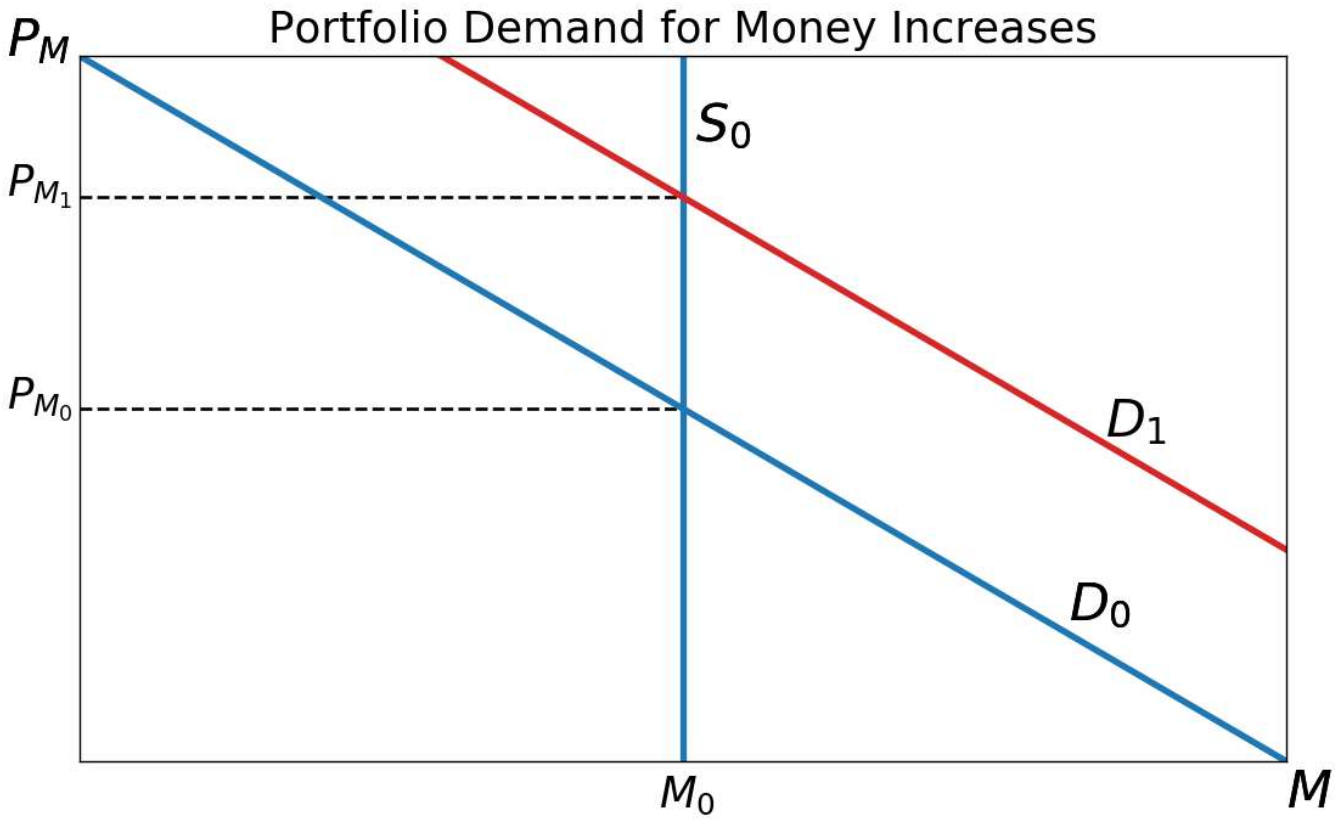


AD may also fall due to an increase in demand to hold money. This increase in portfolio demand for money, k, is the same as a fall in the average velocity of money, V. An increase in demand to hold money leaves less money available for expenditure. This exerts a negative influence on prices and, necessarily, a positive influence on the price of money. Just as with a fall in the money supply, the equilibrium price of money rises from P_{M_0} to P_{M_1}



