TOPIC 5

Money

Outline

- What is Money?
- What does affect the **supply of Money**?
- What does affect the **demand of Money**?
  - Asset Portfolio Decision
  - Quantitative Theory of Money
- **Equilibrium in the Money Market**

Money

- **"Money" is the economic term for assets that are widely used and accepted as payment.**
- The forms of money have been very different: from shells to gold to cigarettes! (Eastern Europe and German Prisoners Of the War camps)
- Most prices are measured in units of money → understanding the role of money is important to understand inflation
- Many economists believe that money has also impact on real variables (we will talk about that!)

3 Functions of Money

1. **Medium of exchange**: Money permits to trade at less cost in time and effort!

   - Barter is inefficient because is difficult and time-consuming to find the trading partner.
   - Other benefit: allows specialization (and rises productivity)

2. **Unit of account**: Money is the basic unit for measuring economic value

   - Given that goods and services are mostly exchanged for money, it is natural to express economic value in terms of money
   - Caveat: In countries with volatile inflation, money is a poor unit of account because prices must be changed frequently. More stable units of account used (dollars or gold), even if transactions use local currency.

3. **Store of Value**: money is a way of storing wealth.

   - Other types of assets may pay higher returns, BUT it is a medium of exchange!!

Measures of Money

- The distinction between monetary and non-monetary assets is controversial.

- Example: MMMFs (money market mutual funds) are organizations that sell shares to the public and invest in short-term gov and corporate debt. Low return and allow for checks (with fee)…Are they Money?

- There are two main official measures of money stock, called **monetary aggregates**:

  1. **M1**: the most narrow definition, includes mainly currencies and balances held in checking accounts.

  2. **M2**: includes everything in M1 plus less "moneylike" components: saving deposits, small time deposits, MMMFa, MMDAs (money market deposit accounts).

Money Supply

- Money supply is the amount of money available in an economy

- In modern economies, money supply is affected by:

1. The **Central Bank** (the Federal Reserve System in the United States) is the government institution responsible for monetary policies

2. **Depositary Institutions** (Banks) are privately owned banks and thrift institutions that accept deposits from and make loans directly to the public

