Course Name	**: Money and Banking Practice**
Course Code	**: APBSS 406**
Course Level	**: Level 4**
Credit Unit	**: 4 CU**
Contact Hours	**: 60 Hrs**

Course Description

The Course is structured into two parts that is the role of money in an economy and the other is the relevance of financial institutions in the economic systems. In the first part, meaning, functions, origins, types, properties, demand, supply, monetary tools and the relationship between money and inflation, exchange rate and the interest rate are looked at. Second part looks at the financial markets, their structure, services and the various instruments involved

Course Objectives

- To help students grasp the importance of money in an economy
- To help them appreciate the role banks in stabilizing the economy's financial status
- To prepare students get well acquainted with different banking concepts, structures and instruments used to maintain financial standards of a country.

Course Content

Money

- The nature of Money
- The supply of Money
- The demand for Money

The Financial Sector

- Hicks-Hasen (IS/LM) Function : General Equilibrium of product and money markets
- Introduction to the IS/LM function
- The product Market Equilibrium
- The Money Market Equilibrium
- Changes in General Equilibrium

Financial Markets

- Nature and functions of financial markets
- The Money Market
- The capital market
- Distinction between Money Markets and Capital Markets
- Inter-relation between Money and Capital Markets

Financial Intermediaries

- Meaning of Financial Intermediation
- Process of intermediation
- Role of Financial Intermediaries
- Financial intermediaries

Non-Bank Intermediaries (NBI's)

- Meaning of NBIs
- Role of NBIs

- NBIs and Monetary policy
- Distinction between banks and NBIs

Commercial Bank

- Functions of commercial banks
- Organization and structure of Commercial Banks
- Balance sheet of a commercial banks
- Role of commercial banks
- Commercial bank policies and principles

The Central Bank and Instruments Credit Control

- Central Bank: An apex Financial Authority
- Functions of a Central Bank
- Central Bank and Monetary management
- Instruments of Credit Control

Monetary Policy

- Objectives of Monetary Policy
- Trade-offs in Monetary Goals
- Instruments of Monetary policy
- Expansionary Monetary Policy
- Restrictive Monetary Policy
- Role of Monetary Policy in developing Economy
- Limitations of Monetary Policy

Development Banks

- The concept of development banks
- Types of development banks
- The role of development banks

Exchange rates and the balance of payments

- Exchange rate determination
- Foreign exchange rate system
- Types of exchange rates
- Factors affecting exchange rate determination
- The purchasing power parity of exchange

The Balance of Payments (BOP)

- Structure of the BOP
- Balance of trade and balance of payments
- Equilibrium in the balance of payments
- Disequilibrium in the balance of payments
- Adjustments in the balance of payments

Mode of Delivery, Face to face Lectures
Assessment
Course Work 40%
Examination 60%
Total Mark 100%

Course outline

1. Money.
   (a) Define 'money' and explain the functions and role of money in an economy.
   (b) Describe the evolution of money, identify the different types of money (e.g. commodity money, near money, broad money); explain qualities of good money.
   (c) Define 'demand for money' and explain the determinants of the demand for money.
   (d) Define 'supply of money' and explain the factors that determine the supply of money.
   (e) Define 'liquidity preference' and explain its determinants.
   (f) Define interest rates and outline the reasons why interest is paid; explain the determinants of the rate of interest.
   (g) Explain the term 'capital markets' (include the institutions in the capital markets like stock exchange, insurance companies, and merchant banks).
   (h) Define 'stock exchange' and explain the functions of the stock exchange; identify the securities traded on the stock exchange and the membership of the stock exchange.
   (i) Explain the problems met by the stock exchange and capital markets in developing countries.

2. The Value of Money.
   Define 'value of money' and explain the factors that influence the value of money.

3. The Quantity Theory of Money.
   (a) Explain the quantity theory of money and give the assumptions on which it operates; do some mathematical examples.
   (b) Discuss the applicability of the quantity theory of money.

4. Commercial Banking.
   (a) Define 'commercial bank'; identify the assets and liabilities of commercial banks; explain the functions and role of commercial banks (indigenous and foreign).
   (b) Define 'credit creation'; identify the assumptions on which the concept of credit creation works; describe the process of credit creation and explain the factors that influence credit creation; explain factors that limit credit creation.
   (c) Explain the problems met by commercial banks in their operations; the objectives of commercial banking, i.e. liquidity, profitability, security.
   (d) Define 'non-bank financial intermediaries' and explain their role in less developed countries (LDCs).

5. Central Banking.
   (a) Define 'central bank' and explain the functions of the central bank.
   (b) Explain the term 'monetary policy' and outline the objectives of monetary policy; describe the working of the tools of monetary policy; explain the limitations to the smooth operation of monetary policy in Uganda.

6. Inflation.
   (a) Define' inflation' and identify the different types of inflation (hyper/ runaway/ galloping, mild/ creeping/ gradual, structural, imported, demand pull, cost push, scarcity, speculative, monetary, stagflation, headline, underlying.
   (b) Explain the causes and types of inflation.
   (c) Examine (give positive and negative) effects of inflation in Uganda.
   (d) Explain the ways/ policies used to control inflation in Uganda.
   (e) Explain the concept of deflation.
   (i) Define and give effects of deflation.

Money

Money is any object or record that is generally accepted as payment for goods and services and repayment of debts in a given socio-economic context or country.[1][2][3] The main functions of money are distinguished as: a medium of exchange; a unit of account; a store of value; and, occasionally in the past, a standard of deferred payment.[4][5] Any kind of object or secure verifiable record that fulfills these functions can serve as money.

Money is historically an emergent market phenomena establishing a commodity money, but nearly all contemporary money systems are based on fiat money.[4] Fiat money is without intrinsic use value as a physical commodity, and derives its value by being declared by a government to be legal tender; that is, it must be accepted as a form of payment within the boundaries of the country, for "all debts, public and private".

The money supply of a country consists of currency (banknotes and coins) and bank money (the balance held in checking accounts and savings accounts). Bank money usually forms by far the largest part of the money supply.

History

The use of barter-like methods may date back to at least 100,000 years ago, though there is no evidence of a society or economy that relied primarily on barter.[9] Instead, non-monetary societies operated largely along the principles of gift economics and debt.[10][11] When barter did in fact occur, it was usually between either complete strangers or potential enemies.[12]

Many cultures around the world eventually developed the use of commodity money. The shekel was originally a unit of weight, and referred to a specific weight of barley, which was used as currency.[13] The first usage of the term came from Mesopotamia circa 3000 BC. Societies in the Americas, Asia, Africa and Australia used shell money – often, the shells of the money cowry (*Cypraeamoneta L.* or *C. annulus L.*). According to Herodotus, the Lydians were the first people to introduce the use of gold and silver coins.[14] It is thought by modern scholars that these first stamped coins were minted around 650–600 BC.[15]

The system of commodity money eventually evolved into a system of representative money.[*citation needed*] This occurred because gold and silver merchants or banks would issue receipts to their depositors – redeemable for the commodity money deposited. Eventually, these receipts became generally accepted as a means of payment and were used as money. Paper money or banknotes were first used in China during the Song Dynasty. These banknotes, known as "jiaozi", evolved from promissory notes that had been used since the 7th century. However, they did not displace commodity money, and were used alongside coins. Banknotes were first issued in Europe by StockholmsBanco in 1661, and were again also used alongside coins. The gold standard, a monetary system where the medium of exchange are paper notes that are convertible into pre-set, fixed quantities of gold, replaced the use of gold coins as currency in the 17th-19th centuries in Europe. These gold standard notes were made legal tender, and redemption into gold coins was discouraged. By the beginning of the 20th century almost all countries had adopted the gold standard, backing their legal tender notes with fixed amounts of gold.

After World War II, at the Bretton Woods Conference, most countries adopted fiat currencies that were fixed to the US dollar. The US dollar was in turn fixed to gold. In 1971 the US government suspended the convertibility of the US dollar to gold. After this many countries de-pegged their currencies from the US dollar, and most of the world's currencies became unbacked by anything except the governments' fiat of legal tender and the ability to convert the money into goods via payment.

Etymology

The word "money" is believed to originate from a temple of Hera, located on Capitoline, one of Rome's seven hills. In the ancient world Hera was often associated with money. The temple of Juno Moneta at Rome was the place where the mint of Ancient Rome was located.[16] The name "Juno" may derive from the Etruscan goddess Uni (which means "the one", "unique", "unit", "union", "united") and "Moneta" either from the Latin word "monere" (remind, warn, or instruct) or the Greek word "moneres" (alone, unique).

In the Western world, a prevalent term for coin-money has been *specie*, stemming from Latin *in specie*, meaning 'in kind'

Functions

In the past, money was generally considered to have the following four main functions, which are summed up in a rhyme found in older economics textbooks: "Money is a matter of functions four, a medium, a measure, a standard, a store." That is, money functions as a medium of exchange, a unit of account, a standard of deferred payment, and a store of value.[5] However, modern textbooks now list only three functions, that of medium of exchange, unit of account, and store of value, not considering a standard of deferred payment as a distinguished function, but rather subsuming it in the others.[4][18][19]

There have been many historical disputes regarding the combination of money's functions, some arguing that they need more separation and that a single unit is insufficient to deal with them all. One of these arguments is that the role of money as a medium of exchange is in conflict with its role as a store of value: its role as a store of value requires holding it without spending, whereas its role as a medium of exchange requires it to circulate.[5] Others argue that storing of value is just deferral of the exchange, but does not diminish the fact that money is a medium of exchange that can be transported both across space and time.[20] The term 'financial capital' is a more general and inclusive term for all liquid instruments, whether or not they are a uniformly recognized tender.

Medium of exchange

When money is used to intermediate the exchange of goods and services, it is performing a function as a *medium of exchange*. It thereby avoids the inefficiencies of a barter system, such as the 'double coincidence of wants' problem.

Unit of account

A *unit of account* is a standard numerical unit of measurement of the market value of goods, services, and other transactions. Also known as a "measure" or "standard" of relative worth and deferred payment, a unit of account is a necessary prerequisite for the formulation of commercial agreements that involve debt. To function as a 'unit of account', whatever is being used as money must be:

- Divisible into smaller units without loss of value; precious metals can be coined from bars, or melted down into bars again.
- Fungible: that is, one unit or piece must be perceived as equivalent to any other, which is why diamonds, works of art or real estate are not suitable as money.
- A specific weight, or measure, or size to be verifiably countable. For instance, coins are often milled with a reeded edge, so that any removal of material from the coin (lowering its commodity value) will be easy to detect.

Store of value

To act as a *store of value*, a money must be able to be reliably saved, stored, and retrieved – and be predictably usable as a medium of exchange when it is retrieved. The value of the money must also remain stable over time. Some have argued that inflation, by reducing the value of money, diminishes the ability of the money to function as a store of value.[4]

Standard of deferred payment

While *standard of deferred payment* is distinguished by some texts,[5] particularly older ones, other texts subsume this under other functions.[4][18][19] A "standard of deferred payment" is an accepted way to settle a debt – a unit in which debts are denominated, and the status of money as legal tender, in those jurisdictions which have this concept, states that it may function for the discharge of debts. When debts are denominated in money, the real value

of debts may change due to inflation and deflation, and for sovereign and international debts via debasement and devaluation.

