EE432 Monetary Theory and Policy

Final Exam Recap III

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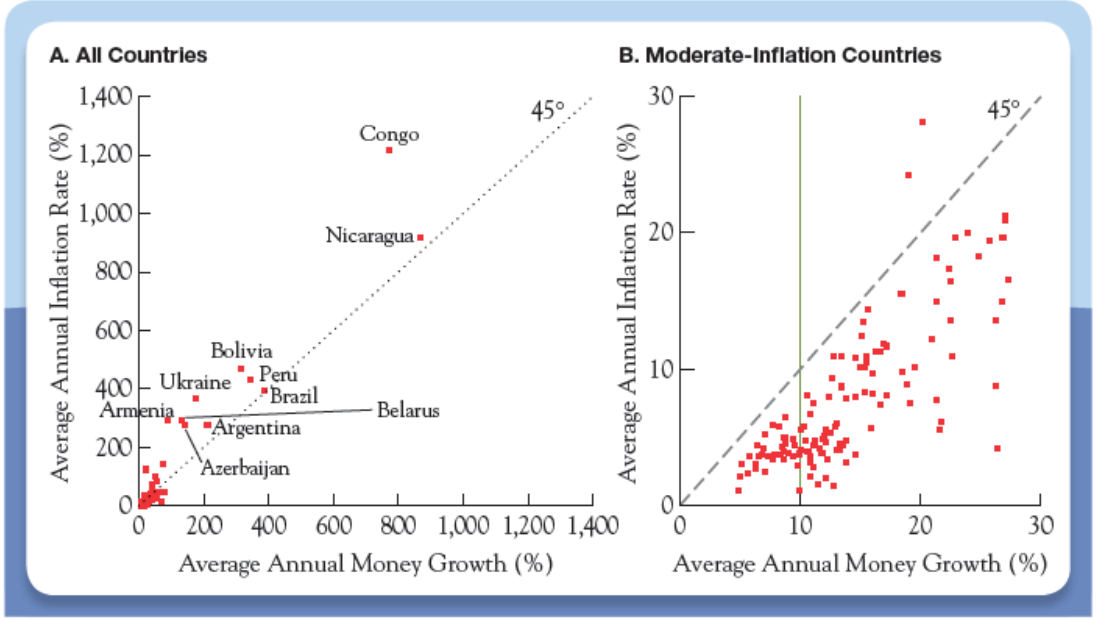
Chapter 20

Money Growth and Money Demand

Why We Care about Monetary Aggregates

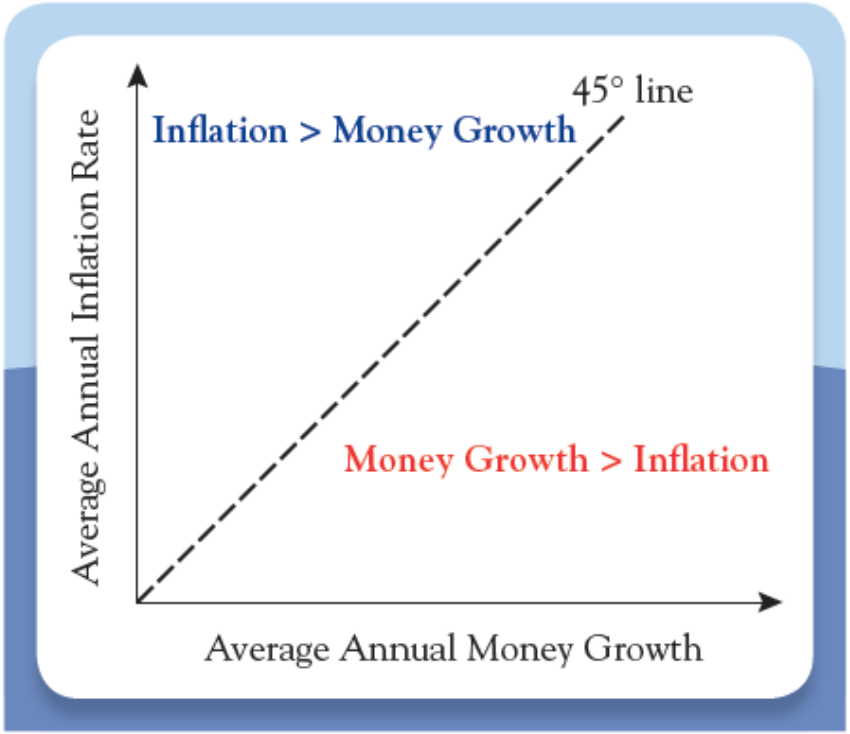
Figure 20.1 Inflation Rates and Money Growth



Every country with ***high inflation*** has ***high money growth***. To avoid sustained episodes of high inflation, a **central bank** must be ***concerned*** with **persistent rapid money growth**.

Why We Care about Monetary Aggregates

Figure 20.2 Money Growth and Inflation



In general, **countries with very high inflation** tend to ***lie above the line*** and *countries with moderate to low inflation* tend to *fall below* it.

Why We Care about Monetary Aggregates

- When the **currency** that *people are holding* **loses value very rapidly**, they will ***spend as quickly as possible*** - the *same effect* on inflation *as an increase in money growth*.
- By **limiting** the ***rate*** at which they ***purchase securities***, *policymakers can* **control** the ***rate of M2 grow***.
- It is *impossible* to have ***high, sustained inflation*** *without* ***monetary accommodation***.

The Quantity Theory and the Velocity of Money

- Thinking about the **value or purchasing power** in terms of the ***goods*** needed *to get* ***money*** *to pay* - the ***impact of inflation***.
- Given steady demand, an ***increase*** in the **supply of money** drives the **price of money** ***down***, *requiring more money* - ***inflation***.
- If the central bank **continuously floods** the economy **with large amounts of money**, ***inflation will reach very high levels***.

Velocity and the Equation of Exchange

- The *number of dollars used* is the **quantity of money** in the economy: **M**
- The *number of times each dollar is used* is called the **velocity of money: V**
- **MV** represents the ***value of transactions***.

Velocity and the Equation of Exchange

- Everyone **purchases** *counted in* **nominal GDP** requires the **use of money**.

$$(\text{Quantity of Money}) \times (\text{Velocity of money}) = \text{Nominal GDP}$$

- ***M*** is the **quantity of money**, ***V*** is the **velocity** and **nominal GDP** can be:
  - The ***price level***, ***P*** times the ***quantity of real output***, ***Y***.

Velocity and the Equation of Exchange

- We can ***rewrite*** the previous equation as:

$$MV = PY$$

- This is called the **equation of exchange**, and tells us that the ***quantity of money*** *multiplied by its* ***velocity*** *equals the level of* ***nominal GDP***.

Velocity and the Equation of Exchange

- We can ***rewrite*** the equation to allow *for the percentage change in each factor*.

$$MV = PY$$

$$\%\Delta M + \%\Delta V = \%\Delta P + \%\Delta Y$$

- ***Money growth*** *plus* ***velocity growth*** *equals* ***inflation*** *plus* ***real growth***.

The Quantity Theory of Money

- Suppose that there are ***no important changes*** occur in **payment methods** or the ***cost of holding money***.
  - If the **interest rate is fixed** and there is ***no financial innovation***, then **velocity will be constant**.
- Also assumed that **real output** is *determined* solely *by* **economic resources** and **production technology**, so it too is **fixed in the short run**.