3. The **public** includes every person or firm (except banks) that holds money in currency or deposits.

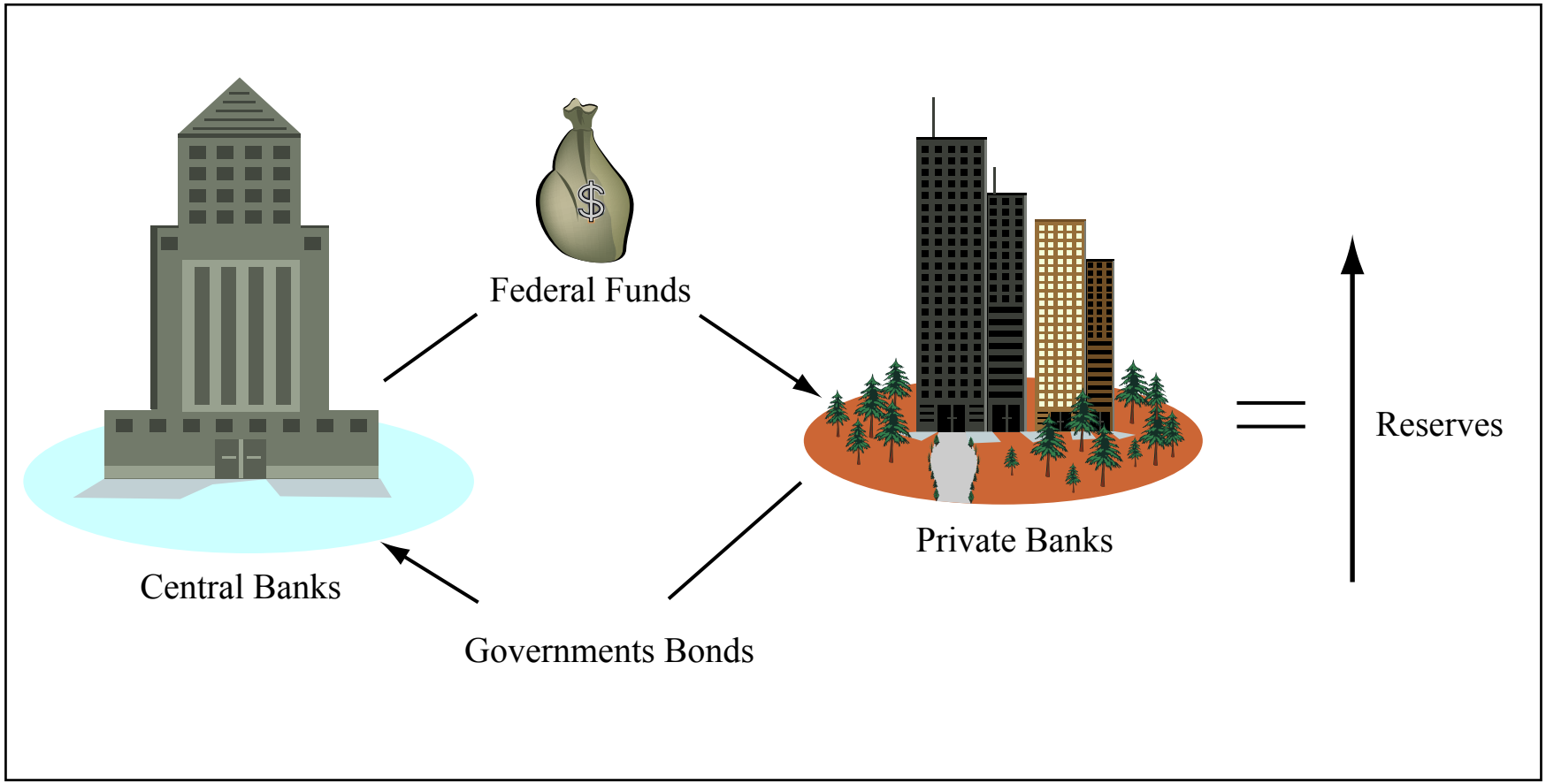
The Fed

- Federal funds are the deposits of private banks with the Fed.
- The federal funds market consists of private banks borrowing and lending their federal funds amongst each other overnight.
- The federal funds rate is the interest rate on these overnight loans. It is set by supply and demand, not by the Fed.
- **The Fed can change the supply of federal funds through open market operations, exerting a powerful indirect effect on the fed funds rate.**
- The Fed targets the **federal funds rate** and carries out open market operations to keep the actual rate near the target rate.

What are Open Market Operations?

Open market operations = Central Bank purchases and sales of government securities on the open market.

Open market purchase (sale) = Central Bank purchases (sells) government securities. The seller (buyer) receives (uses) federal funds as payment.



Back to Money Supply

- For now, assume that the Money Supply is purely affected by the Fed
- Standard Monetary policy = Open Market Operations
- If the Fed conducts an Open Market Purchase = inject Money in the system!
- Money Supply increases
- In a few lectures, we will see that the Money Supply is also affected by Banks and households…

Money Demand

- Agents decide how much wealth to keep as money: **Portfolio allocation decision**
- 4 main characteristics of assets matter:

1. **Expected Return**: the higher the expected return the higher consumption the agent can enjoy!
2. **Risk**: agents are risk-averse, hence to hold a risky asset, it must have a higher expected return
3. **Liquidity**: the easier is to exchange the asset for goods, services or other assets, the more attractive is the asset. Money is highly liquid!

Money is the most liquid BUT has a low return!

Money Demand (continued)

- Nominal money demand is **proportional to the price level**. For example, if prices go up by 10% then individuals need 10% more money for transactions.

- As Y increases, desired consumption increases and so individuals need more money for the increased number of desired transactions. This is the **liquidity demand for money**.

- As the **nominal interest rate** on non-money assets (bonds), i, increases the opportunity cost of holding money increases and so the demand for nominal money balances decreases.

- Since $\mathbf{i = r + \pi^e}$, we can decompose the effects on an increase in i into real interest rate increases (holding expected inflation fixed) and expected inflation increases (holding the real interest rate fixed).

Money Demand (continued)

Other factors affecting Money Demand:

- Wealth
- Risk
- Liquidity of Alternative Assets
- Payment Technologies

Money Demand Function

Our model for the demand for nominal money balances takes the following form

$$\mathbf{M_d = P \cdot L_d(Y, i)}$$

where

M_d = demand for nominal money balances (demand for M1)

L_d = demand for liquidity function

P = aggregate price level (CPI or GDP deflator)

Y = real income (real GDP)

i = nominal interest rate on non-money assets

Real Money Balances

The demand for real balances

Since the demand for nominal balances is proportional to the aggregate price level, we can divide both sides of the nominal money demand equation by P.

This gives the **liquidity demand function** or the demand for real balances function:

$$M_d/P = L_d(Y, r + \pi^e)$$

The left-hand-side of the above equation is the demand for nominal balances divided by the aggregate price level or the **demand for real balances** (the real purchasing power of money).

The right-hand side is the **liquidity demand function**. The demand for real balances is decomposed into a transactions demand for money (captured by Y) and a portfolio demand for money (captured by r and π^e).