Measure of value

Money acts as a standard measure and common denomination of trade. It is thus a basis for quoting and bargaining of prices. It is necessary for developing efficient accounting systems. But its most important usage is as a method for comparing the values of dissimilar objects.

Money supply

In economics, money is a broad term that refers to any financial instrument that can fulfill the functions of money (detailed above). These financial instruments together are collectively referred to as the money supply of an economy. In other words, the money supply is the amount of financial instruments within a specific economy available for purchasing goods or services. Since the money supply consists of various financial instruments (usually currency, demand deposits and various other types of deposits), the amount of money in an economy is measured by adding together these financial instruments creating a *monetary aggregate*.

Modern monetary theory distinguishes among different ways to measure the money supply, reflected in different types of monetary aggregates, using a categorization system that focuses on the liquidity of the financial instrument used as money. The most commonly used monetary aggregates (or types of money) are conventionally designated M1, M2 and M3. These are successively larger aggregate categories: M1 is currency (coins and bills) plus demand deposits (such as checking accounts); M2 is M1 plus savings accounts and time deposits under $100,000; and M3 is M2 plus larger time deposits and similar institutional accounts. M1 includes only the most liquid financial instruments, and M3 relatively illiquid instruments.

Another measure of money, M0, is also used; unlike the other measures, it does not represent actual purchasing power by firms and households in the economy. M0 is base money, or the amount of money actually issued by the central bank of a country. It is measured as currency plus deposits of banks and other institutions at the central bank. M0 is also the only money that can satisfy the reserve requirements of commercial banks.

Market liquidity

Market liquidity describes how easily an item can be traded for another item, or into the common currency within an economy. Money is the most liquid asset because it is universally recognised and accepted as the common currency. In this way, money gives consumers the freedom to trade goods and services easily without having to barter.

Liquid financial instruments are easily tradable and have low transaction costs. There should be no (or minimal) spread between the prices to buy and sell the instrument being used as money.

Types of money

Currently, most modern monetary systems are based on fiat money. However, for most of history, almost all money was commodity money, such as gold and silver coins. As economies developed, commodity money was eventually replaced by representative money, such as the gold standard, as traders found the physical transportation of gold and silver burdensome. Fiat currencies gradually took over in the last hundred years, especially since the breakup of the Bretton Woods system in the early 1970s.

Commodity money

Many items have been used as commodity money such as naturally scarce precious metals, conch shells, barley, beads etc., as well as many other things that are thought of as having value. Commodity money value comes from the commodity out of which it is made. The commodity itself constitutes the money, and the money is the

commodity.[21] Examples of commodities that have been used as mediums of exchange include gold, silver, copper, rice, salt, peppercorns, large stones, decorated belts, shells, alcohol, cigarettes, cannabis, candy, etc. These items were sometimes used in a metric of perceived value in conjunction to one another, in various commodity valuation or Price System economies. Use of commodity money is similar to barter, but a commodity money provides a simple and automatic unit of account for the commodity which is being used as money. Although some gold coins such as the Krugerrand are considered legal tender, there is no record of their face value on either side of the coin. The rationale for this is that emphasis is laid on their direct link to the prevailing value of their fine gold content.[22]American Eagles are imprinted with their gold content and legal tender face value.[23]

Representative money

Main article: Representative money

In 1875 economist William Stanley Jevons described what he called "representative money," i.e., money that consists of token coins, or other physical tokens such as certificates, that can be reliably exchanged for a fixed quantity of a commodity such as gold or silver. The value of representative money stands in direct and fixed relation to the commodity that backs it, while not itself being composed of that commodity.[24]

Fiat money

Main article: Fiat money

Fiat money or fiat currency is money whose value is not derived from any intrinsic value or guarantee that it can be converted into a valuable commodity (such as gold). Instead, it has value only by government order (fiat). Usually, the government declares the fiat currency (typically notes and coins from a central bank, such as the Federal Reserve System in the U.S.) to be legal tender, making it unlawful to not accept the fiat currency as a means of repayment for all debts, public and private.[25][26]

Some bullion coins such as the Australian Gold Nugget and American Eagle are legal tender, however, they trade based on the market price of the metal content as a commodity, rather than their legal tender face value (which is usually only a small fraction of their bullion value).[23][27]

Fiat money, if physically represented in the form of currency (paper or coins) can be accidentally damaged or destroyed. However, fiat money has an advantage over representative or commodity money, in that the same laws that created the money can also define rules for its replacement in case of damage or destruction. For example, the U.S. government will replace mutilated Federal Reserve notes (U.S. fiat money) if at least half of the physical note can be reconstructed, or if it can be otherwise proven to have been destroyed.[28] By contrast, commodity money which has been lost or destroyed cannot be recovered.

Currency

Main article: currency

Currency refers to physical objects generally accepted as a medium of exchange. These are usually the coins and banknotes of a particular government, which comprise the physical aspects of a nation's money supply. The other part of a nation's money supply consists of bank deposits (sometimes called deposit money), ownership of which can be transferred by means of cheques, debit cards, or other forms of money transfer. Deposit money and currency are money in the sense that both are acceptable as a means of payment.[29]

Money in the form of currency has predominated throughout most of history. Usually (gold or silver) coins of intrinsic value (commodity money) have been the norm. However, nearly all contemporary money systems are based on fiat money – modern currency has value only by government order (fiat). Usually, the government

declares the fiat currency (typically notes and coins issued by the central bank) to be legal tender, making it unlawful to not accept the fiat currency as a means of repayment for all debts, public and private.[25][26]

Commercial bank money

Commercial bank money or demand deposits are claims against financial institutions that can be used for the purchase of goods and services. A demand deposit account is an account from which funds can be withdrawn at any time by check or cash withdrawal without giving the bank or financial institution any prior notice. Banks have the legal obligation to return funds held in demand deposits immediately upon demand (or 'at call'). Demand deposit withdrawals can be performed in person, via checks or bank drafts, using automatic teller machines (ATMs), or through online banking.[30]

Commercial bank money is created through fractional-reserve banking, the banking practice where banks keep only a *fraction* of their deposits in reserve (as cash and other highly liquid assets) and lend out the remainder, while maintaining the simultaneous obligation to redeem all these deposits upon demand.[31][32] Commercial bank money differs from commodity and fiat money in two ways, firstly it is non-physical, as its existence is only reflected in the account ledgers of banks and other financial institutions, and secondly, there is some element of risk that the claim will not be fulfilled if the financial institution becomes insolvent. The process of fractional-reserve banking has a cumulative effect of money creation by commercial banks, as it expands money supply (cash and demand deposits) beyond what it would otherwise be. Because of the prevalence of fractional reserve banking, the broad money supply of most countries is a multiple larger than the amount of base money created by the country's central bank. That multiple (called the money multiplier) is determined by the reserve requirement or other financial ratio requirements imposed by financial regulators.

The money supply of a country is usually held to be the total amount of currency in circulation plus the total amount of checking and savings deposits in the commercial banks in the country. In modern economies, relatively little of the money supply is in physical currency. For example, in December 2010 in the U.S., of the $8853.4 billion in broad money supply (M2), only $915.7 billion (about 10%) consisted of physical coins and paper money.[33]

Digital money

Digital currencies gained momentum in before the 2000 tech bubble. Flooz and Beenz were particularly advertised as an alternative form of money. While the tech bubble caused them to be short lived, many new digital currencies have reached some, albeit generally small userbases.

Most digital currencies are simply fiat currencies parleyed across a digital medium. However, protocols like Bitcoin allow money to only exist in cyberspace which allows for some classic limitations to be lifted. Never before has the sending of money across a geographical divide not required the trust of a third party which of course then is susceptible to regulatory capture. New forms of currency coming to fruition this very day allow for the free exchange of wealth across distances.

Monetary policy

Main article: Monetary policy

When gold and silver are used as money, the money supply can grow only if the supply of these metals is increased by mining. This rate of increase will accelerate during periods of gold rushes and discoveries, such as when Columbus discovered the New World and brought back gold and silver to Spain, or when gold was discovered in California in 1848. This causes inflation, as the value of gold goes down. However, if the rate of gold mining cannot keep up with the growth of the economy, gold becomes relatively more valuable, and prices (denominated in gold) will drop, causing deflation. Deflation was the more typical situation for over a century when gold and paper money backed by gold were used as money in the 18th and 19th centuries.

Modern day monetary systems are based on fiat money and are no longer tied to the value of gold. The control of the amount of money in the economy is known as monetary policy. Monetary policy is the process by which a government, central bank, or monetary authority manages the money supply to achieve specific goals. Usually the goal of monetary policy is to accommodate economic growth in an environment of stable prices. For example, it is clearly stated in the Federal Reserve Act that the Board of Governors and the Federal Open Market Committee should seek "to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates."[34]

A failed monetary policy can have significant detrimental effects on an economy and the society that depends on it. These include hyperinflation, stagflation, recession, high unemployment, shortages of imported goods, inability to export goods, and even total monetary collapse and the adoption of a much less efficient barter economy. This happened in Russia, for instance, after the fall of the Soviet Union.

Governments and central banks have taken both regulatory and free market approaches to monetary policy. Some of the tools used to control the money supply include:

- changing the interest rate at which the central bank loans money to (or borrows money from) the commercial banks
- currency purchases or sales
- increasing or lowering government borrowing
- increasing or lowering government spending
- manipulation of exchange rates
- raising or lowering bank reserve requirements
- regulation or prohibition of private currencies
- taxation or tax breaks on imports or exports of capital into a country

In the US, the Federal Reserve is responsible for controlling the money supply, while in the Euro area the respective institution is the European Central Bank. Other central banks with significant impact on global finances are the Bank of Japan, People's Bank of China and the Bank of England.

For many years much of monetary policy was influenced by an economic theory known as monetarism. Monetarism is an economic theory which argues that management of the money supply should be the primary means of regulating economic activity. The stability of the demand for money prior to the 1980s was a key finding of Milton Friedman and Anna Schwartz[35] supported by the work of David Laidler,[36] and many others. The nature of the demand for money changed during the 1980s owing to technical, institutional, and legal factors and the influence of monetarism has since decreased.

The value of money

The **time value of money** is the value of money figuring in a given amount of interest earned over a given amount of time. The time value of money is the central concept in **finance theory.**

For example, $100 of today's money invested for one year and earning 5% interest will be worth $105 after one year. Therefore, $100 paid now or $105 paid exactly one year from now both have the same value to the recipient who assumes 5% interest; using **time value of money terminology**, $100 invested for one year at 5% interest has a *future value* of $105.[1] This notion dates at least to Martín de Azpilcueta (1491–1586) of the School of Salamanca.

The method also allows the valuation of a likely stream of income in the future, in such a way that the annual incomes are discounted and then added together, thus providing a lump-sum "present value" of the entire income stream.

All of the standard calculations for time value of money derive from the most basic algebraic expression for the present value of a future sum, "discounted" to the present by an amount equal to the time value of money. For

example, a sum of *FV* to be received in one year is discounted (at the rate of interest **r**) to give a sum of *PV* at present: $PV = FV - r \cdot PV = FV/(1+r)$.