The Quantity Theory of Money

- *Irving Fisher* concluded that **money growth *translates directly into* inflation**, an assertion that is termed the **quantity theory of money**.
- We can ***reinterpret*** the *quantity theory of money* to describe the **equilibrium** between ***money demand*** and ***money supply***.
  - **Money demanded (M^d)** equals the **total value of transactions *divided*** by the **velocity of money (V).**

The Quantity Theory of Money

- For the economy as a whole, **the demand for money** equals **nominal GDP *divided*** by **velocity**:

$$M^d = \frac{1}{V} PY$$

- The **supply of money (M^S)** is *determined* by the ***central bank*** and the ***behavior of the banking system***.
- *Assuming* ***velocity*** and ***real output*** are **constant**, we can conclude that ***money growth*** equals ***inflation***.

The Quantity Theory of Money

The **quantity theory of money** *accounts for* some important characteristics:

1. It *tells us* why **high inflation** and **high money growth** go together.
2. It explains the tendency for ***moderate- and low-inflation countries*** to fall *below* the 4**5-degree line**.

The Quantity Theory of Money

- **Money growth** tends to be ***higher*** than **inflation** in those countries because they are ***experiencing*** **real growth**.
- If **velocity** is constant, then **money growth** equals the ***sum*** of **inflation** and **real growth**.
- At a *given level of money growth*, the **higher** the level of **real growth**, the ***lower*** the level of ***inflation***.
- In **countries *that are growing***, **inflation** will be ***lower than*** **money growth**, causing their *economies to fall below the 45-degree line*.

The Facts about Velocity

- If the **velocity of money** is ***constant***, it means the **trend in real growth** is *determined by* the **structure of the economy** and the **rate of technological process.**
  - This means countries **could control inflation** *directly by* **limiting money growth**.
- This logic led *Milton Freidman* to conclude that **central banks** should ***simply set money growth*** at a **constant rate**.
  - **M1 and M2** ***should grow*** at a **rate** equal to the ***rate of real growth*** plus the ***desired level of inflation***.

The Facts about Velocity

- To make the rule viable, he **suggested *changes in regulations*** that would:
  - **Limit banks' discretion** in ***creating money***, and
  - ***Tighten the relationship*** *between* the **monetary aggregates** and the **monetary base**, **reducing fluctuations** in the **money multiplier**.
- *For example, an* ***increase in the reserve requirement*** *or* ***restrictions on the number and types of loans banks could make****.*

The Facts about Velocity

- But Friedman's recommendation that the **central bank** should **keep money growth constant** would ***stabilize inflation*** *only if* ***velocity were constant***.
- In countries with ***high levels of inflation***, ***changes in velocity*** *can probably be* ***ignored***.
- But in countries where *inflation rate is below 10% per year*, **changes in velocity** could have a ***significant impact*** on the ***relationship*** between **money growth** and **inflation**.

The Facts about Velocity

- Historical data seem consistent with Fisher's conclusion: *in the **long run**, the **velocity of money is stable**, so that* **controlling inflation** *means **controlling the growth of the money aggregates**.*

The Facts about Velocity

- **Central bankers** are ***concerned about inflation*** *over months and quarters*, **not years**.
- The **monetary aggregates**, even broad ones, ***can be useful guides*** to ***short-term policy*** **only** to the extent that they **signal changes** in **inflation** *during the* ***periods*** *monetary policymakers* ***care about***.

The Facts about Velocity

- Notice the **increase in velocity** in the *late 1970s and early 1980s*.
- This was a period of both **high nominal interest rates** and **significant financial innovations**.
- Together these ***reduced*** *the* **amount of money individuals held** for a given level of transactions, ***raising*** the **velocity of money**.

The Facts about Velocity

- These data clearly suggest that **fluctuations** in the ***velocity of money*** are *tied to* **changes in people's desire to hold money**.
- Policymakers *must understand* the **demand for money.**

The Transactions Demand for Money

- The **quantity of money** people ***hold for transactions purposes*** depends on their
  - Nominal **income**,
  - The **cost of holding money**
  - The availability of **substitutes**
- The **higher people's nominal income**, the ***more*** they ***will spend***, *needing more money*.

The Transactions Demand for Money

- Deciding ***how much money to hold*** depends on the costs and benefits.
- **Benefits**: ***Holding money*** allows people ***to make payments.***
- The cost is based on **opportunity cost**.
  - The ***interest*** that people ***lose*** in ***not buying an*** **interest-bearing bond** is the *opportunity cost of holding money*.

The Transactions Demand for Money

- For a *given cost of switching*, as the **nominal interest rate rises**, people *reduce their checking account balance*, **shifting *funds*** into **higher-yield investments**.
- The **higher** the **nominal interest rate**, the **higher** the **opportunity cost of holding money**, the ***less money*** individuals ***will hold*** for ***transactions***, and the **higher** the **velocity of money.**

The Transactions Demand for Money

- At **high** levels of **inflation**, ***money is losing value*** *very quickly*.
- People respond to the **high cost of holding money** by *keeping it as little as possible.*
  - They therefore ***purchase durable goods*** that have *zero real return* - ***better than negative return on currency***.
- This **relationship** explains why **inflation** *tends to* **exceed money growth** in *high-inflation countries*

The Transactions Demand for Money

- The anxious spending ***drives up*** the **velocity of money.**
- Because *high inflation* brings an *increase in velocity*, ***inflation*** must be higher than ***money growth*** in those countries.

The Transactions Demand for Money

- The **transactions demand for money** is *affected* by ***technology***.
- **Financial innovation** allows people to ***limit*** *the amount of* ***money they hold***.
- This ***lowers*** the **money holdings** at a given level of income.
  - This increases the **velocity** of your money.

The Transactions Demand for Money

- We all **hold money** to ***insure*** ourselves ***against*** **unexpected expenses**.
- We call this the **precautionary demand for money**
- The *higher* the level of ***uncertainty*** about the future, the **higher the demand for money** and the *lower the velocity of money* will be.

The Portfolio Demand for Money

- As a *store of value*, money provides *diversification* when **held** *along with* a wide variety of **other assets**.
- The **demand for bonds** *depends on* several factors including:
  - **Wealth**
  - The **return** *relative to* ***alternative investments***
  - **Expected future interest rates** on *bonds*
  - **Risk** *relative to* ***alternative investments***
  - **Liquidity** *relative to* ***alternative investments***

The Portfolio Demand for Money

- As **wealth *rises***, the *quantity of all these investments*, including **money**, ***rises*** with it.
- A ***decline*** in **bond yields** will ***increase*** the portfolio **demand for money**.
- When **interest rates rise**, ***bond prices drop*** and bondholders *suffer a capital loss*.
  - **bonds will become less attractive** than *money*.
- When **interest rates are expected to rise**, ***money demand goes up.***

The Portfolio Demand for Money

- If a **sudden decrease in the liquidity of stocks**, **bonds**, or **other assets** occurred, we would expect to see an **increase** *in the* **demand for money.**

Chapter 23

Modern Monetary Policy and the Challenges Facing Central Bankers

The Traditional Channels: Interest Rates and Exchange Rates

- **Easing of monetary policy** - a *decrease* in the *target nominal interest rate*, which ***lowers the real interest rate*** - leads to a **depreciation of the dollar.**
- The ***less valuable dollar***:
  - **Drives up** the **cost of imported goods** and services, reducing imports from abroad, and
  - **Makes export goods** and services **cheaper**, so foreigners will buy more of them.

The Traditional Channels: Interest Rates and Exchange Rates

- The **interest-rate channel** is ***not*** very ***powerful***.
- Data suggest that the **investment** component of total spending is **not sensitive to interest rates**.
- While a ***small change in the interest rate*** does change the cost of external financing, it does **not** have much **effect on investment decisions**.