Money Demand

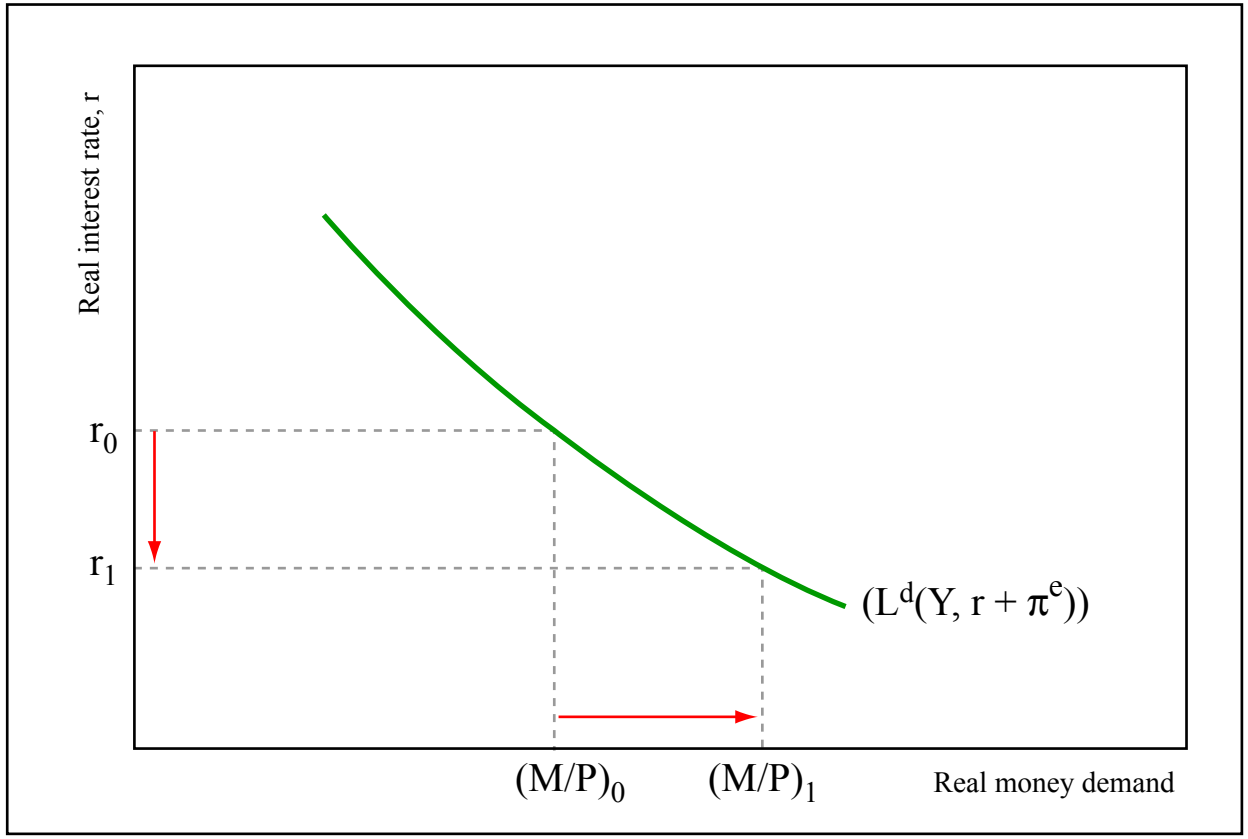


Figure by MIT OpenCourseWare.