Some standard calculations based on the time value of money are:

Present value The current worth of a future sum of money or stream of cash flows given a specified rate of return. Future cash flows are discounted at the discount rate, and the higher the discount rate, the lower the present value of the future cash flows. Determining the appropriate discount rate is the key to properly valuing future cash flows, whether they be earnings or obligations.[2]
Present value of an annuity An annuity is a series of equal payments or receipts that occur at evenly spaced intervals. Leases and rental payments are examples. The payments or receipts occur at the end of each period for an ordinary annuity while they occur at the beginning of each period for an annuity due.[3]
Present value of a perpetuity is an infinite and constant stream of identical cash flows.[4]
Future value is the value of an asset or cash at a specified date in the future that is equivalent in value to a specified sum today.[5]
Future value of an annuity (FVA) is the future value of a stream of payments (annuity), assuming the payments are invested at a given rate of interest.

Calculations

There are several basic equations that represent the equalities listed above. The solutions may be found using (in most cases) the formulas, a financial calculator or a spreadsheet. The formulas are programmed into most financial calculators and several spreadsheet functions (such as PV, FV, RATE, NPER, and PMT).[6]

For any of the equations below, the formula may also be rearranged to determine one of the other unknowns. In the case of the standard annuity formula, however, there is no closed-form algebraic solution for the interest rate (although financial calculators and spreadsheet programs can readily determine solutions through rapid trial and error algorithms).

These equations are frequently combined for particular uses. For example, bonds can be readily priced using these equations. A typical coupon bond is composed of two types of payments: a stream of coupon payments similar to an annuity, and a lump-sum return of capital at the end of the bond's maturity - that is, a future payment. The two formulas can be combined to determine the present value of the bond.

An important note is that the interest rate *i* is the interest rate for the relevant period. For an annuity that makes one payment per year, *i* will be the annual interest rate. For an income or payment stream with a different payment schedule, the interest rate must be converted into the relevant periodic interest rate. For example, a monthly rate for a mortgage with monthly payments requires that the interest rate be divided by 12 (see the example below). See compound interest for details on converting between different periodic interest rates.

The rate of return in the calculations can be either the variable solved for, or a predefined variable that measures a discount rate, interest, inflation, rate of return, cost of equity, cost of debt or any number of other analogous concepts. The choice of the appropriate rate is critical to the exercise, and the use of an incorrect discount rate will make the results meaningless.

For calculations involving annuities, you must decide whether the payments are made at the end of each period (known as an ordinary annuity), or at the beginning of each period (known as an annuity due). If you are using a financial calculator or a spreadsheet, you can usually set it for either calculation. The following formulas are for an ordinary annuity. If you want the answer for the Present Value of an annuity due simply multiply the PV of an ordinary annuity by $(1 + i)$.

Formula

Present value of a future sum

The present value formula is the core formula for the time value of money; each of the other formulae is derived from this formula. For example, the annuity formula is the sum of a series of present value calculations.

The present value (PV) formula has four variables, each of which can be solved for:

$$PV = \frac{FV}{(1+i)^n}$$

1. PV is the value at time=0
2. FV is the value at time=n
3. i is the discount rate, or the interest rate at which the amount will be compounded each period
4. n is the number of periods (not necessarily an integer)

The cumulative present value of future cash flows can be calculated by summing the contributions of FV_t, the value of cash flow at time t

$$PV = \sum_{t=0}^{n} \frac{FV_t}{(1+i)^t}$$

Note that this series can be summed for a given value of n, or when n is ∞.[7] This is a very general formula, which leads to several important special cases given below.

Present value of an annuity for n payment periods

In this case the cash flow values remain the same throughout the n periods. The present value of an annuity (PVA) formula has four variables, each of which can be solved for:

$$PV(A) = \frac{A}{i} \cdot \left[1 - \frac{1}{(1+i)^n}\right]$$

1. PV(A) is the value of the annuity at time=0
2. A is the value of the individual payments in each compounding period
3. i equals the interest rate that would be compounded for each period of time
4. n is the number of payment periods.

To get the PV of an annuity due, multiply the above equation by (1 + i).

Present value of a growing annuity

In this case each cash flow grows by a factor of (1+g). Similar to the formula for an annuity, the present value of a growing annuity (PVGA) uses the same variables with the addition of g as the rate of growth of the annuity (A is the annuity payment in the first period). This is a calculation that is rarely provided for on financial calculators.

Where $i \neq g$:

$$PV = \frac{A}{(i-g)}\left[1 - \left(\frac{1+g}{1+i}\right)^n\right]$$

To get the PV of a growing annuity due, multiply the above equation by (1 + *i*).

Where i = g :

$$PV = \frac{A * n}{1 + i}$$

Present value of a perpetuity

When $n \to \infty$, the *PV* of a perpetuity (a perpetual annuity) formula becomes simple division.

$$PV(P) = \frac{A}{i}$$

Present value of a growing perpetuity

When the perpetual annuity payment grows at a fixed rate (g) the value is theoretically determined according to the following formula. In practice, there are few securities with precise characteristics, and the application of this valuation approach is subject to various qualifications and modifications. Most importantly, it is rare to find a growing perpetual annuity with fixed rates of growth and true perpetual cash flow generation. Despite these qualifications, the general approach may be used in valuations of real estate, equities, and other assets.

$$PVGP = \frac{A}{(i - g)}$$

This is the well knownGordon Growth model used for stock valuation.

Future value of a present sum

The future value (FV) formula is similar and uses the same variables.

$$FV = PV \cdot (1 + i)^n$$

Future value of an annuity

The future value of an annuity (FVA) formula has four variables, each of which can be solved for:

$$FV(A) = A \cdot \frac{(1 + i)^n - 1}{i}$$

1. *FV*(*A*) is the value of the annuity at time = *n*
2. *A* is the value of the individual payments in each compounding period
3. *i* is the interest rate that would be compounded for each period of time
4. *n* is the number of payment periods

Future value of a growing annuity

The future value of a growing annuity (FVA) formula has five variables, each of which can be solved for:

Where i ≠ g :

$$FV(A) = A \cdot \frac{(1+i)^n - (1+g)^n}{i-g}$$

Where i = g :

$$FV(A) = A \cdot n(1+i)^{n-1}$$

1. *FV*(*A*) is the value of the annuity at time = *n*
2. *A* is the value of initial payment paid at time 1
3. *i* is the interest rate that would be compounded for each period of time
4. *g* is the growing rate that would be compounded for each period of time
5. *n* is the number of payment periods

Derivations

Annuity derivation

The formula for the present value of a regular stream of future payments (an annuity) is derived from a sum of the formula for future value of a single future payment, as below, where *C* is the payment amount and *n* the period.

A single payment C at future time *m* has the following future value at future time *n*:

$$FV = C(1+i)^{n-m}$$

Summing over all payments from time 1 to time n, then reversing the order of terms and substituting *k* = *n* - *m*:

$$FVA = \sum_{m=1}^{n} C(1+i)^{n-m} = \sum_{k=0}^{n-1} C(1+i)^{k}$$

Note that this is a geometric series, with the initial value being *a* = *C*, the multiplicative factor being 1 + *i*, with *n* terms. Applying the formula for geometric series, we get

$$FVA = \frac{C(1-(1+i)^n)}{1-(1+i)} = \frac{C(1-(1+i)^n)}{-i}$$

The present value of the annuity (PVA) is obtained by simply dividing by $(1+i)^n$:

$$PVA = \frac{FVA}{(1+i)^n} = \frac{C}{i}\left(1 - \frac{1}{(1+i)^n}\right)$$

Another simple and intuitive way to derive the future value of an annuity is to consider an endowment, whose interest is paid as the annuity, and whose principal remains constant. The principal of this hypothetical endowment can be computed as that whose interest equals the annuity payment amount:

$$\text{Principal} \times i = C$$
$$\text{Principal} = C/i_{\text{+ goal}}$$

Note that no money enters or leaves the combined system of endowment principal + accumulated annuity payments, and thus the future value of this system can be computed simply via the future value formula:

$$FV = PV(1+i)^n$$

Initially, before any payments, the present value of the system is just the endowment principal ($PV = C/i$). At the end, the future value is the endowment principal (which is the same) plus the future value of the total annuity payments ($FV = C/i + FVA$). Plugging this back into the equation:

$$\frac{C}{i} + FVA = \frac{C}{i}(1+i)^n$$
$$FVA = \frac{C}{i}\left[(1+i)^n - 1\right]$$

Perpetuity derivation

Without showing the formal derivation here, the perpetuity formula is derived from the annuity formula. Specifically, the term:

$$\left(1 - \frac{1}{(1+i)^n}\right)$$

can be seen to approach the value of 1 as *n* grows larger. At infinity, it is equal to 1, leaving $\frac{C}{i}$ as the only term remaining.

Examples

Example 1: Present value

One hundred euros to be paid 1 year from now, where the expected rate of return is 5% per year, is worth in today's money:

$$P = F \times (P/F) = F \times \frac{1}{(1+i)^n} = \frac{100}{1.05} = 95.24$$

So the present value of €100 one year from now at 5% is €95.24.

Example 2: Present value of an annuity — solving for the payment amount

Consider a 10 year mortgage where the principal amount *P* is $200,000 and the annual interest rate is 6%.

The number of monthly payments is

$$n = 10 \text{ years} \times 12 \text{ months per year} = 120 \text{ months}$$

and the monthly interest rate is

$$i = \frac{6\% \text{ per year}}{12 \text{ months per year}} = 0.5\% \text{ per month}$$

The annuity formula for (*A*/*P*) calculates the monthly payment:

$$A = P \times (A/P) = P \times \frac{i(1+i)^n}{(1+i)^n - 1} = \$200{,}000 \times \frac{0.005(1.005)^{120}}{(1.005)^{120} - 1}$$
$$= \$200{,}000 \times 0.01110205 = \$2{,}220.41 \text{ per month}$$

This is considering an interest rate compounding monthly. If the interest were only to compound yearly at 6%, the monthly payment would be significantly different.

Example 3: Solving for the period needed to double money

Consider a deposit of $100 placed at 10% (annual). How many years are needed for the value of the deposit to double to $200?

Using the algrebraic identity that if:

$$x = b^y$$

then

$$y = \frac{\log(x)}{\log(b)}$$

The present value formula can be rearranged such that:

$$y = \frac{\log(\frac{FV}{PV})}{\log(1+i)} = \frac{\log(\frac{200}{100})}{\log(1.10)} = 7.27 \text{ } \textit{(years)}$$

This same method can be used to determine the length of time needed to increase a deposit to any particular sum, as long as the interest rate is known. For the period of time needed to double an investment, the Rule of 72 is a useful shortcut that gives a reasonable approximation of the period needed.

Example 4: What return is needed to double money?

Similarly, the present value formula can be rearranged to determine what rate of return is needed to accumulate a given amount from an investment. For example, $100 is invested today and $200 return is expected in five years; what rate of return (interest rate) does this represent?

The present value formula restated in terms of the interest rate is:

$$i = \left(\frac{FV}{PV}\right)^{\frac{1}{n}} - 1 = \left(\frac{200}{100}\right)^{\frac{1}{5}} - 1 = 2^{0.20} - 1 = 0.15 = 15\%$$

see also Rule of 72

Example 5: Calculate the value of a regular savings deposit in the future.