Increase in Demand for Money

Show the final price and quantity of money after demand for money has increased



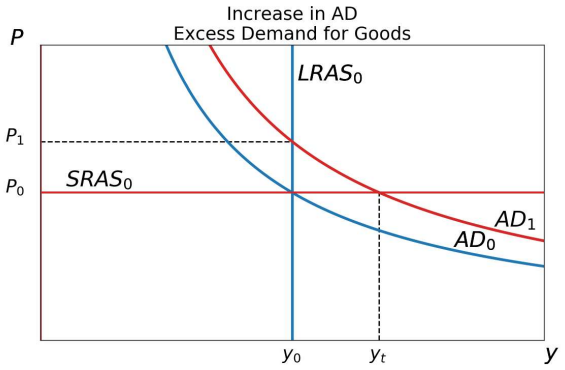
Short-run Dynamics: Excess Supply and Excess Demand

The short-run is defined by any period of time that real income responds to changes in aggregate demand. The short-run is defined by a short-run aggregate supply (SRAS) is perfectly elastic. This means that it is horizontal, set at the value of the initial price level. We assume that in the short-run, quantities adjust before the price level. In the long-run, any value of y that is less than y_0 is less than the full potential that can be produced in the long-run. Any value of y that is greater than y_0 cannot be sustained as it would demand that producers sustain real losses as input prices are bid upward. An scess demand for goods imply an excess supply of money and excess supply of goods implies an excess demand for money.

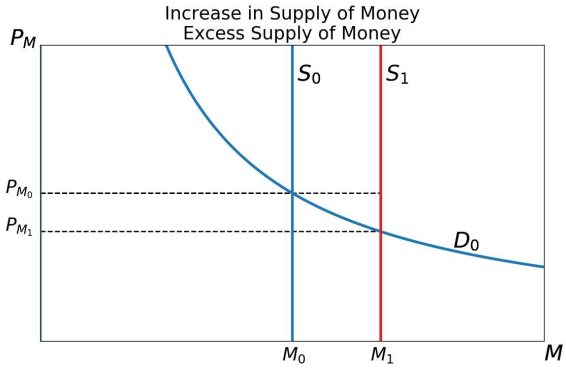
It is not necessary that the short-run outcome actually occur. If forward looking agents expect that there will be a change in total expenditures and that this change will affect the price of particular goods, they may adjust these prices downward in expectation of the price change. However, there are cases where investors may be less willing to realize a loss by the sale of a home, such as might occur in the real estate market during a recession. Homeowners that have purchased their home with a mortgage will likely avoid such a sale if the value of the home falls below what is owed on the mortgage. In situations like this, assets that would otherwise be sold may remain unsold, leading to a fall in real income. This will be discussed in greater detail in the discussion of business cycles in a later chapter.

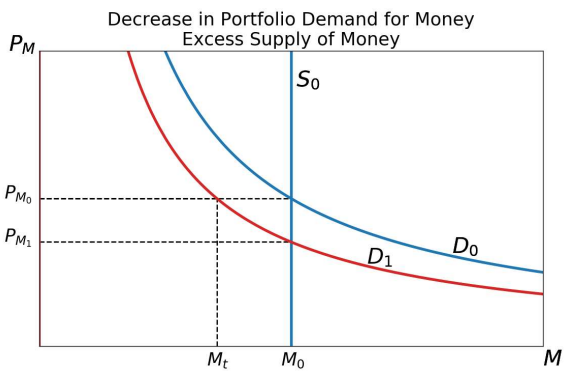
Case 1: Excess Supply of Money and Excess Demand for Goods

If aggregate demand increases, the immediate effect will be for consumers to purchase goods at a rate that is not sustainable. If producers do not recognize this fact immediately, they may increase the quantity of goods produced. To the extent that prices rise as factor costs are bid up, the total value of production will be constrained compared to if the price level remained static.