The Traditional Channels: Interest Rates and Exchange Rates

- The **impact of *short-term* interest rates** on ***household decisions*** is **modest**.
- The problems is that *people's decisions to purchase cars or houses* depend on ***longer-term* interest rates** rather than the *short-run target rate.*
- *Household consumption decisions* will only *change* to the extent that the **target interest rate *affects* long-term interest rates**.

The Traditional Channels: Interest Rates and Exchange Rates

- The **policy-controlled interest rate** is just *one of many factors* that *shift the demand and supply* for the dollar on ***foreign exchange markets***.
- The **traditional channels** of ***monetary policy transmission*** are **not** very **powerful**.
- Yet, evidence shows that **monetary policy** is **effective**.
- **Something else** must be ***amplifying*** the **impact of monetary policy changes** on ***real economic activity.***

Bank-Lending and Balance-Sheet Channels

- **Banks** are *essential* to the ***operation of a modern industrial economy***.
- **Banks** are also the **channel** through which ***monetary policy is transmitted*** to the economy.
- To understand monetary policy changes completely, we ***look at*** the **impact** of **policy changes** on **banks and bank lending**.

Banks and Bank Lending

- ***Borrowers*** do not have *access to capital market financing* - ***must go through banks***.
- When ***banks stop lending***, **borrowers** simply can **not obtain financing**.
- By ***altering*** the **supply of funds *to the banking system***, policymakers ***can affect*** **banks' ability** and **willingness to lend**.
  - The **bank-lending channel** of ***monetary policy transmission***.

Banks and Bank Lending

- An **open market purchase** has a ***direct impact*** on the **supply of loans**.
- **Financial regulators** can ***also*** influence **bank-lending practices**.
- **Changes in financial regulations**, will have an ***impact*** on the ***amount of bank lending***.
- **Credit conditions** typically ***tighten*** in *recessions* and ease in booms.

Firms' Balance Sheets and Household Net Worth

- The **balance-sheet channel** of *monetary policy transmission* works because ***monetary policy*** has the **direct influence** on the **net worth of potential borrowers**.
  - An *easing of monetary policy* **improves *firms' and households'* balance sheets**, *increasing* their ***net worth*** and *reducing* their ***credit risk premium***.
  - ***Increases*** in ***net worth*** *reduce* the problems of *moral hazard* and *adverse selection*.
    - This *lowers* information *costs of lending* and ***allows borrowers*** to ***obtain financing*** *more easily*.

Firms' Balance Sheets and Household Net Worth

How does ***monetary policy expansion*** *improve* borrowers' ***net worth***?

1. ***Expansionary policy*** *drives up* ***asset prices***, *increasing* the *value of firms* and the *wealth* of *households*.
2. ***Lower interest rates*** *reduce* the ***burden of repayment*** of *current loans of borrowers*.

Firms' Balance Sheets and Household Net Worth

- At **lower interest rates**, a person with *a variable rate loan* ***enjoys*** **lower interest payments.**
  - The ***percentage of person's income*** that is ***devoted to loan payments*** will be **lower**.
  - *As **interest rates fall**, the **supply of loans increases**.*
- **Information services** are central to ***banks' role*** in the *financial system*.
  - They help to *address the problems* of **adverse selection** and **moral hazard**.

Firms' Balance Sheets and Household Net Worth

- **Inferior information** leads to an ***increase*** *in* ***adverse selection***.
- This then:
  - ***Reduces bank lending***,
  - ***Lowers investment***, *and ultimately*
  - ***Depresses the quality of aggregate output demanded***.

Firms' Balance Sheets and Household Net Worth

- The **channels of monetary policy transmission** depend on the ***structure of the financial system.***
- ***If banks*** are ***unimportant sources of funds*** for firms and individuals, ***the bank-lending channel*** is **not** ***tremendously important***.
- Though ***technology*** *has made the processing of increasing amount of* ***information*** *easier* and *cheaper*, it seems **unlikely to solve** the problems of **adverse selection** and **moral hazard**.

Asset-Price Channels: Wealth and Investment

- When the **interest rate *moves*, *so do* stock prices.**
  - This ***relationship*** is *referred to* the ***asset-price channel*** of **monetary policy transmission**.
- The **lower the interest rate**, the *higher the present value* is and the **higher the stock price**.

Asset-Price Channels: Wealth and Investment

- When ***policymakers*** *reduce their interest-rate target,* it drives the **mortgage rate *down***.
  - ***Higher demand*** for ***residential housing,*** *driving up* the ***prices of existing homes***.
- **Stock and property prices** affect both *individual* ***consumption*** *and business* ***investment***.
  - ***Higher stock*** and ***real estate prices*** mean an ***increase in wealth***.
  - *An increase in wealth means* ***higher consumption***.

Asset-Price Channels: Wealth and Investment

- As **stock prices *rise***, firms find it ***easier to raise funds*** by **issuing new shares**.
- As financing become *less expensive,* **more investments *become profitable***.

Financial Crisis and the Transmission of Monetary Policy

- The ***crisis of 2007-2009*** *intensified* fundamental problems of **asymmetric information** that *affect* the **provision of credit** in a modern economy.
- The ***widespread losses*** at intermediaries and the ***heightened uncertainty*** *about* the *damage suffered* by ***specific intermediaries*** **reduced confidence.**

Financial Crisis and the Transmission of Monetary Policy

- Funding **liquidity *dried up***.
- *Households' and nonfinancial firms'* **net worth *fell*** substantially, ***reducing*** their ***ability to borrow,*** *so* they ***cut spending***.
- The result of all this was a **destabilizing feedback loop** between ***worsening economic prospects*** and the ***deterioration of financial conditions*** that *influence spending*.

Financial Crisis and the Transmission of Monetary Policy

- When the **policy transmission mechanism** is **obstructed**, ***central banks cannot*** assume that a ***cut in their target policy rate*** will ***ease the financial conditions*** that influence the economy.
- ***Central banks*** must always take into account the **workings of the monetary policy transmission mechanism** in order to ***achieve*** their goals of ***economic and price stability***.

The Challenges Modern Monetary Policymakers Face

The Challenges Modern Monetary Policymakers Face

- **Stock prices** and **property values** have a ***tendency*** to go through **boom and bust cycles**.
- Policymakers' ***options*** are **limited**
- The ***nominal interest rate*** cannot ***fall below*** the ***effective lower bound***.

Booms and Busts in Property and Equity Prices

- **Bubbles** are damaging because the **wealth effects** they create *cause* **consumption** *to* ***surge*** and ***then contract*** just as rapidly.
  - Bubbles are identified after the fact by a **sharp rise** then a **sharp decline** in ***prices***.
- The **collapse of the Internet bubble** in the **1990s** had a *relatively* ***minor impact*** because intermediaries faced ***limited credit exposure*** and ***remained well capitalized***.
- While the ***loss of capital*** in the financial system ***in 2007-2009*** could have ***led to catastrophe*** without *extraordinary government actions*.

Booms and Busts in Property and Equity Prices

- Proponents of a *policy of "leaning against bubbles"* say that ***stabilizing inflation and real growth*** means **raising interest rates** to ***discourage bubbles*** from developing.
- ***Opponents of this interventionist*** view claim that **bubbles** are **too difficult to identify *when they are developing.***
  - Central banks should **wait *until the bubble bursts*** and ***only then react aggressively to limit the fallout*** on the economy by cleaning up the mess.

Booms and Busts in Property and Equity Prices

- Today, the ***proper policy toolkit*** for *addressing bubbles* is not *interest rates* but the **macroprudential regulatory** approach
- According to this view, **bubbles** are a ***major threat.***
  - The best result would be to ***adjust regulatory rules*** to **inhibit *intermediaries*** from *extending* such ***risky credit*** in economic booms.