To calculate the future value of a stream of savings deposit in the future requires two steps, or, alternatively, combining the two steps into one large formula. First, calculate the present value of a stream of deposits of $1,000 every year for 20 years earning 7% interest:

$$PVA = A \cdot \frac{1 - \frac{1}{(1+i)^n}}{i} = 1000 \cdot \frac{1 - \frac{1}{(1+.07)^{20}}}{.07} = 1000 \cdot \frac{1 - 0.258}{.07} = 1000 * 10.594 =$$

This does not sound like very much, but remember - this is *future money* discounted back to its value *today*; it is understandably lower. To calculate the future value (at the end of the twenty-year period):

$$FV = PV(1+i)^n = \$10,594 * (1+.07)^{20} = \$10,594 * 3.87 = \$40,995$$

These steps can be combined into a single formula:

$$FV = A \cdot \frac{1 - \frac{1}{(1+i)^n}}{i} \cdot (1+i)^n = A \cdot \frac{(1+i)^n - 1}{i}$$

Example 6: Price/earnings (P/E) ratio

It is often mentioned that perpetuities, or securities with an indefinitely long maturity, are rare or unrealistic, and particularly those with a growing payment. In fact, many types of assets have characteristics that are similar to perpetuities. Examples might include income-oriented real estate, preferred shares, and even most forms of publicly-traded stocks. Frequently, the terminology may be slightly different, but are based on the fundamentals of time value of money calculations. The application of this methodology is subject to various qualifications or modifications, such as the Gordon growth model.

For example, stocks are commonly noted as trading at a certain P/E ratio. The P/E ratio is easily recognized as a variation on the perpetuity or growing perpetuity formulae - save that the P/E ratio is usually cited as the *inverse* of the "rate" in the perpetuity formula.

If we substitute for the time being: the *price* of the stock for the present value; the earnings per share of the stock for the cash annuity; and, the discount rate of the stock for the interest rate, we can see that:

$$\frac{P}{E} = \frac{1}{i} = \frac{PV}{A}$$

And in fact, the P/E ratio is analogous to the inverse of the interest rate (or discount rate).

$$\frac{1}{P/E} = i$$

Of course, stocks may have increasing earnings. The formulation above does not allow for growth in earnings, but to incorporate growth, the formula can be restated as follows:

$$\frac{P}{E} = \frac{1}{(i-g)}$$

If we wish to determine the implied rate of growth (if we are given the discount rate), we may solve for *g*:

$$g = i - \frac{E}{P}$$

Continuous compounding

Rates are sometimes converted into the continuous compound interest rate equivalent because the continuous equivalent is more convenient (for example, more easily differentiated). Each of the formulæ above may be restated in their continuous equivalents. For example, the present value at time 0 of a future payment at time **t** can be restated in the following way, where **e** is the base of the natural logarithm and **r** is the continuously compounded rate:

$$\mathrm{PV} = \mathrm{FV} \cdot e^{-rt}$$

This can be generalized to discount rates that vary over time: instead of a constant discount rate *r*, one uses a function of time *r*(*t*). In that case the discount factor, and thus the present value, of a cash flow at time *T* is given by the integral of the continuously compounded rate *r*(*t*):

$$\mathrm{PV} = \mathrm{FV} \cdot \exp\left(-\int_0^T r(t)\,dt\right)$$

Indeed, a key reason for using continuous compounding is to simplify the analysis of varying discount rates and to allow one to use the tools of calculus. Further, for interest accrued and capitalized overnight (hence compounded daily), continuous compounding is a close approximation for the actual daily compounding. More sophisticated analysis includes the use of differential equations, as detailed below.

Examples

Using continuous compounding yields the following formulas for various instruments:

Annuity

$$PV = \frac{A(1 - e^{-rt})}{e^r - 1}$$

Perpetuity

$$PV = \frac{A}{e^r - 1}$$

Growing annuity

$$PV = \frac{A(1 - e^{-(r-g)t})}{e^{(r-g)} - 1}$$

Growing perpetuity

$$PV = \frac{A}{e^{(r-g)} - 1}$$

Annuity with continuous payments

$$PV = \frac{1 - e^{(-rt)}}{r}$$

Differential equations

Ordinary and partialdifferential equations (ODEs and PDEs) – equations involving derivatives and one (respectively, multiple) variables are ubiquitous in more advanced treatments of financial mathematics. While time

value of money can be understood without using the framework of differential equations, the added sophistication sheds additional light on time value, and provides a simple introduction before considering more complicated and less familiar situations. This exposition follows (Carr &Flesaker 2006, pp. 6–7).

The fundamental change that the differential equation perspective brings is that, rather than computing a *number* (the present value *now*), one computes a *function* (the present value now or at any point in *future*). This function may then be analyzed – how does its value change over time – or compared with other functions.

Formally, the statement that "value decreases over time" is given by defining the linear differential operator $\mathcal{L}$ as:

$$\mathcal{L} := -\partial_t + r(t).$$

This states that values decreases (−) over time (∂_t) at the discount rate ($r(t)$). Applied to a function it yields:

$$\mathcal{L}f = -\partial_t f(t) + r(t)f(t).$$

For an instrument whose payment stream is described by $f(t)$, the value $V(t)$ satisfies the inhomogeneousfirst-order ODE $\mathcal{L}V = f$ ("inhomogeneous" is because one has f rather than 0, and "first-order" is because one has first derivatives but no higher derivatives) – this encodes the fact that when any cash flow occurs, the value of the instrument changes by the value of the cash flow (if you receive a $10 coupon, the remaining value decreases by exactly $10).

The standard technique tool in the analysis of ODEs is the use of Green's functions, from which other solutions can be built. In terms of time value of money, the Green's function (for the time value ODE) is the value of a bond paying $1 at a single point in time u – the value of any other stream of cash flows can then be obtained by taking combinations of this basic cash flow. In mathematical terms, this instantaneous cash flow is modeled as a delta function $\delta_u(t) := \delta(t-u).$

The Green's function for the value at time t of a $1 cash flow at time u is

$$b(t;u) := H(u-t) \cdot \exp\left(-\int_t^u r(v)\,dv\right)$$

where H is the Heaviside step function – the notation "$;u$" is to emphasize that u is a *parameter* (fixed in any instance – the time when the cash flow will occur), while t is a *variable* (time). In other words, future cash flows are exponentially discounted (exp) by the sum (integral, $\int$) of the future discount rates ($\int_t^u$ for future, $r(v)$ for discount rates), while past cash flows are worth 0 ($H(u-t) = 1 \text{ if } t < u, 0 \text{ if } t > u$), because they have already occurred. Note that the value *at* the moment of a cash flow is not well-defined – there is a discontinuity at that point, and one can use a convention (assume cash flows have already occurred, or not already occurred), or simply not define the value at that point.

In case the discount rate is constant, $r(v) \equiv r$, this simplifies to

$$b(t;u) = H(u-t) \cdot e^{-(u-t)r} = \begin{cases} e^{-(u-t)r} & t < u \\ 0 & t > u, \end{cases}$$

where $(u-t)$ is "time remaining until cash flow".

Thus for a stream of cash flows *f*(*u*) ending by time *T* (which can be set to $T = +\infty$ for no time horizon) the value at time *t*, $V(t;T)$ is given by combining the values of these individual cash flows:

$$V(t;T) = \int_t^T f(u)b(t;u)\,du.$$

This formalizes time value of money to future values of cash flows with varying discount rates, and is the basis of many formulas in financial mathematics, such as the Black–Scholes formula with varying interest rates.

Quantity theory of money

In monetary economics, the **quantity theory of money** is the theory that money supply has a direct, proportional relationship with the price level.

The theory was challenged by Keynesian economics,[1] but updated and reinvigorated by the monetarist school of economics. While mainstream economists agree that the quantity theory holds true in the long run, there is still disagreement about its applicability in the short run. Critics of the theory argue that money velocity is not stable and, in the short-run, prices are sticky, so the direct relationship between money supply and price level does not hold.

Alternative theories include the real bills doctrine and the more recent fiscal theory of the price level.

Origins and development of the quantity theory

The quantity theory descends from Copernicus,[2] followers of the School of Salamanca, Jean Bodin,[3] and various others who noted the increase in prices following the import of gold and silver, used in the coinage of money, from the New World. The "equation of exchange" relating the supply of money to the value of money transactions was stated by John Stuart Mill[4] who expanded on the ideas of David Hume.[5] The quantity theory was developed by Simon Newcomb,[6] Alfred de Foville,[7]Irving Fisher,[8] and Ludwig von Mises[9] in the latter 19th and early 20th century, while it had been argued against by Karl Marx.[10] The theory was influentially restated by Milton Friedman in response to Keynesianism.[11]

Academic discussion remains over the degree to which different figures developed the theory.[12] For instance, Bieda argues that Copernicus's observation

Money can lose its value through excessive abundance, if so much silver is coined as to heighten people's demand for silver bullion. For in this way, the coinage's estimation vanishes when it cannot buy as much silver as the money itself contains […]. The solution is to mint no more coinage until it recovers its par value.[12]

amounts to a statement of the theory,[13] while other economic historians date the discovery later, to figures such as Jean Bodin, David Hume, and John Stuart Mill.[12][14]

Historically, the main rival of the quantity theory was the real bills doctrine, which says that the issue of money does not raise prices, as long as the new money is issued in exchange for assets of sufficient value.[15]

Equation of exchange

In its modern form, the quantity theory builds upon the following definitional relationship.

$$M \cdot V_T = \sum_i (p_i \cdot q_i) = \mathbf{p}^{\mathrm{T}}\mathbf{q}$$

where

M is the total amount of money in circulation on average in an economy during the period, say a year.
V_T is the transactions velocity of money, that is the average frequency across all transactions with which a unit of money is spent. This reflects availability of financial institutions, economic variables, and choices made as to how fast people turn over their money.
p_i and q_i are the price and quantity of the i-th transaction.
$\mathbf{p}$ is a column vector of the p_i, and the superscript $^{\mathbf{T}}$ is the transpose operator.
$\mathbf{q}$ is a column vector of the q_i.

Mainstream economics accepts a simplification, the equation of exchange:

$$M \cdot V_T = P_T \cdot T$$

where

P_T is the price level associated with transactions for the economy during the period
T is an index of the real value of aggregate transactions.

The previous equation presents the difficulty that the associated data are not available for all transactions. With the development of national income and product accounts, emphasis shifted to national-income or final-product transactions, rather than gross transactions. Economists may therefore work with the form

$$M \cdot V = P \cdot Q$$

where

V is the velocity of money in final expenditures.
Q is an index of the real value of final expenditures.

As an example, M might represent currency plus deposits in checking and savings accounts held by the public, Q real output (which equals real expenditure in macroeconomic equilibrium) with P the corresponding price level, and $P \cdot Q$ the nominal (money) value of output. In one empirical formulation, velocity was taken to be "the ratio of net national product in current prices to the money stock".[16]

Thus far, the theory is not particularly controversial, as the equation of exchange is an identity. A theory requires that assumptions be made about the causal relationships among the four variables in this one equation. There are debates about the extent to which each of these variables is dependent upon the others. Without further restrictions, the equation does not require that a change in the money supply would change the value of any or all of P, Q, or $P \cdot Q$. For example, a 10% increase in M could be accompanied by a 10% decrease in V, leaving $P \cdot Q$ unchanged. The quantity theory postulates that the primary causal effect is an effect of *M* on *P*.

A rudimentary version of the quantity theory

The equation of exchange can be used to form a rudimentary version of the quantity theory of the effect of monetary growth on inflation.

$$P = \frac{M \cdot V}{Q}.$$

If V and Q were constant, then:

$$\frac{dP}{P} = \frac{dM}{M}$$

and thus

$$\frac{dP/P}{dt} = \frac{dM/M}{dt}$$

where

t is time.