The excess supply of goods at price level P_0, defined by $y_t - y_0$, necessarily implies an excess demand for money. This occurs either by an increase in the quantity of money supplied to the market or by a relinquishing of money held on reserve by economic actors. The first instance is represented by an increase in the money stock. The latter instance is represented by a fall in portfolio demand for money, which is equivalent to a rise in velocity. As the quantity of money increase from M_0 to M_1, individuals find themselves holding more money than they desire at given prices. As individuals spend money, price of goods begin to rise on average as signified by an increase in the price level. Since the price of money, P_M, is the inverse of the price level, P, a rise in the price level indicates a fall in the price of money. Once the price of money falls from P_{M_0} to P_{M_1}, the excess supply of money is offset.

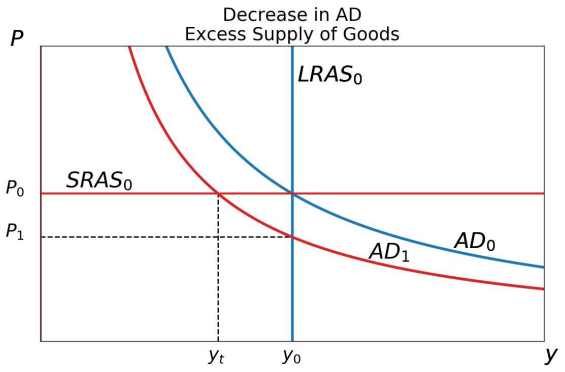


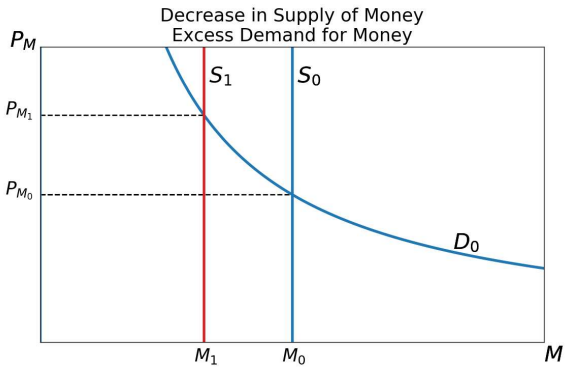


Nearly the same proces occurs when there is a fall in portfolio demand for money. Since consumers are willing to spend a greater of share of their income, they can increase their consumption of goods to the extent that prices do not rise in response to the new expenditure. At the given price level, P_0, consumers desire to hold less money. The difference between M_0 and M_t represents the excess balances that consumers plan to spend. As these funds are spent, the price level moves from P_0 to P_1 and the price of money

falls from P_{M_0} to P_{M_1}. The fall in the value of money moves the quantity of money demanded back to an equilibrium where the quantity demanded of money matches the quantity supplied.

Case 2: Excess Demand for Money and Excess Supply of Goods

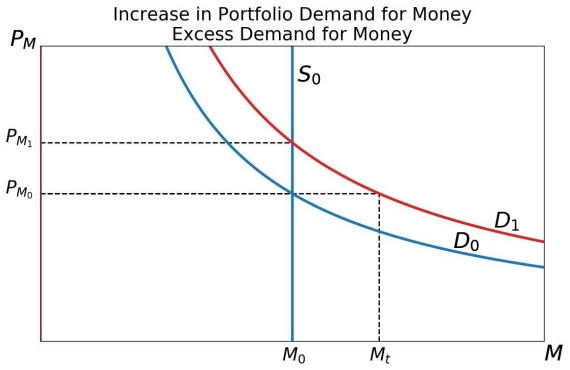




In the short-run, a fall in aggregate demand leads to a scenario where not all goods available in the market are purchased. If producers do not instantly respond to the change in prices, there will be more goods produced than can be purchased given the quantity of money available to be spent at the initial price level, P_0.

The excess supply of goods is represented by the difference of y_0 and y_t. The fall in expenditures that drive the shift from AD_0 to AD_1 must occur either due to a fall in the quantity of money or a fall in the velocity of money which is equivalently an increase in portfolio demand for money. In the case the supply of money falls, agents must adjust their planned expenditures to account for the fall in the quantity of available funds. At P_{M_0} the quantity of money demanded, M_0, is greater than the available quantity of money, M_1. If their demand to hold money does not change, this must occur by a fall expenditures so long as the price of money does not increase from P_{M_0} to P_{M_1} in response to the fall in supply of money.