Money Market

The Money Market is in Equilibrium when

Real Money Demand = Real Money Supply

where Real Money Supply = M_s/P

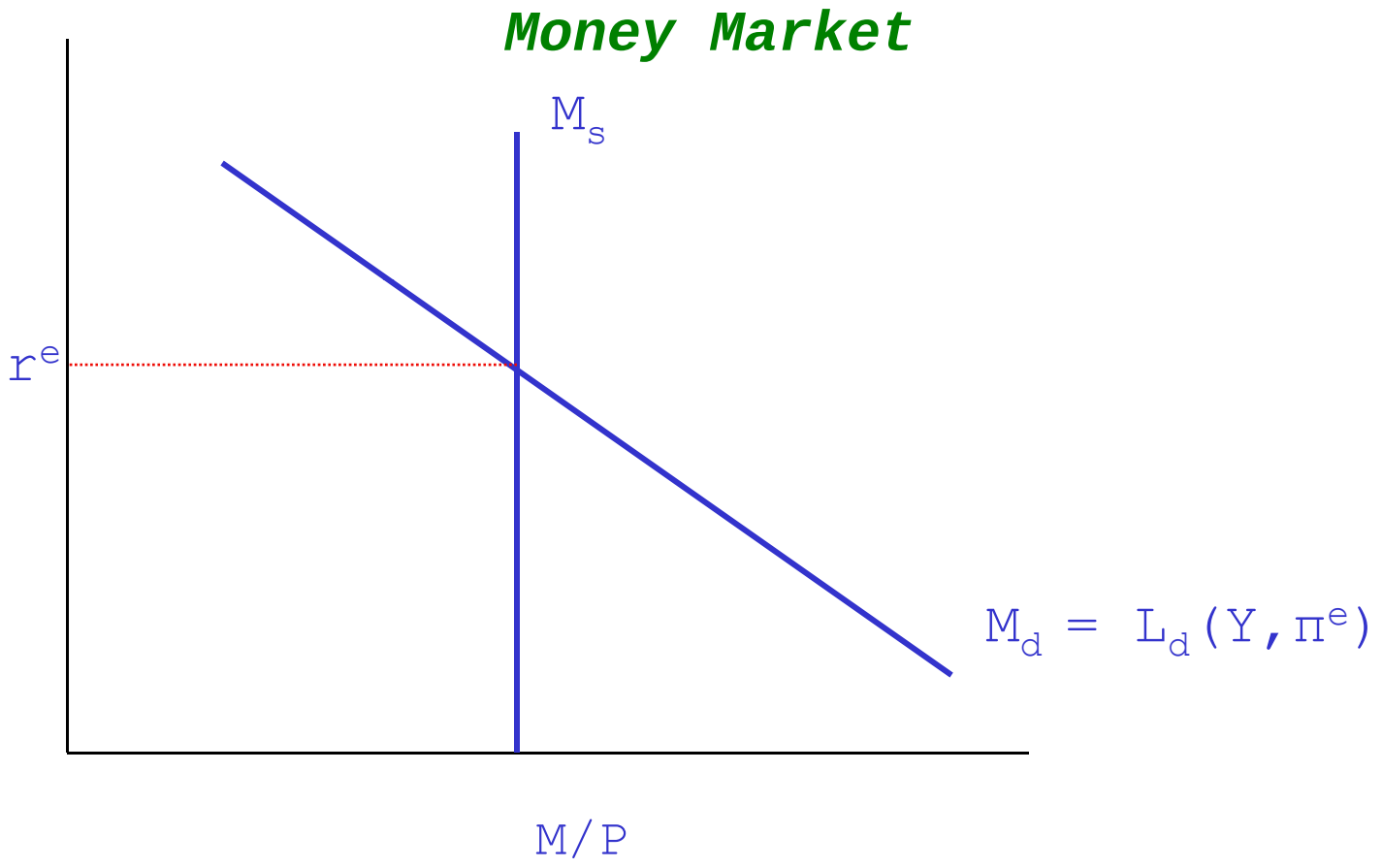
Real Money Demand = $M_d/P = L_d(Y, r + \pi^e)$

Note: The money supply curve does not change with interest rates (it is verticle)