Booms and Busts in Property and Equity Prices

- This approach *still depends on* the **foresight and judgment of regulators** to limit the ***buildup of an asset price bubble***.
- Using **interest rates** to **combat *asset price bubbles*** now is *more likely* to be viewed as a ***backup*** approach for *extreme circumstances*.

Deflation and the Effective Lower Interest-Rate Bound

- **Nominal interest rates** can **not** be ***deeply negative***.
  - There is an ***effective lower bound (ELB)*** that is **below zero** due to transactions costs
  - Investors can ***always hold cash***, so ***bonds must have yields*** above the ELB to attract bondholders.
- Such risk which policymakers have ***no scope to lower rates further***, **has concerned central banks** *since Japan's experience in the 1990s*.

Deflation and the Effective Lower Interest-Rate Bound

- Think about the *consequences of a shock* that ***depresses aggregate expenditure***.
  - The **dynamic aggregate demand curve** shifts to the ***left***.
  - **Real output *falls below* potential** - a *recessionary output gap* putting ***downward pressure*** on **inflation**.
  - **Monetary policymakers** would normally react by ***cutting interest rates***.
  - This would *increase spending*, ***raise*** **real output**, and ***eliminate*** the **output gap**.

Deflation and the Effective Lower Interest-Rate Bound

- What if, when the shock occurs, **inflation is zero** and the **policy interest rate** that central bankers control is **at the ELB**?
  - The **decline in aggregate demand** still *drives* ***real output*** *below* ***potential output***.
  - There is ***downward pressure on inflation***.
  - But when **inflation *falls***, it drops ***below zero*** so that, on average, ***prices are falling***.
- This result is **deflation**.

Deflation and the Effective Lower Interest-Rate Bound

- When there is a **recessionary output gap**, **current inflation** is ***below*** *expected inflation* and **expected inflation *falls***, which drives deflation down even more.
- Because the **nominal interest rate** is at the **ELB**, policymakers cannot counter the ***worsening deflation*** by ***lowering*** it.
  - The **interest rate stays near zero** and could not be negative, **while inflation rate becomes negative**. **Real interest rate, thus, increase above zero**. -> e.g. r = i - π = 0 – (-0.5) = 1.0 or the rate actually increases
  - The **real interest rate *rises***, *reducing spending*, shifting the **AD curve** to the ***left***.
    - This **expands** the **recessionary output gap**.
- The result is ***deflationary spiral*** in which *deflation grows* worse and worse.

Deflation and the Effective Lower Interest-Rate Bound

- **Deflation** makes it *more difficult* for businesses to ***obtain financing for new projects***.
  - **Without investment** there is ***no growth***.
- **Deflation**, therefore, **increases** the ***real value*** of a **firm's liabilities** without affecting the real value of its assets.

Deflation and the Effective Lower Interest-Rate Bound

Policymakers can minimize the chances of this sort of catastrophe:

1. They can ***set*** their **inflation** objective with the ***perils of deflation*** *in mind*
2. They can ***act boldly*** when there is ***even an indication of deflation***
3. They can ***utilize*** **unconventional policy tools**

Deflation and the Effective Lower Interest-Rate Bound

- ***Reducing*** the **interest rate *significantly*** and ***rapidly*** *when faced with* the ***possibility of hitting the ELB*** is "**acting preemptively**"
- Central bankers can use ***unconventional policy tools*** that *include*:
  - **Forward guidance**
  - **Quantitative easing**
  - **Targeted asset purchases**

Deflation and the Effective Lower Interest-Rate Bound

- Central bankers are *very reluctant to use* ***unconventional policy tools***
  - Continued uncertainty about ***how and why they work*** and ***how to apply them effectively***
  - ***Policy exit*** may be difficult

Chapter 19

Exchange-Rate Policy and the Central Bank

Linking Exchange-Rate Policy with Domestic Monetary Policy

- **Exchange-rate policy** is ***integral*** to any **monetary policy regime**.
- When **capital flows *freely across*** a country's ***borders***, a **fixed exchange rate** means **giving up** domestic **monetary policy**.

Linking Exchange-Rate Policy with Domestic Monetary Policy

There are two ways to see the **connection** between ***exchange rates*** and ***monetary policy***.

1. Think about the ***market for goods*** and **purchasing power parity**.
2. ***Short-run movements in exchange rates*** are tied to the **supply and demand** in the ***currency markets***.

Inflation and the Long-Run Implications of Purchasing Power Parity

- *Ignoring transportation costs*, the ***law of one price*** says that **identical goods** *should* ***sell for the same price*** regardless of where they are sold.
- The concept of **purchasing power parity (PPP)** *extends* the logic of the law of one price *to a basket of goods and services.*

Inflation and the Long-Run Implications of Purchasing Power Parity

- As long as goods can *move freely across international boundaries*, **one unit of domestic currency *should buy the same basket of goods*** anywhere in the world.
- When **prices change** *in one country* but not in another, the **exchange rate *will adjust*** to reflect the change.
- In the *long run*, **changes in the exchange rate** are tied to **differences in inflation**.
- *The central bank must **choose** either a **fixed exchange rate** or an **independent inflation policy**.*

Interest Rates and the Short-Run Implications of Capital Market Arbitrage

- In the **short run**,
  - A country's **exchange rate** is ***determined*** by **supply and demand**.
- When the bonds have ***different yields***, the **prices** will be ***bid up or down*** **until the returns are equal.**

Capital Controls and the Policymaker's Choice

- **Impossible Trinity**: a country *cannot* complete 3 conditions
  - **Free capital flows**
  - **Sovereign monetary policy**
  - **Fixed exchange rate**
- Policymakers must ***choose two of these three*** options.
- *If* a country is willing to participate in **international capital markets**, it *can*:
  - **Liberalize capital mobility**
  - Conduct **independent monetary policy**
  - But, it could not keep its ***exchange rate*** **fixed**

Capital Controls and the Policymaker's Choice

- Internationally **integrated capital markets** ***ensure*** that **capital goes to its *most efficient* uses**.
- **Disturbances** in one country's financial market *can be quickly* ***transmitted*** *to other countries.*
- For emerging-market countries, **greater openness** of capital markets ***poses greater risks***.

Capital Controls and the Policymaker's Choice

- Countries with ***open capital markets*** are **vulnerable** to ***sudden changes*** in *investor sentiment.*
- Investors may **decide to sell** a ***country's bonds***.
  - The **value of the domestic currency** is ***driven down***.
  - **Bond prices** are ***driven down***.
  - **Interest rates** are ***driven up***.
- The *result* is *similar to a* ***bank run***.
  - *All investors leave* at once, **triggering** a **financial collapse.**

The Central Bank's Balance Sheet

- As the Fed works to **maintain** a ***fixed dollar-euro exchange rate***, its *balance sheet shifts*.
- **Buying euros** *or selling dollars* ***increases*** the **supply of reserves** to the banking system.
- These ***interventions*** have an impact on **interest rates** and the **quantity of money** in the economy.
- **Controlling the exchange rate** means **giving up control of the size of reserves** so that the ***market*** *determines the* ***interest rate***.

The Central Bank's Balance Sheet

- In *September 2000*, the world's largest central banks **intervened** to ***bolster*** the **value of the euro**.
- The **Fed *purchased €1.5 billion*** in exchange for $1.34 billion.
  - They did this **by purchasing bonds *issued by euro-area governments***.

The Central Bank's Balance Sheet

Figure 19.1 Change in the Federal Reserve's Balance Sheet Immediately following a Purchase of Euros

Assets		Liabilities	
Euro reserves (German government bonds)	+ $1.34 billion	Commercial bank reserves	+ $1.34 billion

- The Fed ***increased*** its **euro-denominated foreign exchange assets** by $1.34 billion.
- On the liabilities side, **commercial bank reserves** have increase by the same amount.