The same fall in aggregate demand may occur as a result of an increase in demand to hold money on reserve. This increase in portfolio demand leads to an increase in the price of money in the long-run. Before prices respond to the change in demand for money, individuals will demand to hold more money than will allow for the clearing of the goods market. The excess demand for money, $M_t - M_0$, exactly matches the value of goods that remain unsold $y_0 - y_t$.



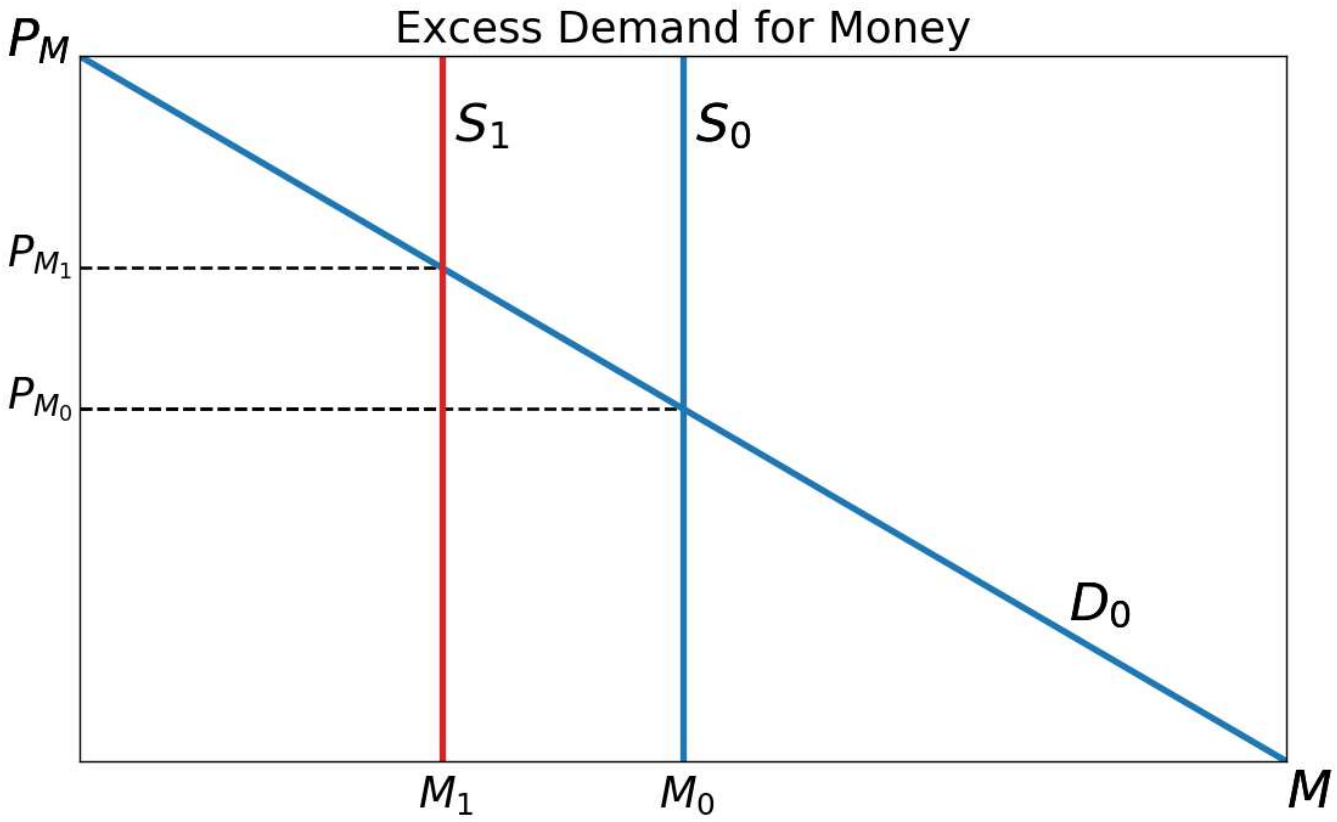
Excess Demand and Excess Supply

An excess demand for money implies that

A	prices need to fall on average for the economy to arrive at the new equilibrium combination of the price level and real income
B	there is an excess supply of non-money goods
C	more money is demanded than can be satisfied at the current price level
D	all of the above