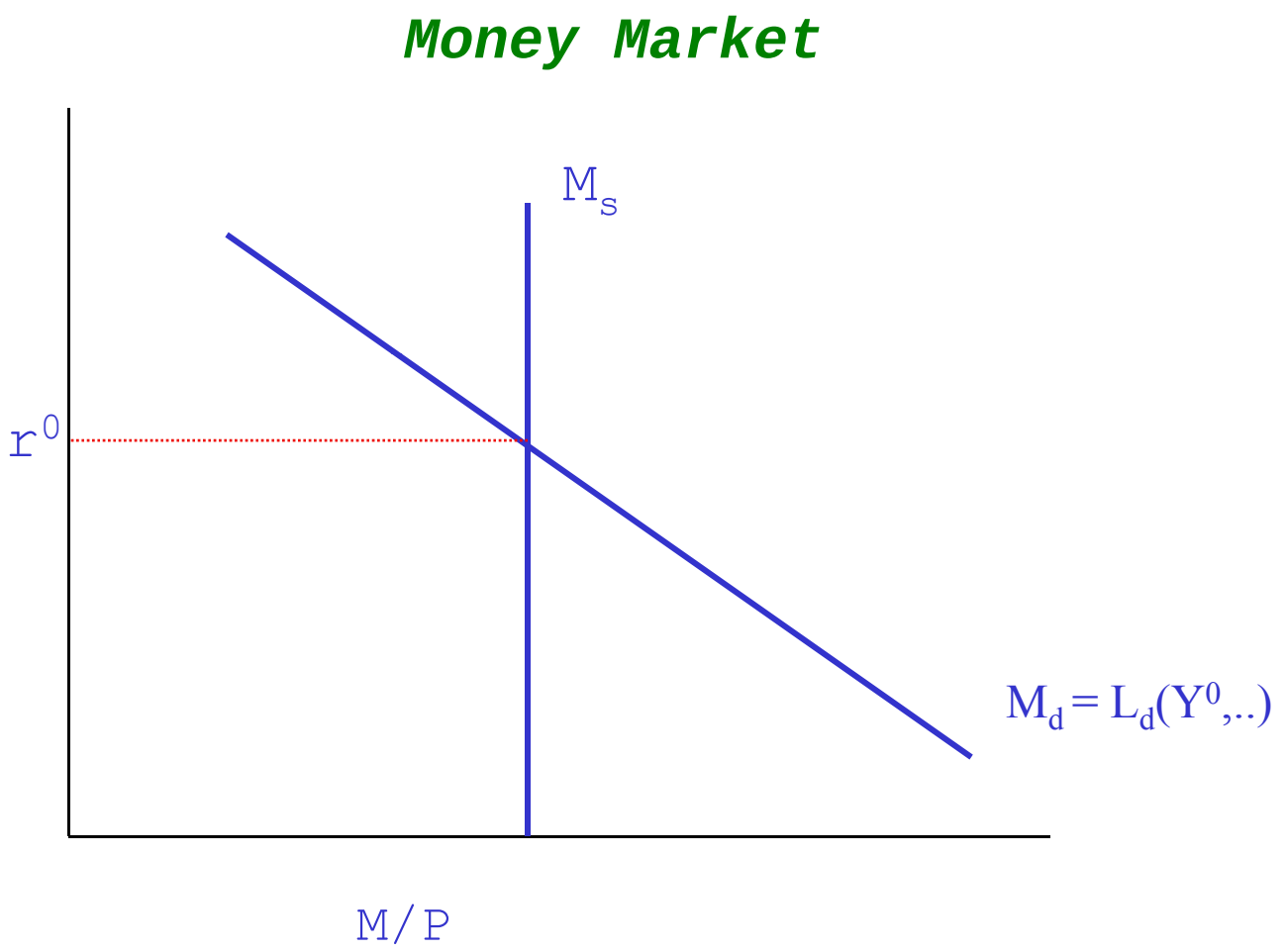
What shifts real money supply: M, P

What shifts real money demand: Y, π^e

Money Market Equilibrium

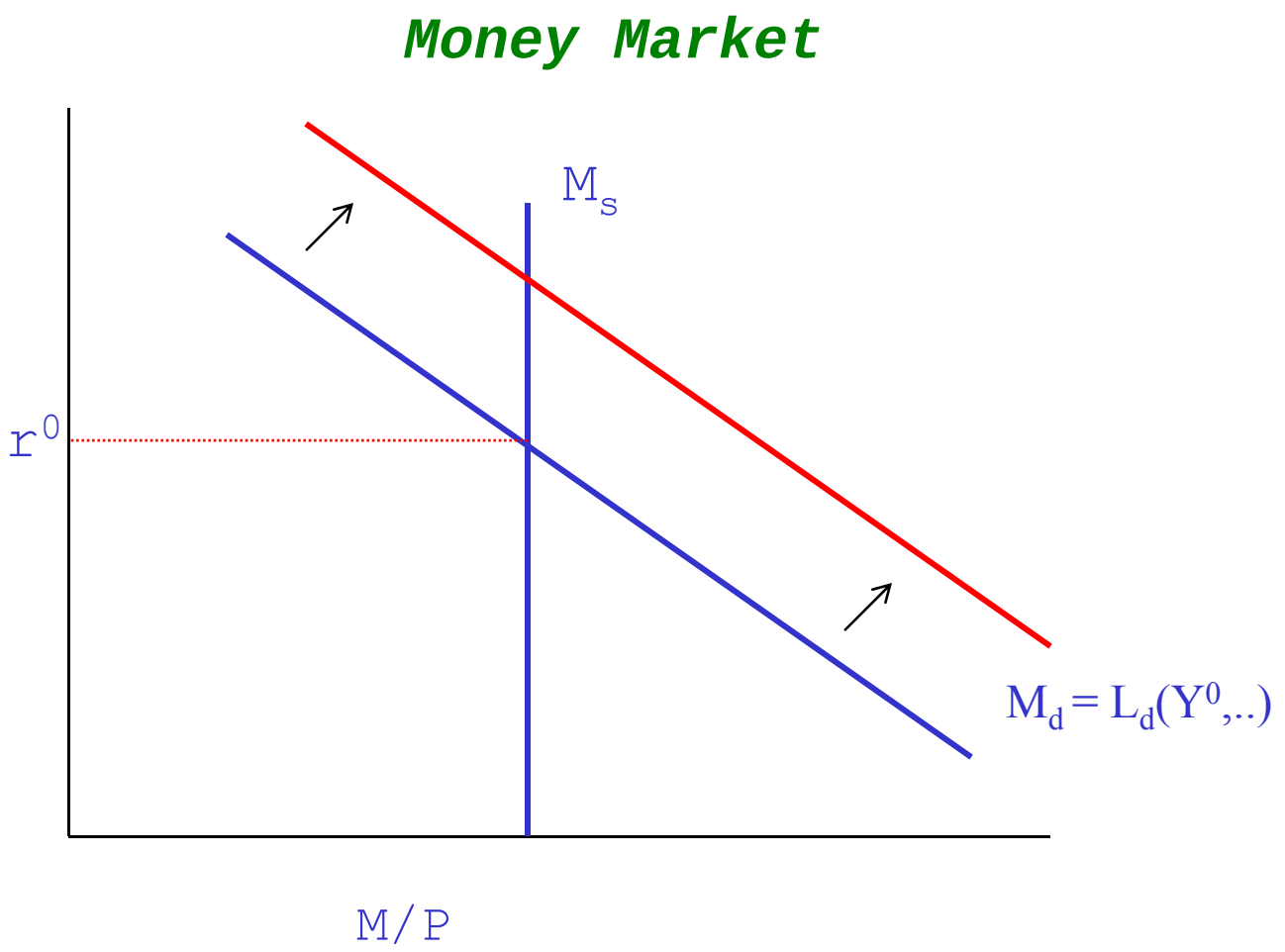


Money Market Equilibrium – Increasing Y



Suppose Y increases from Y^0 to Y^1 (Holding Money Supply fixed!)