That is to say that, if V and Q were constant, then the inflation rate (the rate of growth $\frac{dP/P}{dt}$ of the price level) would exactly equal the growth rate $\frac{dM/M}{dt}$ of the money supply. In short, the inflation rate is a function of the monetary growth rate.

Less restrictively, with time-varying *V* and *Q*, we have the identity

$$\frac{dP/P}{dt} = \frac{dM/M}{dt} + \frac{dV/V}{dt} - \frac{dQ/Q}{dt},$$

which says that the inflation rate equals the monetary growth rate plus the growth rate of the velocity of money minus the growth rate of real expenditure. If one makes the quantity theory assumptions that, at least in the long run, (i) the monetary growth rate is controlled by the central bank, (ii) the growth rate of velocity is purely determined by the evolution of payments mechanisms, and (iii) the growth rate of real expenditure is determined by the rate of technological progress plus the rate of labor force growth, then while the inflation rate need not *equal* the monetary growth rate, an *x* percentage point rise in the monetary growth rate will result in an *x* percentage point rise in the inflation rate.

Cambridge approach

Further information: Cambridge equation

Economists Alfred Marshall, A.C. Pigou, and John Maynard Keynes (before he developed his own, eponymous school of thought) associated with Cambridge University, took a slightly different approach to the quantity theory, focusing on money demand instead of money supply. They argued that a certain portion of the money supply will not be used for transactions; instead, it will be held for the convenience and security of having cash on hand. This portion of cash is commonly represented as *k*, a portion of nominal income ($P \cdot Y$). The Cambridge economists also thought wealth would play a role, but wealth is often omitted for simplicity. The Cambridge equation is thus:

$$M^d = k \cdot P \cdot Y$$

Assuming that the economy is at equilibrium ($M^d = M$), Y is exogenous, and *k* is fixed in the short run, the Cambridge equation is equivalent to the equation of exchange with velocity equal to the inverse of *k*:

$$M \cdot \frac{1}{k} = P \cdot Y$$

The Cambridge version of the quantity theory led to both Keynes's attack on the quantity theory and the Monetarist revival of the theory.[17]

Quantity theory and evidence

As restated by Milton Friedman, the quantity theory emphasizes the following relationship of the nominal value of expenditures PQ and the price level P to the quantity of money M:

$$(1) PQ = f(\overset{+}{M})$$
$$(2) P = g(\overset{+}{M})$$

The plus signs indicate that a change in the money supply is hypothesized to change nominal expenditures and the price level in the same direction (for other variables held constant).

Friedman described the empirical regularity of substantial changes in the quantity of money and in the level of prices as perhaps the most-evidenced economic phenomenon on record.[18] Empirical studies have found relations consistent with the models above and with causation running from money to prices. The short-run relation of a change in the money supply in the past has been relatively more associated with a change in real output Q than the price level P in (1) but with much variation in the precision, timing, and size of the relation. For the *long*-run, there has been stronger support for (1) and (2) and no systematic association of Q and M.[19]

Principles

The theory above is based on the following hypotheses:

1. The source of inflation is fundamentally derived from the growth rate of the money supply.
2. The supply of money is exogenous.
3. The demand for money, as reflected in its velocity, is a stable function of nominal income, interest rates, and so forth.
4. The mechanism for injecting money into the economy is not that important in the long run.
5. The real interest rate is determined by non-monetary factors: (productivity of capital, time preference).

Decline of money-supply targeting

An application of the quantity-theory approach aimed at removing monetary policy as a source of macroeconomic instability was to target a constant, low growth rate of the money supply.[20] Still, practical identification of the relevant money supply, including measurement, was always somewhat controversial and difficult. As financial intermediation grew in complexity and sophistication in the 1980s and 1990s, it became more so. As a result, some central banks, including the U.S. Federal Reserve, which had targeted the money supply, reverted to targeting interest rates. But monetary aggregates remain a leading economic indicator.[21] with "some evidence that the linkages between money and economic activity are robust even at relatively short-run frequencies."[22]

Criticisms

John Maynard Keynes criticized the quantity theory of money in *The General Theory of Employment, Interest and Money*. Keynes had originally been a proponent of the theory, but he presented an alternative in the *General Theory*.

Keynes argued that price level was not strictly determined by money supply. Changes in the money supply could have effects on real variables like output.[1]

Ludwig von Mises agreed that there was a core of truth in the Quantity Theory, but criticized its focus on the supply of money without adequately explaining the demand for money. He said the theory "fails to explain the mechanism of variations in the value of money".[23]

Commercial bank

A **commercial bank** (or **business bank**) is a type of financial institution and intermediary. It is a bank that lends money and provides transactional, savings, and money market accounts and that accepts time deposits.[1]

Origin of the word

The name *bank* derives from the Italian word *banco* "desk/bench", used during the Renaissance era by Florentine bankers, who used to make their transactions above a desk covered by a green tablecloth.[2] However, traces of banking activity can be found even in ancient times.

In fact, the word traces its origins back to the Ancient Roman Empire, where moneylenders would set up their stalls in the middle of enclosed courtyards called *macella* on a long bench called a *bancu*, from which the words *banco* and *bank* are derived. As a moneychanger, the merchant at the *bancu* did not so much invest money as merely convert the foreign currency into the only legal tender in Rome – that of the Imperial Mint.[3]

The role of commercial banks

Commercial banks engage in the following activities:

- processing of payments by way of telegraphic transfer, EFTPOS, internet banking, or other means
- issuing bank drafts and bank cheques
- accepting money on term deposit
- lending money by overdraft, installment loan, or other means
- providing documentary and standby letter of credit, guarantees, performance bonds, securities underwriting commitments and other forms of off balance sheet exposures
- safekeeping of documents and other items in safe deposit boxes
- sales, distribution or brokerage, with or without advice, of: insurance, unit trusts and similar financial products as a “financial supermarket”
- cash management and treasury
- merchant banking and private equity financing
- traditionally, large commercial banks also underwrite bonds, and make markets in currency, interest rates, and credit-related securities, but today large commercial banks usually have an investment bank arm that is involved in the mentioned activities[*clarify*].

Types of loans granted by commercial banks

Secured loan

A secured loan is a loan in which the borrower pledges some asset (e.g. a car or property) as collateral for the loan, which then becomes a secured debt owed to the creditor who gives the loan. The debt is thus secured against the collateral — in the event that the borrower defaults, the creditor takes possession of the asset used as collateral and may sell it to regain some or all of the amount originally lent to the borrower, for example, foreclosure of a home. From the creditor's perspective this is a category of debt in which a lender has been granted a portion of the bundle of rights to specified property. If the sale of the collateral does not raise enough money to pay off the debt, the creditor can often obtain a deficiency judgment against the borrower for the remaining amount. The opposite of

secured debt/loan is unsecured debt, which is not connected to any specific piece of property and instead the creditor may only satisfy the debt against the borrower rather than the borrower's collateral and the borrower.

A mortgage loan is a very common type of debt instrument, used to purchase real estate. Under this arrangement, the money is used to purchase the property. Commercial banks, however, are given security - a lien on the title to the house - until the mortgage is paid off in full. If the borrower defaults on the loan, the bank would have the legal right to repossess the house and sell it, to recover sums owing to it.

In the past, commercial banks have not been greatly interested in real estate loans and have placed only a relatively small percentage of assets in mortgages. As their name implies, such financial institutions secured their earning primarily from commercial and consumer loans and left the major task of home financing to others. However, due to changes in banking laws and policies, commercial banks are increasingly active in home financing.

Changes in banking laws now allow commercial banks to make home mortgage loans on a more liberal basis than ever before. In acquiring mortgages on real estate, these institutions follow two main practices. First, some of the banks maintain active and well-organized departments whose primary function is to compete actively for real estate loans. In areas lacking specialized real estate financial institutions, these banks become the source for residential and farm mortgage loans. Second, the banks acquire mortgages by simply purchasing them from mortgage bankers or dealers.

In addition, dealer service companies, which were originally used to obtain car loans for permanent lenders such as commercial banks, wanted to broaden their activity beyond their local area. In recent years, however, such companies have concentrated on acquiring mobile home loans in volume for both commercial banks and savings and loan associations. Service companies obtain these loans from retail dealers, usually on a nonrecourse basis. Almost all bank/service company agreements contain a credit insurance policy that protects the lender if the consumer defaults.

Unsecured loan

Unsecured loans are monetary loans that are not secured against the borrower's assets (i.e., no collateral is involved). There are small businesss unsecured loans such as credit cards and credit lines to large corporate credit lines. These may be available from financial institutions under many different guises or marketing packages:

- bank overdrafts

An overdraft occurs when money is withdrawn from a bank account and the available balance goes below zero. In this situation the account is said to be "overdrawn". If there is a prior agreement with the account provider for an overdraft, and the amount overdrawn is within the authorized overdraft limit, then interest is normally charged at the agreed rate. If the POSITIVE balance exceeds the agreed terms, then additional fees may be charged and higher interest rates may apply.

- corporate bonds
- credit card debt
- credit facilities or lines of credit
- personal loans

What makes a bank limited liability company

A corporate bond is a bond issued by a corporation. It is a bond that a corporation issues to raise money in order to expand its business.[1] The term is usually applied to longer-term debt instruments, generally with a maturity date falling at least a year after their issue date. (The term "commercial paper" is sometimes used for instruments with a shorter maturity.) Sometimes, the term "corporate bonds" is used to include all bonds except those issued by

governments in their own currencies. Strictly speaking, however, it only applies to those issued by corporations. The bonds of local authorities and supranational organizations do not fit in either category.[clarification needed] Corporate bonds are often listed on major exchanges (bonds there are called "listed" bonds) and ECNs like Bonds.com and MarketAxess, and the coupon (i.e. interest payment) is usually taxable. Sometimes this coupon can be zero with a high redemption value. However, despite being listed on exchanges, the vast majority of trading volume in corporate bonds in most developed markets takes place in decentralized, dealer-based, over-the-counter markets. Some corporate bonds have an embedded call option that allows the issuer to redeem the debt before its maturity date. Other bonds, known as convertible bonds, allow investors to convert the bond into equity. Corporate Credit spreads may alternatively be earned in exchange for default risk through the mechanism of Credit Default Swaps which give an unfunded synthetic exposure to similar risks on the same 'Reference Entities'. However, owing to quite volatile CDS 'basis' the spreads on CDS and the credit spreads on corporate bonds can be significantly different.

Central bank

A **central bank**, **reserve bank**, or **monetary authority** is a public institution that manages a state'scurrency, money supply, and interest rates. Central banks also usually oversee the commercial banking system of their respective countries. In contrast to a commercial bank, a central bank possesses a monopoly on increasing the nation's monetary base, and usually also prints the national currency, which usually serves as the nation's legal tender.[1][2] Examples include the European Central Bank (ECB), the Federal Reserve of the United States, and the People's Bank of China.[3]

The primary function of a central bank is to manage the nation's money supply (monetary policy), through active duties such as managing interest rates, setting the reserve requirement, and acting as a lender of last resort to the banking sector during times of bank insolvency or financial crisis. Central banks usually also have supervisory powers, intended to prevent bank runs and to reduce the risk that commercial banks and other financial institutions engage in reckless or fraudulent behavior. Central banks in most developed nations are institutionally designed to be independent from political interference.