The Central Bank's Balance Sheet

- This transaction is **identical** to a ***purchase of U.S. Treasury bonds***.
- A foreign exchange intervention has the **same impact on reserves** as a ***domestic open market operation.***
- The **Fed** did **supply dollars** to the market through its intervention, but *more importantly*, the **interest rate has fallen**.

The Central Bank's Balance Sheet

- When Fed intervened to buy euros, it did **not change *interest-rate targets.***
- We assumed that when the Fed bought euros, it **increased *commercial bank reserves***, which would **reduce the interest rate** in the *absence of any other action*.
- This is an example of an **unsterilized foreign exchange intervention**

Sterilized Intervention

- In fact, **central banks** in large countries **do <u>not</u>** ***operate that way***.
- They engage in **<u>sterilized</u> foreign exchange interventions**:
  - A **change in foreign exchange reserves** alters the ***asset side*** of the ***central bank's balance sheet*** but the **domestic monetary base** ***<u>remains unaffected</u>***.

Sterilized Intervention

A **sterilized intervention** is a ***combination*** of two transactions:

1. There is the **purchase or sale of foreign currency reserves**, which ***changes the central bank's liabilities.***
2. Then, an **immediate open market operation**, of ***exactly the same size***, designed to **offset** the impact of the first transaction on the ***monetary base***.

Sterilized Intervention

- For example, the **Fed's purchase of a German government bond**, is ***offset*** by the **sale of a U.S. Treasury bond**.
  - These two actions **leave the level of reserves unchanged.**
- This intervention is **sterilized** with respect to its ***effect on the monetary base***, or the ***size of the central bank's balance sheet***.
- An intervention is **sterilized** since it does **not change** the ***monetary base***.

Sterilized Intervention

- The **FOMC** had **not changed** the **target federal funds rate**.
- The ***foreign exchange desk*** had **purchased bonds issued by a euro-area government**, *paying for them with reserves*, and the ***open market desk*** had **sold U.S. Treasury bonds** to ***reverse the potential impact***.

Figure 19.3 Change in the Federal Reserve's Balance Sheet following a *Sterilized* Purchase of Euro-Denominated Bonds

Assets		Liabilities
Euro reserves (German government bonds)	+$1.34 billion	Commercial bank reserves unchanged
Securities (U.S. Treasury bonds)	−$1.34 billion	

The Costs, Benefits, and Risks of Fixed Exchange Rates

- **Fixed exchange rates** not only ***simplify operations*** for *international trade businesses*, they also ***reduce the risk*** that investors face when they ***hold foreign stocks and bonds***.
- *In countries* that are prone to bouts of *high inflation*, a **fixed exchange rate** may be the only way to ***establish*** a **credible low-inflation policy.**

Assessing the Costs and Benefits

- One serious **drawback** to a **fixed exchange rate** is that it ***could <u>not</u> operate*** **independent monetary policy.**
  - You **<u>must adopt</u>** the ***other country's interest-rate policy.***
- A ***fixed exchange rate policy*** makes the most sense when the *two countries involved have <u>similar</u> macroeconomic fluctuations.*
  - Otherwise, the ***country with the flexible exchange rate*** that is in **control of monetary policy** might be ***raising interest rates*** at the same time **another country in going into a recession.**

Assessing the Costs and Benefits

Policymakers should consider several additional matters.

1. When a country **fixes its exchange rate**, the central bank is ***offering*** to **buy and sell its own currency** at a **fixed rate**.
   - Monetary policymakers will **need ample currency reserves.**
2. *Fixing the exchange rate* means **reducing** the domestic economy's natural **ability to respond to macroeconomic shocks.**

The Danger of Speculative Attacks

- **Fixed exchange rates** are *fragile and likely to to* a type of crisis called a **speculative attack**.
- Suppose for some reason, *financial market participants* come to ***believe*** that the ***government will need to devalue*** its currency in the near future.
  - ***Investors*** are ***likely to attack the currency now*** and ***force*** an **immediate devaluation**.

The Danger of Speculative Attacks

Causes of a speculative attack:

1. Fiscal policy:
   - If investors begin to think that at current levels, ***government spending*** *must ultimately* **increase inflation**, they will ***not believe*** that ***officials can maintain the exchange rate*** at its **fixed level**.
2. Financial instability:
   - If a country's banking system is **insufficiently capitalized**, a central bank may face pressure to ***relax monetary policy*** to **avoid financial crisis**.
   - If **investors doubt** that the **central bank will keep interest rates high** enough for a ***sufficient time*** to **defend the currency peg**, an ***attack may follow***.

Assessing the Costs and Benefits

3. Spontaneously:
   - If enough currency **speculators** simply ***decide*** that a ***central bank <u>cannot</u> maintain its exchange rate***, they will **attack**.
     - **Spontaneous speculative attacks** are like **bank runs**; they can be ***contagious***.

Many observers suspect that in today's world, **<u>no</u> central bank *has the resources to withstand such an attack*** in the **absence of capital controls**

EE432 Monetary Theory and Policy

Additional Lecture: New Keynesian Monetary Economics

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Semester 1/2019

Additional lecture made for EE432 Monetary Theory and Policy at Thammasat University
(This is not part of Cecchetti and Schoenholtz (2017) Money, Banking, and Financial Markets. McGraw-Hill Textbook)

New Keynesian Model

- Over the past two decades, **macroeconomics** has evolved from a divided field, which in many ways ***lacked a solid foundation***, into a more comprehensive discipline built on a fairly firm **microeconomic foundation**.

New Keynesian Model

- **New Keynesian economics** reconciles the ***general equilibrium approach*** of the *real business cycle school* with the clear role of **rigidities** advocated by Keynes and Phelps.
- The **general equilibrium approach** derives the *equilibrium conditions* from the ***optimization problem*** of ***forward-looking*** households, firms and fiscal and monetary authorities in conditions of ***uncertainty***.

New Keynesian Model

- The **New Keynesian** emphasis on **expectations** and **forward-looking behaviour** in markets has similarly had major consequences for monetary policy implementation.
- If **private agents' expectations about future inflation** are the **main determinants of inflation**, it is crucial for monetary policy-making to be ***systematic, credible and transparent*** **to maximize its impact on them**.

New Keynesian Model

- This **expectational channel** of monetary policy introduces a ***new instrument for monetary authorities***, i.e. the possibility to influence inflation by **influencing forward-looking expectations**.

New Keynesian Model

- This has led to **an ongoing discussion** on the **advantages of commitment *versus discretion***.
- The current debate centres on the ***benefits from committing to price stability*** by **introducing an official inflation target**, and *being transparent in formulation, communication and implementation of monetary policy* in order to **anchor future inflation expectations** and **improve the tradeoff between stabilizing inflation and output gap volatility**.

New Keynesian Model

- As a consequence of the **presence of nominal rigidities**, *prices do not adjust in proportion to changes in the money supply* (thus causing real balances to vary), or ***if* expected inflation *does not move one-for-one with the nominal interest rate*** when the latter varies, thus ***leading to a change in the* real interest rate**.
- The **central bank** will generally be ***able to alter the level aggregate demand*** and, as a result, ***the equilibrium levels of output and employment***.