Excess Demand for Money

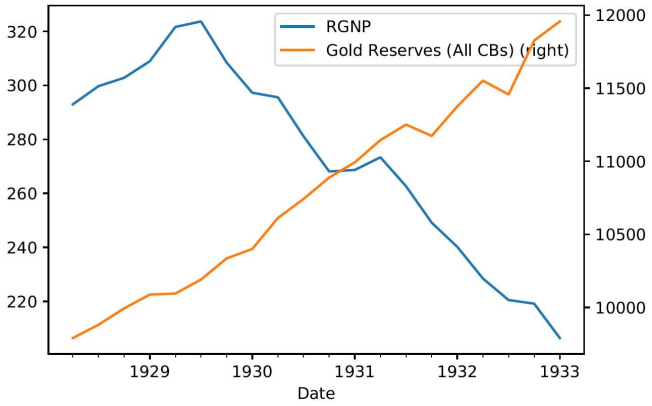
Mark the initial position of the money market before prices adjust to the change in supply



Aggregate Demand Driven Business Cycles

Excess demand and excess supplies play a fundamental role in explain macroeconomic fluctuations. Presuming that the economy produces a steady-state level of income and capital, deviations from these levels represent either an inflationary boom or a deflationary recession. Neither of these outcomes are necessary by a change in aggregate demand. Only in cases where prices are slow to adjust to changes in the money market will such macroeconomic disequilibrium occur.

This phenomenon occurred in an extreme manner during the Great Depression as many central banks their gold holdings without also increasing the quantity of central bank notes in circulation. The result was a fall in real income and substantial deflation, both of which occurred at an international scale. While there were many other factors, which include policies that disrupted credit, labor, and goods markets, the disruption of money markets by central banks was a feature of the Great Depression and is commonly a driving force of relatively extreme economic depressions.



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Factors Unexplained by Aggregate Analysis

Although aggregate analysis provides a powerful description of the macroeconomy, it does not capture many elements that are at play in the economic process. Consider the effects of money creation. There may result an ecnomic boom due to a confusion between real and nominal profits. Producers, especially those who receive the new money first, will invest in expectation of earning increased profits. Some early producers may succeed in this endeavor, but as more producers enter the market, the price of production inputs are bid up.

The expected increase in profits by investors often leads to construction of productive factors that would otherwise not be created. Since we live in a world of scarcity, this means that productive processes that are producing goods that consumers truly value will not be created. The creation of new capital that is the reuslt of this misallocation cannot be cheaply reversed. The process of readjustment of the capital structure may result in depression, or it may result in the sustained production of relatively lower level of real income due to the misallocation of productive factors that will remain in use even after being rerepriced once the boom has slowed.

Although aggregate analysis fails to capture this, this does not mean that the aggregate factors are not exerting force on the economic system. Macroeconomic forces described here are always at play. There are simply other factors that impact economic activity alongside these macroeconomic factors.

Conclusion

Aggregate demand is defined as total expenditures. The value of real income that can be derived from these expenditures changes inversely to the price level. The economy tends to be subject to equillibrating forces such that the price level moves to a level that enables the production and purchase of level of output that is sustainable in the long-run. Deviances from the equilibrium price level represent movements away from the sustainable level of output and can drive macroeconomic fluctuations.

Footnotes

[1] A change in the LRAS can occur if population grows, however in the Solow model output per capita is given. For simplicitly, we assume a stable population throughout most analysis of the macroeconomy.
[2] In reality, short-run effects can impact the capital structure, thereby influencing the production structure in different markets and leading the lasting equilibrium structure that is relatively inefficient compared to cases where the capital structure is not distorted by AD shocks.