History

Prior to the 17th century most money was commodity money, typically gold or silver. However, promises to pay were widely circulated and accepted as value at least five hundred years earlier in both Europe and Asia. The Song Dynasty was the first to issue generally circulating paper currency, while the Yuan Dynasty was the first to use notes as the predominant circulating medium. In 1455, in an effort to control inflation, the succeeding Ming Dynasty ended the use of paper money and closed much of Chinese trade. The medieval European Knights Templar ran an early prototype of a central banking system, as their promises to pay were widely respected, and many regard their activities as having laid the basis for the modern banking system.

As the first public bank to "offer accounts not directly convertible to coin", the Bank of Amsterdam established in 1609 is considered to be the precursor to modern central banks.[4] The central bank of Sweden ("SverigesRiksbank" or simply "Riksbanken") was founded in Stockholm from the remains of the failed bank StockholmsBanco in 1664 and answered to the parliament ("Riksdag of the Estates") thus making it the oldest central bank still operating today.[5] One role of the Swedish central bank was lending to the government,[6] which was likewise true of the Bank of England, created in 1694 by Scottish businessman William Paterson in the City of London at the request of the English government to help pay for a war. The War of the Second Coalition led to the creation of the Banque de France in 1800.

Although central banks today are generally associated with fiat money, the 19th and early 20th centuries central banks in most of Europe and Japan developed under the international gold standard, elsewhere free banking or currency boards were more usual at this time. Problems with collapses of banks during downturns, however, was leading to wider support for central banks in those nations which did not as yet possess them, most notably in Australia.

The US Federal Reserve was created by the U.S. Congress through the passing of The Federal Reserve Act in the Senate and its signing by President Woodrow Wilson on the same day, December 23, 1913. Australia established its first central bank in 1920, Colombia in 1923, Mexico and Chile in 1925 and Canada and New Zealand in the aftermath of the Great Depression in 1934. By 1935, the only significant independent nation that did not possess a central bank was Brazil, which subsequently developed a precursor thereto in 1945 and the present central bank twenty years later. Having gained independence, African and Asian countries also established central banks or monetary unions.

The People's Bank of China evolved its role as a central bank starting in about 1979 with the introduction of market reforms, which accelerated in 1989 when the country adopted a generally capitalist approach to its export economy. Evolving further partly in response to the European Central Bank, the People's Bank of China has by 2000 become a modern central bank. The most recent bank model, was introduced together with the euro, involves coordination of the European national banks, which continue to manage their respective economies separately in all respects other than currency exchange and base interest rates.

Naming of central banks

There is no standard terminology for the name of a central bank, but many countries use the "Bank of Country" form (for example: Bank of England, Bank of Canada, Bank of Mexico). Some are styled "national" banks, such as the National Bank of Ukraine; but the term "national bank" is more often used by privately owned commercial banks, especially in the United States. In other cases, central banks may incorporate the word "Central" (for example, European Central Bank, Central Bank of Ireland); but the Central Bank of India is a (government-owned) commercial bank and not a central bank. The word "Reserve" is also often included, such as the Reserve Bank of India, Reserve Bank of Australia, Reserve Bank of New Zealand, the South African Reserve Bank, and U.S. Federal Reserve System. Many countries have state-owned banks or other quasi-government entities that have entirely separate functions, such as financing imports and exports.

In some countries, particularly in some Communist countries, the term national bank may be used to indicate both the monetary authority and the leading banking entity, such as the Soviet Union's Gosbank (state bank). In other countries, the term national bank may be used to indicate that the central bank's goals are broader than monetary stability, such as full employment, industrial development, or other goals.

Activities and responsibilities

Functions of a central bank may include:

- implementing monetary policies.
- determining Interest rates
- controlling the nation's entire money supply
- the Government's banker and the bankers' bank ("lender of last resort")
- managing the country's foreign exchange and gold reserves and the Government's stock register
- regulating and supervising the banking industry
- setting the official interest rate – used to manage both inflation and the country's exchange rate – and ensuring that this rate takes effect via a variety of policy mechanisms

Monetary policy

Central banks implement a country's chosen monetary policy. At the most basic level, this involves establishing what form of currency the country may have, whether a fiat currency, gold-backed currency (disallowed for countries with membership of the International Monetary Fund), currency board or a currency union. When a country has its own national currency, this involves the issue of some form of standardized currency, which is essentially a form of promissory note: a promise to exchange the note for "money" under certain circumstances. Historically, this was often a promise to exchange the money for precious metals in some fixed amount. Now, when

many currencies are fiat money, the "promise to pay" consists of the promise to accept that currency to pay for taxes.

A central bank may use another country's currency either directly (in a currency union), or indirectly (a currency board). In the latter case, exemplified by Bulgaria, Hong Kong and Latvia, the local currency is backed at a fixed rate by the central bank's holdings of a foreign currency.

In countries with fiat money, the expression "monetary policy" may refer more narrowly to the interest-rate targets and other active measures undertaken by the monetary authority.

Goals of monetary policy

High employment

Frictional unemployment is the time period between jobs when a worker is searching for, or transitioning from one job to another. Unemployment beyond frictional unemployment is classified as unintended unemployment.

For example, structural unemployment is a form of unemployment resulting from a mismatch between demand in the labour market and the skills and locations of the workers seeking employment. Macroeconomic policy generally aims to reduce unintended unemployment.

Keynes labeled any jobs that would be created by a rise in wage-goods (i.e., a decrease in real-wages) as involuntary unemployment:

Men are involuntarily unemployed if, in the event of a small rise in the price of wage-goods relatively to the money-wage, both the aggregate supply of labour willing to work for the current money-wage and the aggregate demand for it at that wage would be greater than the existing volume of employment.

Price stability;

Inflation is defined either as the devaluation of a currency or equivalently the rise of prices relative to a currency.

Since inflation lowers real wages, Keynesians view inflation as the solution to involuntary unemployment. However, "unanticipated" inflation leads to lender losses as the real interest rate will be lower than expected. Thus, Keynesian monetary policy aims for a steady rate of inflation.

Economic growth

Economic growth can be enhanced by investment in capital, such as more or better machinery. A low interest rate implies that firms can loan money to invest in their capital stock and pay less interest for it. Lowering the interest is therefore considered to encourage economic growth and is often used to alleviate times of low economic growth. On the other hand, raising the interest rate is often used in times of high economic growth as a contra-cyclical device to keep the economy from overheating and avoid market bubbles.

Interest rate stability
Financial market stability
Foreign exchange market stability
Conflicts among goals

Goals frequently cannot be separated from each other and often conflict. Costs must therefore be carefully weighed before policy implementation.

Currency issuance

Similar to commercial banks, central banks hold assets (government bonds, foreign exchange, gold, and other financial assets) and incur liabilities (currency outstanding). Central banks create money by issuing interest-free currency notes and selling them to the public in exchange for interest-bearing assets such as government bonds. When a central bank wishes to purchase more bonds than their respective national governments make available, they may purchase private bonds or assets denominated in foreign currencies.

The European Central Bank remits its interest income to the central banks of the member countries of the European Union. The US Federal Reserve remits all its profits to the U.S. Treasury. This income, derived from the power to issue currency, is referred to as seigniorage, and usually belongs to the national government. The state-sanctioned power to create currency is called the Right of Issuance. Throughout history there have been disagreements over this power, since whoever controls the creation of currency controls the seigniorage income.

Interest rate interventions

Typically a central bank controls certain types of short-term interest rates. These influence the stock- and bond markets as well as mortgage and other interest rates. The European Central Bank for example announces its interest rate at the meeting of its Governing Council; in the case of the U.S. Federal Reserve, the Board of Governors.

Both the Federal Reserve and the ECB are composed of one or more central bodies that are responsible for the main decisions about interest rates and the size and type of open market operations, and several branches to execute its policies. In the case of the Federal Reserve, they are the local Federal Reserve Banks; for the ECB they are the national central banks.

Limits on policy effects

Although the perception by the public may be that the "central bank" controls some or all interest rates and currency rates, economic theory (and substantial empirical evidence) shows that it is impossible to do both at once in an open economy. Robert Mundell's "impossible trinity" is the most famous formulation of these limited powers, and postulates that it is impossible to target monetary policy (broadly, interest rates), the exchange rate (through a fixed rate) and maintain free capital movement. Since most Western economies are now considered "open" with free capital movement, this essentially means that central banks may target interest rates or exchange rates with credibility, but not both at once.

In the most famous case of policy failure, Black Wednesday, George Soros arbitraged the pound sterling's relationship to the ECU and (after making $2 billion himself and forcing the UK to spend over $8bn defending the pound) forced it to abandon its policy. Since then he has been a harsh critic of clumsy bank policies and argued that no one should be able to do what he did.

The most complex relationships are those between the yuan and the US dollar, and between the euro and its neighbours. The situation in Cuba is so exceptional as to require the Cuban peso to be dealt with simply as an exception, since the United States forbids direct trade with Cuba. US dollars were ubiquitous in Cuba's economy after its legalization in 1991, but were officially removed from circulation in 2004 and replaced by the convertible peso.

Policy instruments

The main monetary policy instruments available to central banks are open market operation, bank reserve requirement, interest rate policy, re-lending and re-discount (including using the term repurchase market), and credit policy (often coordinated with trade policy). While capital adequacy is important, it is defined and regulated by the Bank for International Settlements, and central banks in practice generally do not apply stricter rules.

To enable open market operations, a central bank must hold foreign exchange reserves (usually in the form of government bonds) and official gold reserves. It will often have some influence over any official or mandated

exchange rates: Some exchange rates are managed, some are market based (free float) and many are somewhere in between ("managed float" or "dirty float").

Interest rates

By far the most visible and obvious power of many modern central banks is to influence market interest rates; contrary to popular belief, they rarely "set" rates to a fixed number. Although the mechanism differs from country to country, most use a similar mechanism based on a central bank's ability to create as much fiat money as required.

The mechanism to move the market towards a 'target rate' (whichever specific rate is used) is generally to lend money or borrow money in theoretically unlimited quantities, until the targeted market rate is sufficiently close to the target. Central banks may do so by lending money to and borrowing money from (taking deposits from) a limited number of qualified banks, or by purchasing and selling bonds. As an example of how this functions, the Bank of Canada sets a target overnight rate, and a band of plus or minus 0.25%. Qualified banks borrow from each other within this band, but never above or below, because the central bank will always lend to them at the top of the band, and take deposits at the bottom of the band; in principle, the capacity to borrow and lend at the extremes of the band are unlimited.[7] Other central banks use similar mechanisms.

It is also notable that the target rates are generally short-term rates. The actual rate that borrowers and lenders receive on the market will depend on (perceived) credit risk, maturity and other factors. For example, a central bank might set a target rate for overnight lending of 4.5%, but rates for (equivalent risk) five-year bonds might be 5%, 4.75%, or, in cases of inverted yield curves, even below the short-term rate. Many central banks have one primary "headline" rate that is quoted as the "central bank rate". In practice, they will have other tools and rates that are used, but only one that is rigorously targeted and enforced.