Key Properties of Model

- **Monopolistic competition**; prices and wages are ***set by private economic agents*** in order to maximize their objectives
- **Nominal rigidities**; firms are *subjected to some* ***constraints*** *to* ***adjust the price*** *of goods*, including wage

Key Properties of Model

- **Short-run non-neutrality of monetary policy**; *in the presence* of ***nominal rigidities***, *changes in short-term nominal interest rates* are not matched by *one-for-one changes in expected inflation*, thus leading to **variations in real interest rates.**
- As a result, firms find its *optimal to adjust the quantity of goods supplied to the new level of demand*. However, in the **long run**, the ***economy reverts back to its natural equilibrium***.

Key Properties of Model

- **New Keynesian models** represent a convergence between
- (i) **simple (static) policy-oriented models** such as the *IS-LM model*,
- (ii) **Keynesian** emphasis on the role of **monopolistic competition**, *markups and costly price adjustments*, and
- (iii) **dynamic general equilibrium models** with their roots in the real business cycle literature.

The New Keynesian Model for a Closed Economy

- A **small-scale new Keynesian model** *for a closed economy* basically consists of three components;
- The **demand block** is represented by an ***expectational IS curve***, which is a linear approximation to the representative household's intertemporal Euler equation to **optimize household consumption** across time *based on their intertemporal budget constraints*.
- This relates the **level of real activity** *to expected (and sometimes past) real activity* and the **real interest rate.**

The New Keynesian Model for a Closed Economy

- The **supply block** is represented by a ***price-setting equation*** – the **new Keynesian Phillips curve** – which can be derived from price-setting behaviour.
- It *relates inflation to expected* (and sometimes past) *inflation* and a measure of excess demand.
- Thus, it *adds an expectation term* to the conventional **Phillips curve.**

The New Keynesian Model for a Closed Economy

- The third relationship is an **interest rate rule**, which *describes how the **nominal rate of interest** is determined*.
- This condition is *typically linked to **interest rate rule*** to conduct of monetary policy.
- The policy interest rate setting is thus *commonly a **reaction function*** where the *monetary authorities respond to the output gap and (expected) inflation*

Evidence of Monetary Policy Non-neutralities

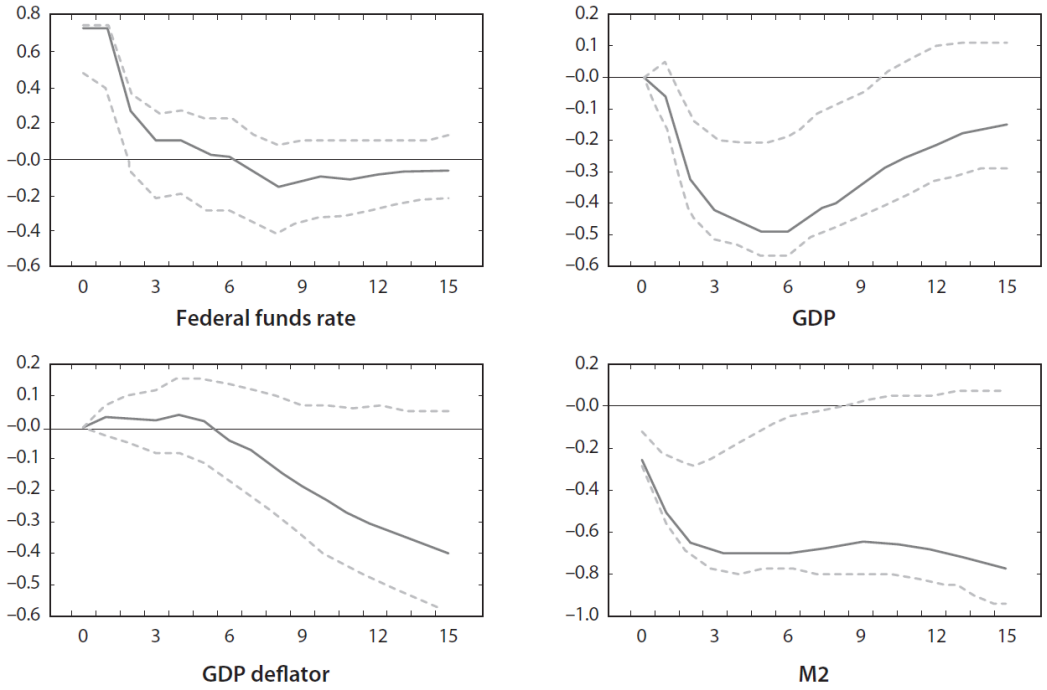


Figure 1.1. Estimated Dynamic Response to a Monetary Policy Shock
Source: Christiano, Eichenbaum, and Evans (1999).

- The evidence taken from Christiano, Eichenbaum, and Evans (1999) seeking to **estimate the <u>effects of exogenous monetary policy shocks</u>**.

Evidence of Monetary Policy Non-neutralities

- Figure shows the **dynamic responses** of the ***federal funds rate***, (log) **GDP**, (log) **GDP deflator**, and the (log) **money supply** (measured by M2), *to* an *exogenous tightening of monetary policy*.
- The **solid line** represents ***the estimated response***, with the **dashed lines** capturing the ***corresponding 95 percent confidence interval***.
- The scale on the *horizontal axis* measures the *number of quarters after the initial shock*.

Evidence of Monetary Policy Non-neutralities

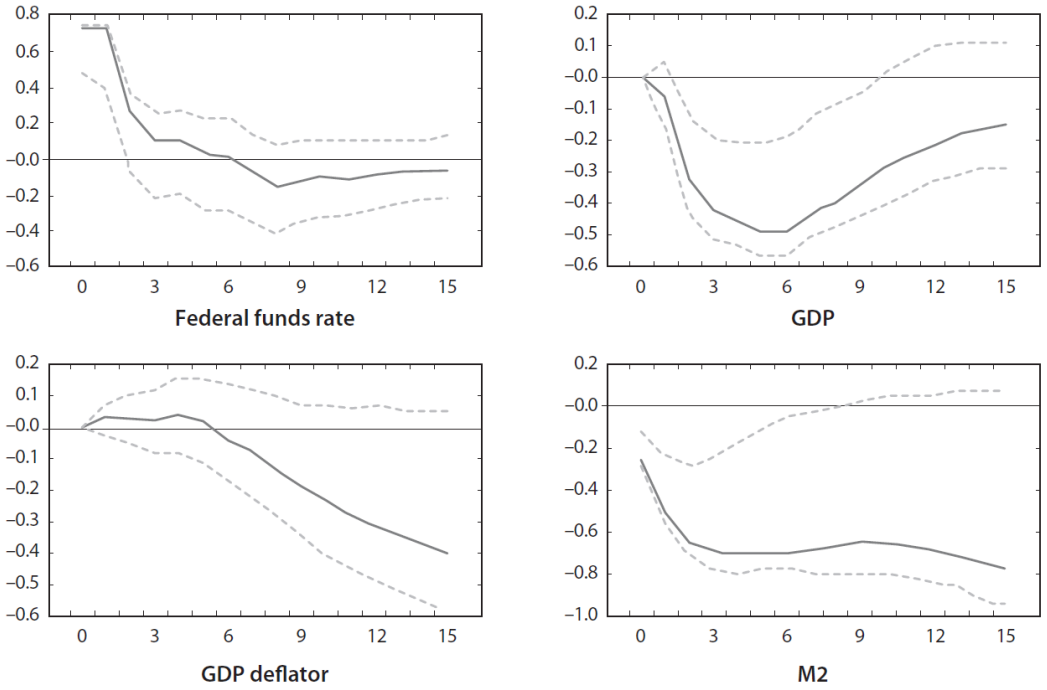


Figure 1.1. Estimated Dynamic Response to a Monetary Policy Shock
Source: Christiano, Eichenbaum, and Evans (1999).