Money Market Equilibrium – Increasing Y



Suppose Y increases from Y^0 to Y^1 (Holding Money Supply fixed!)

The Quantity Theory

Definition: V = velocity = PY/M

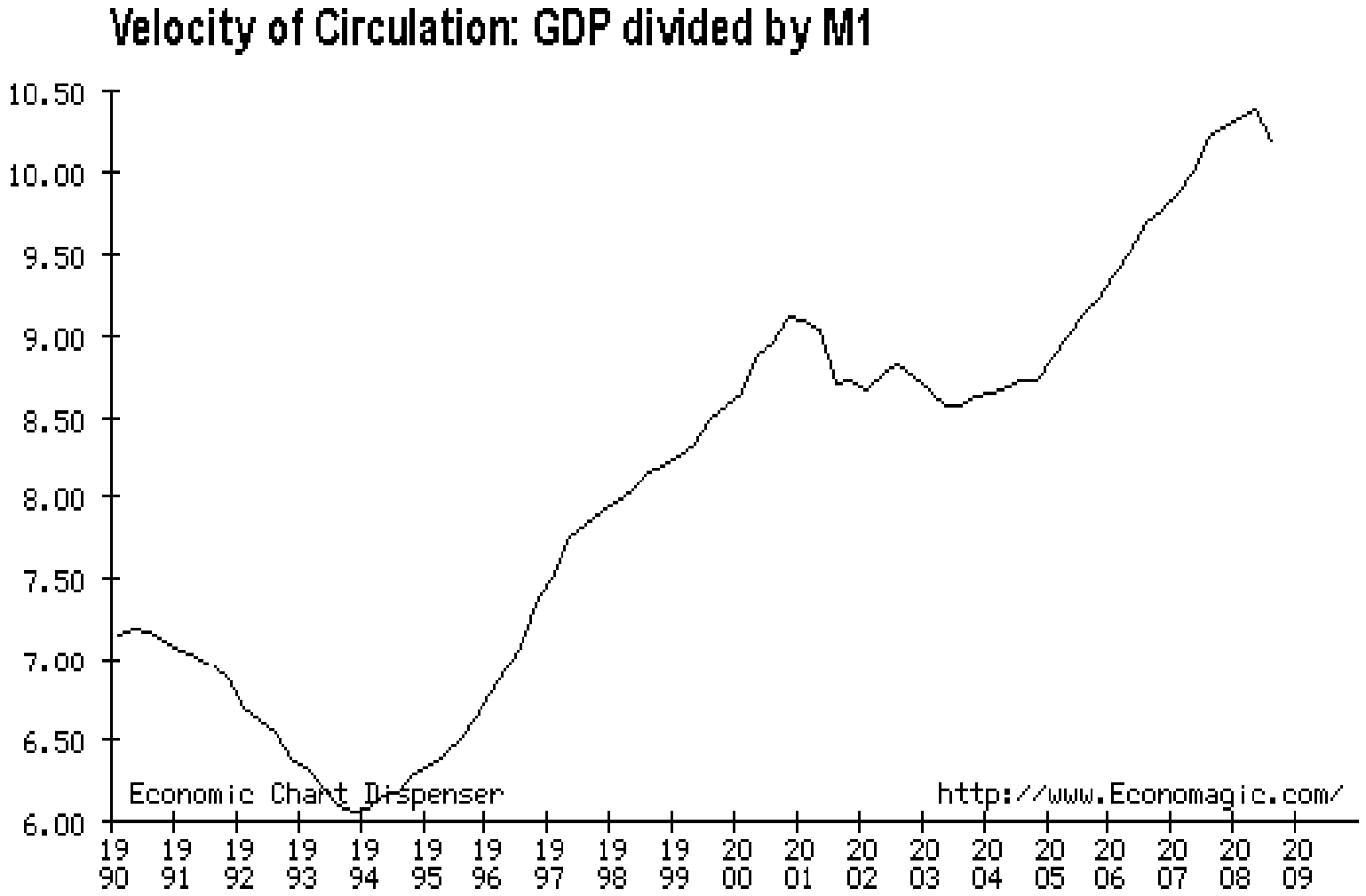
$$M/P = k*Y$$

M = money supply, P = the GDP deflator, Y = real GDP

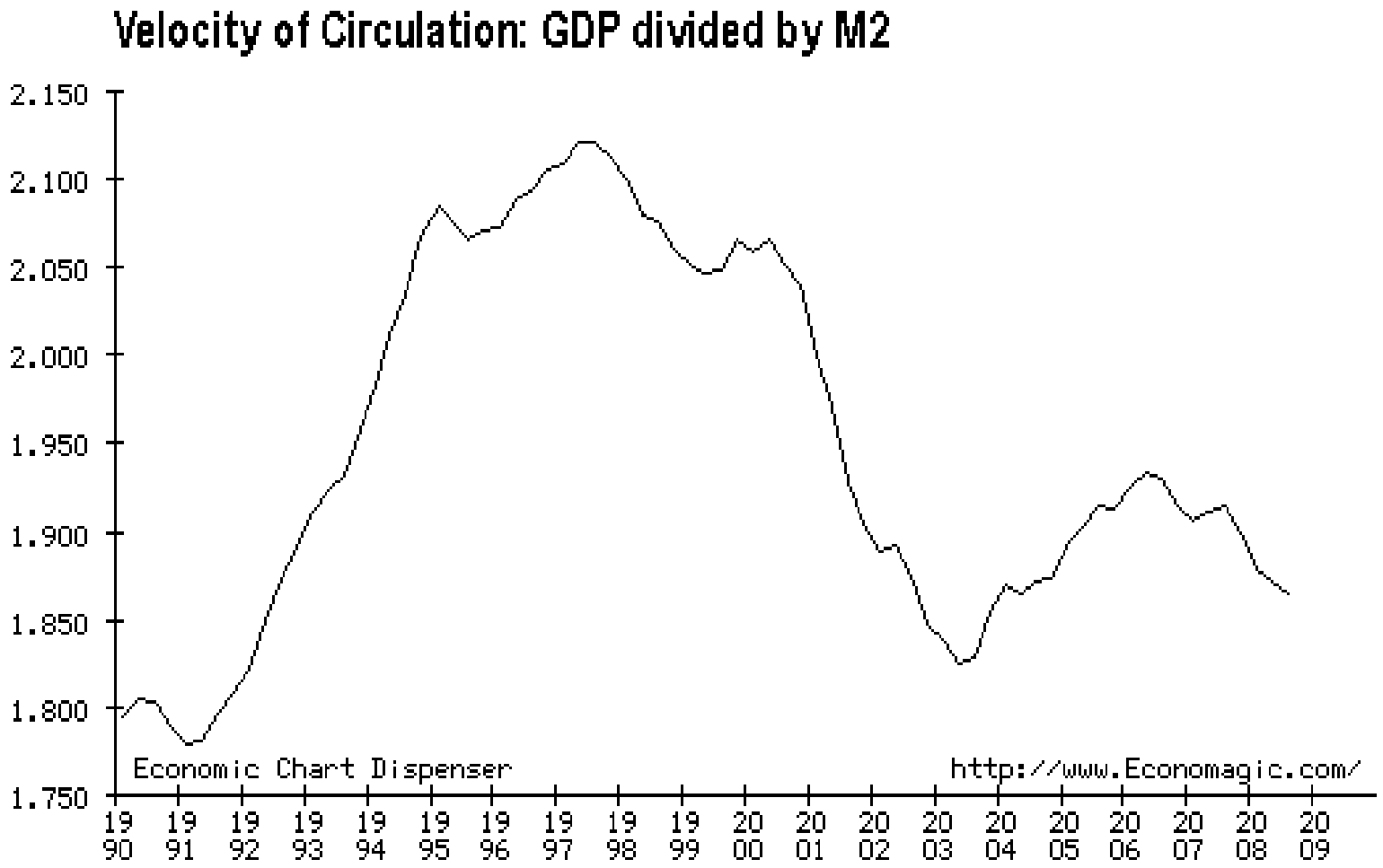
Quantity theory: k is constant and hence V=k is constant!

However, it seems that V is not so constant over time…

The Evolution of Velocity (M1)



The Evolution of Velocity (M2)



Money Growth and Inflation

- If in equilibrium demand = supply, then if Central Bank doubles M, the result is a doubling of P
- ***"Inflation is always and everywhere a monetary phenomenon"***
- This Friedman quote is not literally correct because of Y and V movements. But a LR correlation of .95 means it's close enough.
- Inflation is caused by **too much money chasing too few goods**, i.e. by M rising relative to Y (controlling for how much M we need to transact PY, which is V).
- Note **inflation** could rise despite fixed M because of **falling Y or rising V**. Across countries, however, most differences in inflation are associated with differences in **M growth**: **correlation between M growth and inflation is above .95**.

Money Growth and Inflation

- V is not fixed in reality. **V rises with financial innovation and with i** (the nominal interest rate).

- Recall that $i = r + \pi$. For given r, then higher inflation translates one-for-one into higher i. Implication: **V rises with the rate of inflation**.