"The rate at which the central bank lends money can indeed be chosen at will by the central bank; this is the rate that makes the financial headlines." – Henry C.K. Liu.[8] Liu explains further that "the U.S. central-bank lending rate is known as the Fed funds rate. The Fed sets a target for the Fed funds rate, which its Open Market Committee tries to match by lending or borrowing in the money market ... a fiat money system set by command of the central bank. The Fed is the head of the central-bank because the U.S. dollar is the key reserve currency for international trade. The global money market is a USA dollar market. All other currencies markets revolve around the U.S. dollar market." Accordingly the U.S. situation is not typical of central banks in general.

A typical central bank has several interest rates or monetary policy tools it can set to influence markets.

- Marginal lending rate (currently 1.5% in the Eurozone) – a fixed rate for institutions to borrow money from the central bank. (In the USA this is called the discount rate).
- Main refinancing rate (0.75% in the Eurozone) – the publicly visible interest rate the central bank announces. It is also known as *minimum bid rate* and serves as a bidding floor for refinancing loans. (In the USA this is called the federal funds rate).
- Deposit rate (0.00% in the Eurozone) – the rate parties receive for deposits at the central bank.

These rates directly affect the rates in the money market, the market for short term loans.

Open market operations

Through open market operations, a central bank influences the money supply in an economy directly. Each time it buys securities, exchanging money for the security, it raises the money supply. Conversely, selling of securities lowers the money supply. Buying of securities thus amounts to printing new money while lowering supply of the specific security.

The main open market operations are:

- Temporary lending of money for collateral securities ("Reverse Operations" or "repurchase operations", otherwise known as the "repo" market). These operations are carried out on a regular basis, where fixed maturity loans (of one week and one month for the ECB) are auctioned off.
- Buying or selling securities ("direct operations") on ad-hoc basis.
- Foreign exchange operations such as forex swaps.

All of these interventions can also influence the foreign exchange market and thus the exchange rate. For example the People's Bank of China and the Bank of Japan have on occasion bought several hundred billions of U.S. Treasuries, presumably in order to stop the decline of the U.S. dollar versus the renminbi and the yen.

Capital requirements

All banks are required to hold a certain percentage of their assets as capital, a rate which may be established by the central bank or the banking supervisor. For international banks, including the 55 member central banks of the Bank for International Settlements, the threshold is 8% (see the Basel Capital Accords) of risk-adjusted assets, whereby certain assets (such as government bonds) are considered to have lower risk and are either partially or fully excluded from total assets for the purposes of calculating capital adequacy. Partly due to concerns about asset inflation and repurchase agreements, capital requirements may be considered more effective than reserve requirements in preventing indefinite lending: when at the threshold, a bank cannot extend another loan without acquiring further capital on its balance sheet.

Reserve requirements

Historically, bank reserves have formed only a small fraction of deposits, a system called fractional reserve banking. Banks would hold only a small percentage of their assets in the form of cash reserves as insurance against bank runs. Over time this process has been regulated and insured by central banks. Such legal reserve requirements were introduced in the 19th century as an attempt to reduce the risk of banks overextending themselves and suffering from bank runs, as this could lead to knock-on effects on other overextended banks. *See also money multiplier*.

As the early 20th century gold standard was undermined by inflation and the late 20th century fiat dollar hegemony evolved, and as banks proliferated and engaged in more complex transactions and were able to profit from dealings globally on a moment's notice, these practices became mandatory, if only to ensure that there was some limit on the ballooning of money supply. Such limits have become harder to enforce. The People's Bank of China retains (and uses) more powers over reserves because the yuan that it manages is a non-convertible currency.

Loan activity by banks plays a fundamental role in determining the money supply. The central-bank money after aggregate settlement – "final money" – can take only one of two forms:

- physical cash, which is rarely used in wholesale financial markets,
- central-bank money which is rarely used by the people

The currency component of the money supply is far smaller than the deposit component. Currency, bank reserves and institutional loan agreements together make up the monetary base, called M1, M2 and M3. The Federal Reserve Bank stopped publishing M3 and counting it as part of the money supply in 2006.[9]

Exchange requirements

To influence the money supply, some central banks may require that some or all foreign exchange receipts (generally from exports) be exchanged for the local currency. The rate that is used to purchase local currency may be market-based or arbitrarily set by the bank. This tool is generally used in countries with non-convertible currencies or partially convertible currencies. The recipient of the local currency may be allowed to freely dispose of the funds, required to hold the funds with the central bank for some period of time, or allowed to use the funds

subject to certain restrictions. In other cases, the ability to hold or use the foreign exchange may be otherwise limited.

In this method, money supply is increased by the central bank when it purchases the foreign currency by issuing (selling) the local currency. The central bank may subsequently reduce the money supply by various means, including selling bonds or foreign exchange interventions.

Margin requirements and other tools

In some countries, central banks may have other tools that work indirectly to limit lending practices and otherwise restrict or regulate capital markets. For example, a central bank may regulate margin lending, whereby individuals or companies may borrow against pledged securities. The margin requirement establishes a minimum ratio of the value of the securities to the amount borrowed.

Central banks often have requirements for the quality of assets that may be held by financial institutions; these requirements may act as a limit on the amount of risk and leverage created by the financial system. These requirements may be direct, such as requiring certain assets to bear certain minimum credit ratings, or indirect, by the central bank lending to counterparties only when security of a certain quality is pledged as collateral.

Banking supervision and other activities

In some countries a central bank through its subsidiaries controls and monitors the banking sector. In other countries banking supervision is carried out by a government department such as the UK Treasury, or an independent government agency (for example, UK's Financial Services Authority). It examines the banks' balance sheets and behaviour and policies toward consumers. Apart from refinancing, it also provides banks with services such as transfer of funds, bank notes and coins or foreign currency. Thus it is often described as the "bank of banks".

Many countries such as the United States will monitor and control the banking sector through different agencies and for different purposes, although there is usually significant cooperation between the agencies. For example, money center banks, deposit-taking institutions, and other types of financial institutions may be subject to different (and occasionally overlapping) regulation. Some types of banking regulation may be delegated to other levels of government, such as state or provincial governments.

Any cartel of banks is particularly closely watched and controlled. Most countries control bank mergers and are wary of concentration in this industry due to the danger of groupthink and runaway lending bubbles based on a single point of failure, the credit culture of the few large banks.

Independence

Over the past decade, there has been a trend towards increasing the independence of central banks as a way of improving long-term economic performance. However, while a large volume of economic research has been done to define the relationship between central bank independence and economic performance, the results are ambiguous.

Advocates of central bank independence argue that a central bank which is too susceptible to political direction or pressure may encourage economic cycles ("boom and bust"), as politicians may be tempted to boost economic activity in advance of an election, to the detriment of the long-term health of the economy and the country. In this context, independence is usually defined as the central bank's operational and management independence from the government.

The literature on central bank independence has defined a number of types of independence.

Legal independence

The independence of the central bank is enshrined in law. This type of independence is limited in a democratic state; in almost all cases the central bank is accountable at some level to government officials, either through a government minister or directly to a legislature. Even defining degrees of legal independence has proven to be a challenge since legislation typically provides only a framework within which the government and the central bank work out their relationship.

Goal independence

The central bank has the right to set its own policy goals, whether inflation targeting, control of the money supply, or maintaining a fixed exchange rate. While this type of independence is more common, many central banks prefer to announce their policy goals in partnership with the appropriate government departments. This increases the transparency of the policy setting process and thereby increases the credibility of the goals chosen by providing assurance that they will not be changed without notice. In addition, the setting of common goals by the central bank and the government helps to avoid situations where monetary and fiscal policy are in conflict; a policy combination that is clearly sub-optimal.

Operational independence

The central bank has the independence to determine the best way of achieving its policy goals, including the types of instruments used and the timing of their use. This is the most common form of central bank independence. The granting of independence to the Bank of England in 1997 was, in fact, the granting of operational independence; the inflation target continued to be announced in the Chancellor's annual budget speech to Parliament.

Management independence

The central bank has the authority to run its own operations (appointing staff, setting budgets, and so on.) without excessive involvement of the government. The other forms of independence are not possible unless the central bank has a significant degree of management independence. One of the most common statistical indicators used in the literature as a proxy for central bank independence is the "turn-over-rate" of central bank governors. If a government is in the habit of appointing and replacing the governor frequently, it clearly has the capacity to micro-manage the central bank through its choice of governors.

It is argued that an independent central bank can run a more credible monetary policy, making market expectations more responsive to signals from the central bank. Recently, both the Bank of England (1997) and the European Central Bank have been made independent and follow a set of published inflation targets so that markets know what to expect. Even the People's Bank of China has been accorded great latitude due to the difficulty of problems it faces, though in the People's Republic of China the official role of the bank remains that of a national bank rather than a central bank, underlined by the official refusal to "unpeg" the yuan or to revalue it "under pressure". The People's Bank of China's independence can thus be read more as independence from the USA which rules the financial markets, than from the Communist Party of China which rules the country. The fact that the Communist Party is not elected also relieves the pressure to please people, increasing its independence.

Governments generally have some degree of influence over even "independent" central banks; the aim of independence is primarily to prevent short-term interference. For example, the chairman of the U.S. Federal Reserve Bank is appointed by the President of the U.S. (all nominees for this post are recommended by the owners of the Federal Reserve, as are all the board members), his choice must be confirmed by the Congress, and he must appear and testify before congress twice a year.

International organizations such as the World Bank, the Bank for International Settlements (BIS) and the International Monetary Fund (IMF) are strong supporters of central bank independence. This results, in part, from a belief in the intrinsic merits of increased independence. The support for independence from the international organizations also derives partly from the connection between increased independence for the central bank and increased transparency in the policy-making process. The IMF's Financial Services Action Plan (FSAP) review self-assessment, for example, includes a number of questions about central bank independence in the transparency section. An independent central bank will score higher in the review than one that is not independent.

Inflation

In economics, **inflation** is a rise in the general level of prices of goods and services in an economy over a period of time.[1] When the general price level rises, each unit of currency buys fewer goods and services. Consequently, inflation also reflects an erosion in the purchasing power of money – a loss of real value in the internal medium of exchange and unit of account in the economy.[2][3] A chief measure of price inflation is the inflation rate, the annualized percentage change in a general price index (normally the Consumer Price Index) over time.[4]

Inflation's effects on an economy are various and can be simultaneously positive and negative. Negative effects of inflation include an increase in the opportunity cost of holding money, uncertainty over future inflation which may discourage investment and savings, and if inflation is rapid enough, shortages of goods as consumers begin hoarding out of concern that prices will increase in the future. Positive effects include ensuring that central banks can adjust real interest rates (intended to mitigate recessions),[5] and encouraging investment in non-monetary capital projects.