- An **initial increase of Fed funds rate about 75 basis points**, *followed by a gradual return to its original level*.
- **In response to that tightening of policy, <u>GDP declines</u>** with a characteristic ***hump-shaped pattern***, and then it *slowly reverts back to its original level*. That estimated response of GDP can be viewed as **evidence of sizable persistent real effects** of monetary policy shocks.

Evidence of Monetary Policy Non-neutralities

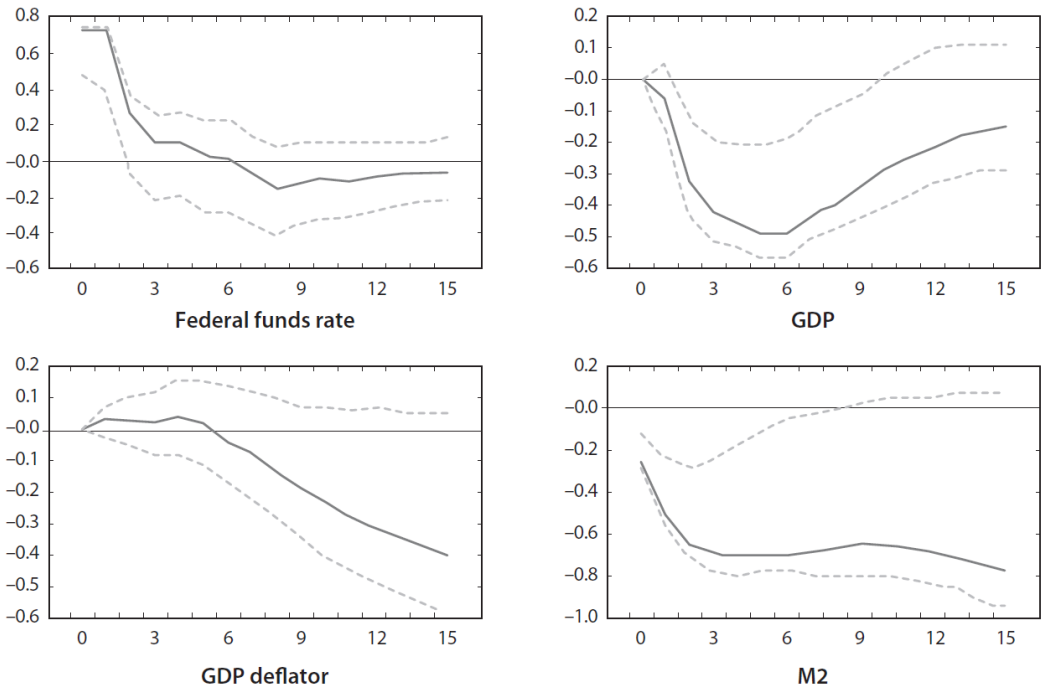


Figure 1.1. Estimated Dynamic Response to a Monetary Policy Shock
Source: Christiano, Eichenbaum, and Evans (1999).

- On the other hand, the (log) **GDP deflator** displays ***a flat response for over a year***, **after which it declines**.
- That estimated **sluggish response of prices** *to the policy tightening* is generally interpreted as **evidence of substantial price rigidities**.
- Note: Surprisingly, ***there is an initial positive response of inflation*** due to **risk averse behavior** – higher cost and wage to compensate risk premium, so called **prize puzzle**.

Evidence of Monetary Policy Non-neutralities

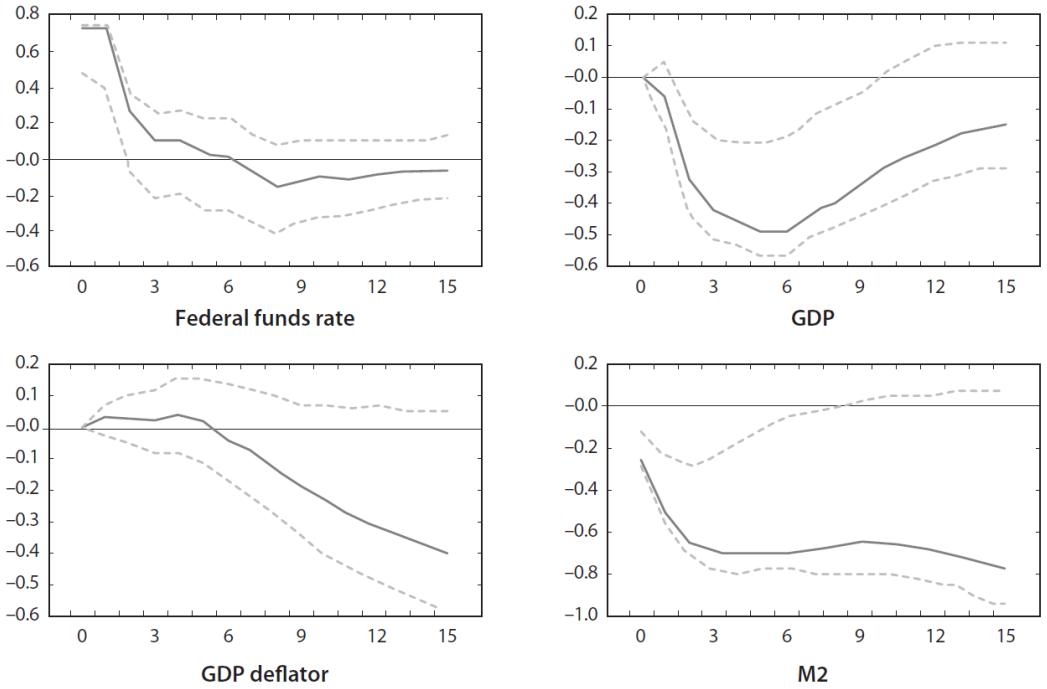


Figure 1.1. Estimated Dynamic Response to a Monetary Policy Shock
Source: Christiano, Eichenbaum, and Evans (1999).

- Note that (log) **M2** displays a ***persistent decline*** in the face of the *rise in the federal funds rate*, suggesting that the **Fed needs to reduce the amount of money in circulation** *in order to bring about the increase in the nominal rate.*

EE432 Monetary Theory and Policy

Additional Lecture:
Special Topics on Monetary Theory and Policy

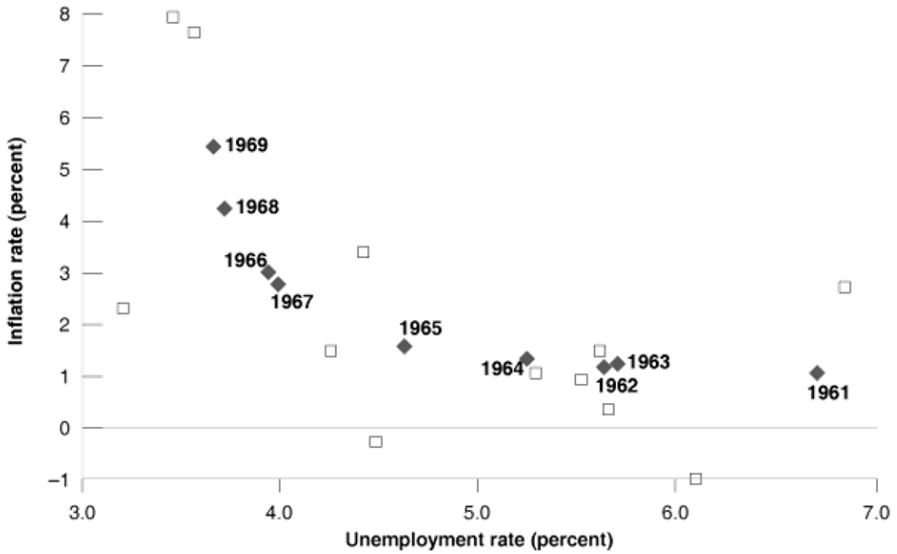
Additional lecture made for EE432 Monetary Theory and Policy at Thammasat University
(This is not part of Cecchetti and Schoenholtz (2017) Money, Banking, and Financial Markets. McGraw-Hill Textbook)