- Thus taking into account that V is not fixed only makes the channel from M growth to P growth stronger

- **When M growth is high it generates inflation , which raises V, which in turn raises inflation further. This is a big deal in hyperinflations.**

Money Growth and Inflation

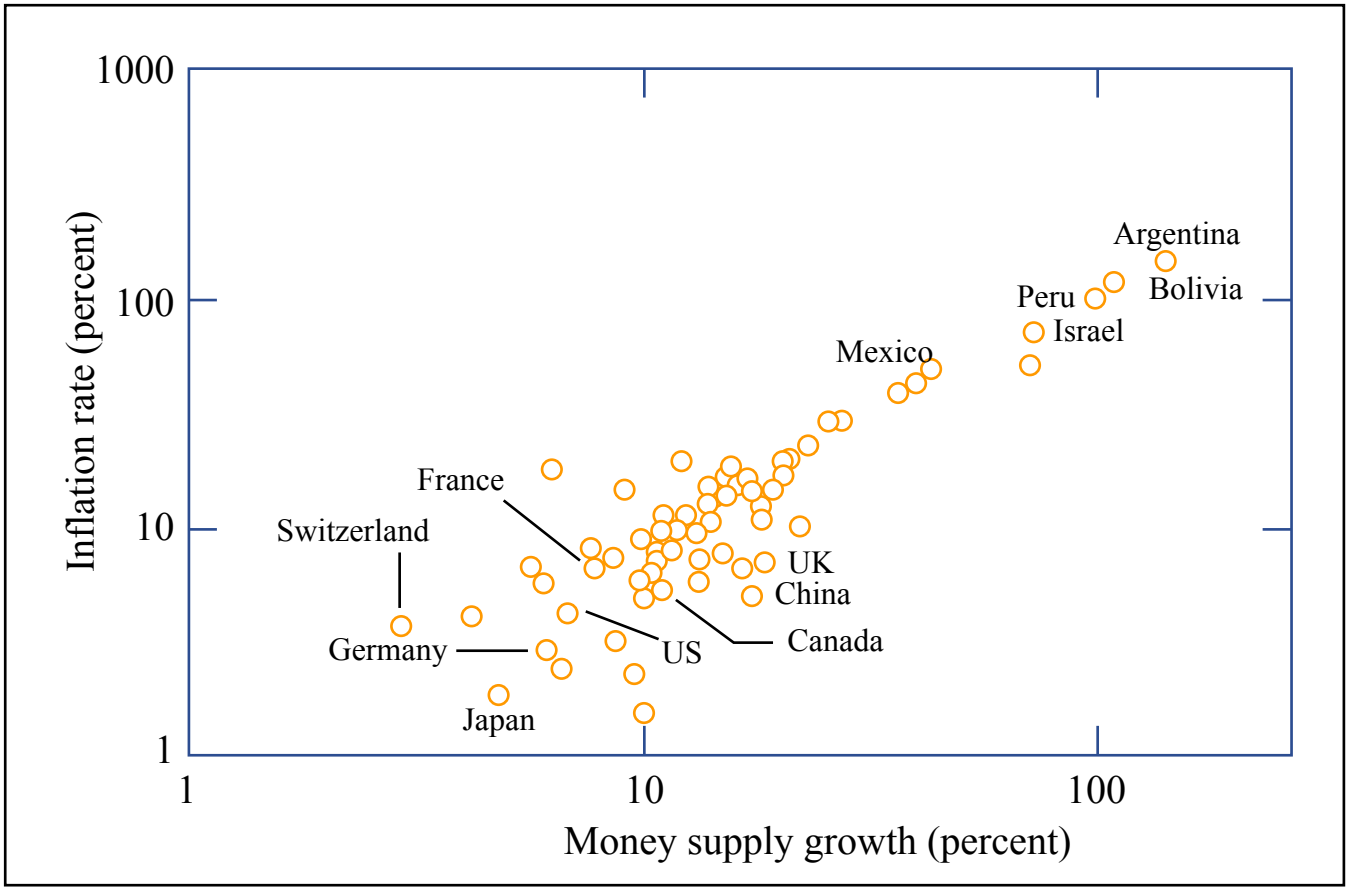


Figure by MIT OpenCourseWare.

Adapted from Romer, David. *Advanced Macroeconomics*. New York, NY: McGraw-Hill, 1996. ISBN: 9780070536678.

Hyperinflations are ...

- sometimes defined as 30% or more inflation in a year
- usually characterized by accelerating inflation (wage indexation)
- caused by rapid M growth (the Central Bank creating new reserves at a rapid rate)
- exacerbated by rising velocity (efforts to economize on M)
- highly disruptive to Y
- 1985 Bolivia 10,000%, 1989 Argentina 3100%, 1990 Peru 7500%, 1993 Brazil 2100%, 1993 Ukraine 5000%.

14.02 Principles of Macroeconomics

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