Phillips Curve

Phillips curve

- The ***negative*** relation between **unemployment and inflation**

$$\pi_t = (\mu + z) - \alpha u_t$$

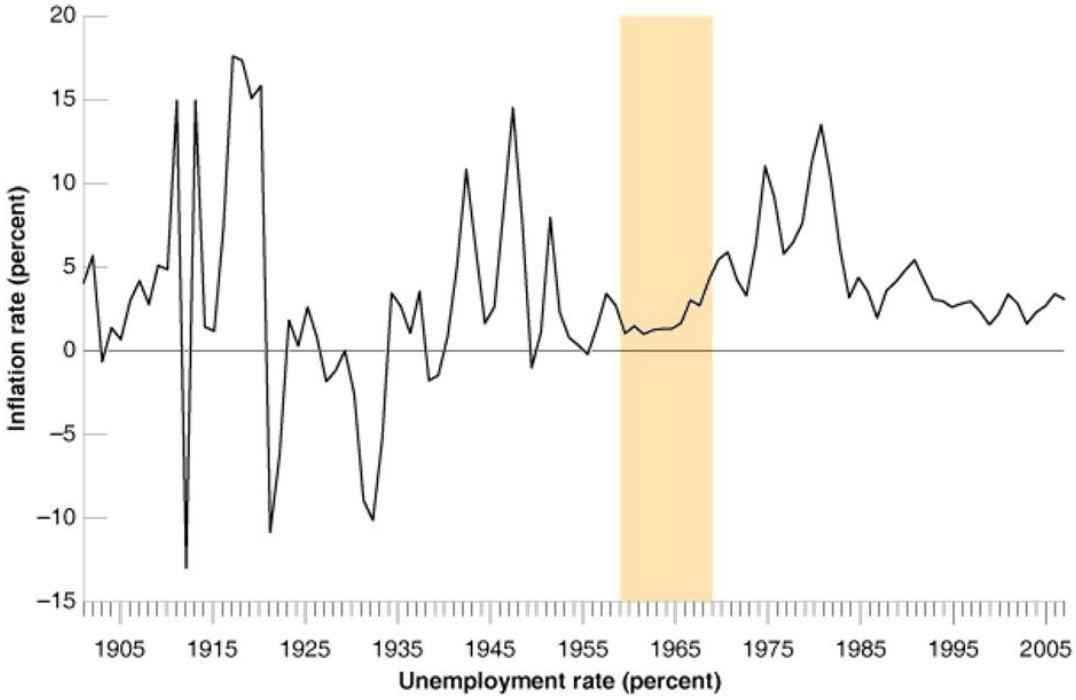


The **steady decline in the U.S. unemployment rate** throughout the 1960s was associated with a **steady increase in the inflation rate**.

Phillips Curve

- Since 1970, a clear ***negative relation*** emerged between the **unemployment rate** and the **change in the inflation rate**.
- The **modified Phillips curve**, or the ***expectations-augmented Phillips curve***, or the ***accelerationist Phillips curve***, is:

$$\pi_t - \pi_{t-1} = (\mu + z) - \alpha u_t$$



Since the 1960s, the U.S. **inflation rate** has been **consistently positive**. Inflation has also **become more persistent**: *A **high inflation rate this year** is **more likely to be followed** by a **high inflation rate next year***.

Natural Rate of Unemployment

- Nobel prize laureates, Milton Friedman and Edmund Phelps ***questioned*** *the* ***trade-off between*** *unemployment and inflation*. They argued that the **unemployment rate** could **not** be ***sustained below a certain level***, a level they called the "**natural rate of unemployment**."
- The **natural rate of unemployment** is the ***unemployment rate*** such that the **actual inflation rate** is equal to the **expected inflation rate.**
- It is the **minimum unemployment rate**, which includes only ***frictional*** and ***structural unemployment*** (not include cyclical unemployment)

Natural Rate of Unemployment

$$\pi_t - \pi_{t-1} = -\alpha(u_t - u_n)$$

- This relation gives *another way of thinking about* the **Phillips curve** in terms of the ***actual*** and the ***natural unemployment rates***, and the ***change in the inflation rate***.

Natural Rate of Unemployment

- ***If policymakers*** try to **maintain unemployment <u>below</u>** its **natural rate**, the **inflation will accelerate** with each successive attempt.
- The result is a *self-fulfilling* **spiral** of **wage and price** increases.
- The **<u>natural unemployment rate</u>** is referred as the ***non-accelerating inflation* rate of unemployment** (NAIRU).

Modern Monetary Theory

- **'Modern monetary theory' (MMT)** has *become a much-discussed topic in policy recently*. US Congresswoman, *Ocasio-Cortez*, stressed its importance to **boost public spending** for ***education and medical services***
- *Former ECB President Mario Draghi* mentioned about MMT and former *Fed Vice Chairman Stanley Fischer* said ***central banks*** *should* ***put money*** "**directly in the hands** of *public and private sector* spenders."

Modern Monetary Theory

- **Modern monetary theory (MMT):** government with a fiat money system ***can print as much money as they need*** to spend since *it could not be insolvent*.
- If a nation's ***expenditure exceeds its revenues***, it incurs a **government deficit**, which can ***be financed*** *by* ***'debt monetization'***

Modern Monetary Theory

- **Monetizing debt** is a *two-step process*
  - The **government issues debt** *(government bond)* to ***cover its spending***
  - The **central bank purchases bond** *from secondary markets* **through open market operation**, and ***perpetually rolls it over***, leaving the system an *increased* ***supply of money***
- ***Taxes*** *would drain money from consumers and businesses* so total spending in the economy ***won't be excessive*** to **keep inflation under control**.

Features of MMT

The **dominance of fiscal policy** over monetary policy - ***fiscal policy*** *is* *effective* while *monetary policy is ineffective*

- **Monetary accommodation** in a downturn does **not** necessarily ***generate sufficient demand for credit*** when the *outlook on firm* ***profitability*** *and household* ***income*** remains ***weak***
- A **cut in interest rates** ***could*** *be economically* ***contractionary***, since **reduced interest income** ***discourages*** active private sector ***spending***.
- **Monetary easing** tends to promote an **accumulation of private sector debt** and thus ***reduce private sector net wealth***.

Why MMT should be considered as alternative monetary policy

- **Public spending** should intensively ***prioritize productivity-enhancing infrastructure***, ***human capital, and innovation***, which would **raise potential economic growth** and thereby **prevent substantial inflation**.
- Government should **issue its own currency** *rather than* ***issue bonds*** that are *sensitive to investor sentiment* and *subject to volatility*.

Why MMT should be considered as alternative monetary policy

- **Government debt** is ***more desirable*** and *sustainable* than *private sector debt*.
- In contrast, **growing private sector debt** ***reduces net financial wealth*** *within the private sector* and ***amplifies default risk***.

Critiques on MMT

- *Lawrence Summers*, the former Treasury secretary and *Paul Krugman*, Nobel prize laureate worried that **MMT will give a bad name** to their more *conventionally* ***dovish*** *views* on **deficits**.
- Trying to ***use*** **fiscal policy** ***to steer the economy*** is a ***proven failure*** because politicians ***rarely*** act ***quickly enough*** to respond to ***economic downturn***.
- Politicians ***hardly*** **impose higher taxes** or **lower spending** to cope with **rising inflation**.