Economists generally agree that high rates of inflation and hyperinflation are caused by an excessive growth of the money supply.[6] Views on which factors determine low to moderate rates of inflation are more varied. Low or moderate inflation may be attributed to fluctuations in realdemand for goods and services, or changes in available supplies such as during scarcities, as well as to growth in the money supply. However, the consensus view is that a long sustained period of inflation is caused by money supply growing faster than the rate of economic growth.[7][8]

Today, most economists favor a low, steady rate of inflation.[9] Low (as opposed to zero or negative) inflation reduces the severity of economic recessions by enabling the labor market to adjust more quickly in a downturn, and reduces the risk that a liquidity trap prevents monetary policy from stabilizing the economy.[10] The task of keeping the rate of inflation low and stable is usually given to monetary authorities. Generally, these monetary authorities are the central banks that control monetary policy through the setting of interest rates, through open market operations, and through the setting of banking reserve requirements.[11]

History

Increases in the quantity of money or in the overall money supply (or debasement of the means of exchange) have occurred in many different societies throughout history, changing with different forms of money used.[12][13] For instance, when gold was used as currency, the government could collect gold coins, melt them down, mix them with other metals such a silver, copper or lead, and reissue them at the same nominal value. By diluting the gold with other metals, the government could issue more coins without also needing to increase the amount of gold used to make them. When the cost of each coin is lowered in this way, the government profits from an increase in seigniorage.[14] This practice would increase the money supply but at the same time the relative value of each coin would be lowered. As the relative value of the coins becomes lower, consumers would need to give more coins in exchange for the same goods and services as before. These goods and services would experience a price increase as the value of each coin is reduced.[15]

With a fiat currency,[16]Song Dynasty China introduced the practice of printing money during the 11th century and, according to Daniel Headrick, "paper money allowed governments to spend far more than they received in taxes... in wartime, and the Song were often at war, such deficit spending caused runaway inflation."[17] This inflation made paper money undesirable, and in 1020, desperate officials were forced to perfume the money to encourage its use.[18] The problem of paper money inflation continued after the Song Dynasty. Peter Bernholz writes that "from then on, nearly every Chinese dynasty up to the Ming began by issuing some stable and convertible paper money and ended with pronounced inflation caused by circulating ever increasing amounts of paper notes to finance budget deficits."[19]

During the Mongol Yuan Dynasty, the government spent a great deal of money fighting costly wars, and reacted by printing more, leading to inflation.[20] The problem of inflation became so severe that the people stopped using paper money, which they saw as "worthless paper."[19] Fearing the inflation that plagued the Yuan dynasty, the Ming Dynasty initially rejected the use of paper money, using only copper coins. The dynasty did not issue paper currency until 1375.[19]

Historically, infusions of gold or silver into an economy also led to inflation. From the second half of the 15th century to the first half of the 17th, Western Europe experienced a major inflationary cycle referred to as the "price revolution",[21][22] with prices on average rising perhaps sixfold over 150 years. This was largely caused by the sudden influx of gold and silver from the New World into Habsburg Spain.[23] The silver spread throughout a previously cash-starved Europe and caused widespread inflation.[24][25] Demographic factors also contributed to upward pressure on prices, with European population growth after depopulation caused by the Black Death pandemic.

By the nineteenth century, economists categorized three separate factors that cause a rise or fall in the price of goods: a change in the *value* or production costs of the good, a change in the *price of money* which then was usually a fluctuation in the commodity price of the metallic content in the currency, and *currency depreciation* resulting from an increased supply of currency relative to the quantity of redeemable metal backing the currency. Following the proliferation of private banknote currency printed during the American Civil War, the term "inflation" started to appear as a direct reference to the *currency depreciation* that occurred as the quantity of redeemable banknotes outstripped the quantity of metal available for their redemption. At that time, the term inflation referred to the devaluation of the currency, and not to a rise in the price of goods.[26]

This relationship between the over-supply of banknotes and a resulting depreciation in their value was noted by earlier classical economists such as David Hume and David Ricardo, who would go on to examine and debate what effect a currency devaluation (later termed *monetary inflation*) has on the price of goods (later termed *price inflation*, and eventually just *inflation*).[27]

The adoption of fiat currency by many countries, from the 18th century onwards, made much larger variations in the supply of money possible. Since then, huge increases in the supply of paper money have taken place in a number of countries, producing hyperinflations – episodes of extreme inflation rates much higher than those observed in earlier periods of commodity money. The hyperinflation in the Weimar Republic of Germany is a notable example.

Related definitions

The term "inflation" originally referred to increases in the amount of money in circulation, and some economists still use the word in this way. However, most economists today use the term "inflation" to refer to a rise in the price level. An increase in the money supply may be called monetary inflation, to distinguish it from rising prices, which may also for clarity be called 'price inflation'.[28] Economists generally agree that in the long run, inflation is caused by increases in the money supply.[29]

Other economic concepts related to inflation include: deflation – a fall in the general price level; disinflation – a decrease in the rate of inflation; hyperinflation – an out-of-control inflationary spiral; stagflation – a combination of inflation, slow economic growth and high unemployment; and reflation – an attempt to raise the general level of prices to counteract deflationary pressures.

Since there are many possible measures of the price level, there are many possible measures of price inflation. Most frequently, the term "inflation" refers to a rise in a broad price index representing the overall price level for goods and services in the economy. The Consumer Price Index (CPI), the Personal Consumption Expenditures Price Index (PCEPI) and the GDP deflator are some examples of broad price indices. However, "inflation" may also be used to describe a rising price level within a narrower set of assets, goods or services within the economy, such as commodities (including food, fuel, metals), tangible assets (such as real estate), financial assets (such as stocks, bonds), services (such as entertainment and health care), or labor. The Reuters-CRB Index (CCI), the Producer Price Index, and Employment Cost Index (ECI) are examples of narrow price indices used to measure price inflation in particular sectors of the economy. Core inflation is a measure of inflation for a subset of consumer prices that excludes food and energy prices, which rise and fall more than other prices in the short term. The Federal Reserve Board pays particular attention to the core inflation rate to get a better estimate of long-term future inflation trends overall.[30]

Measures

Inflation is usually estimated by calculating the inflation rate of a price index, usually the Consumer Price Index.[31] The Consumer Price Index measures prices of a selection of goods and services purchased by a "typical consumer".[4] The inflation rate is the percentage rate of change of a price index over time.

For instance, in January 2007, the U.S. Consumer Price Index was 202.416, and in January 2008 it was 211.080. The formula for calculating the annual percentage rate inflation in the CPI over the course of 2007 is

$$\left(\frac{211.080 - 202.416}{202.416}\right) \times 100\% = 4.28\%$$

The resulting inflation rate for the CPI in this one year period is 4.28%, meaning the general level of prices for typical U.S. consumers rose by approximately four percent in 2007.[32]

Other widely used price indices for calculating price inflation include the following:

- **Producer price indices** (PPIs) which measures average changes in prices received by domestic producers for their output. This differs from the CPI in that price subsidization, profits, and taxes may cause the amount received by the producer to differ from what the consumer paid. There is also typically a delay between an increase in the PPI and any eventual increase in the CPI. Producer price index measures the pressure being put on producers by the costs of their raw materials. This could be "passed on" to consumers, or it could be absorbed by profits, or offset by increasing productivity. In India and the United States, an earlier version of the PPI was called the Wholesale Price Index.
- **Commodity price indices**, which measure the price of a selection of commodities. In the present commodity price indices are weighted by the relative importance of the components to the "all in" cost of an employee.
- **Core price indices**: because food and oil prices can change quickly due to changes in supply and demand conditions in the food and oil markets, it can be difficult to detect the long run trend in price levels when those prices are included. Therefore most statistical agencies also report a measure of 'core inflation', which removes the most volatile components (such as food and oil) from a broad price index like the CPI. Because core inflation is less affected by short run supply and demand conditions in specific markets, central banks rely on it to better measure the inflationary impact of current monetary policy.

Other common measures of inflation are:

- **GDP deflator** is a measure of the price of all the goods and services included in gross domestic product (GDP). The US Commerce Department publishes a deflator series for US GDP, defined as its nominal GDP measure divided by its real GDP measure.
- **Regional inflation** The Bureau of Labor Statistics breaks down CPI-U calculations down to different regions of the US.
- **Historical inflation**Before collecting consistent econometric data became standard for governments, and for the purpose of comparing absolute, rather than relative standards of living, various economists have calculated imputed inflation figures. Most inflation data before the early 20th century is imputed based on the known costs of goods, rather than compiled at the time. It is also used to adjust for the differences in real standard of living for the presence of technology.
- **Asset price inflation** is an undue increase in the prices of real or financial assets, such as stock (equity) and real estate. While there is no widely accepted index of this type, some central bankers have suggested that it would be better to aim at stabilizing a wider general price level inflation measure that includes some asset prices, instead of stabilizing CPI or core inflation only. The reason is that by raising interest rates when stock prices or real estate prices rise, and lowering them when these asset prices fall, central banks might be more successful in avoiding bubbles and crashes in asset prices.[*dubious– discuss*]

Issues in measuring

Measuring inflation in an economy requires objective means of differentiating changes in nominal prices on a common set of goods and services, and distinguishing them from those price shifts resulting from changes in value such as volume, quality, or performance. For example, if the price of a 10 oz. can of corn changes from $0.90 to $1.00 over the course of a year, with no change in quality, then this price difference represents inflation. This single price change would not, however, represent general inflation in an overall economy. To measure overall inflation, the price change of a large "basket" of representative goods and services is measured. This is the purpose of a price index, which is the combined price of a "basket" of many goods and services. The combined price is the sum of the weighted average prices of items in the "basket". A weighted price is calculated by multiplying the unit price of an item to the number of those items the average consumer purchases. Weighted pricing is a necessary means to measuring the impact of individual unit price changes on the economy's overall inflation. The Consumer Price Index, for example, uses data collected by surveying households to determine what proportion of the typical consumer's overall spending is spent on specific goods and services, and weights the average prices of those items accordingly. Those weighted average prices are combined to calculate the overall price. To better relate price changes over time, indexes typically choose a "base year" price and assign it a value of 100. Index prices in subsequent years are then expressed in relation to the base year price.[11] While comparing inflation measures for various periods one has to take into consideration the base effect as well.

Inflation measures are often modified over time, either for the relative weight of goods in the basket, or in the way in which goods and services from the present are compared with goods and services from the past. Over time, adjustments are made to the type of goods and services selected in order to reflect changes in the sorts of goods and services purchased by 'typical consumers'. New products may be introduced, older products disappear, the quality of existing products may change, and consumer preferences can shift. Both the sorts of goods and services which are included in the "basket" and the weighted price used in inflation measures will be changed over time in order to keep pace with the changing marketplace.[*citation needed*]

Inflation numbers are often seasonally adjusted in order to differentiate expected cyclical cost shifts. For example, home heating costs are expected to rise in colder months, and seasonal adjustments are often used when measuring for inflation to compensate for cyclical spikes in energy or fuel demand. Inflation numbers may be averaged or otherwise subjected to statistical techniques in order to remove statistical noise and volatility of individual prices.[*citation needed*]

When looking at inflation, economic institutions may focus only on certain kinds of prices, or *special indices*, such as the core inflation index which is used by central banks to formulate monetary policy.[*citation needed*]

Most inflation indices are calculated from weighted averages of selected price changes. This necessarily introduces distortion, and can lead to legitimate disputes about what the true inflation rate is. This problem can be overcome by including all available price changes in the calculation, and then choosing the median value.

Effects

General

An increase in the general level of prices implies a decrease in the purchasing power of the currency. That is, when the general level of prices rises, each monetary unit buys fewer goods and services. The effect of inflation is not distributed evenly in the economy, and as a consequence there are hidden costs to some and benefits to others from this decrease in the purchasing power of money. For example, with inflation, lenders or depositors who are paid a fixed rate of interest on loans or deposits will lose purchasing power from their interest earnings, while their borrowers benefit. Individuals or institutions with cash assets will experience a decline in the purchasing power of their holdings. Increases in payments to workers and pensioners often lag behind inflation, especially for those with fixed payments. Increases in the price level (inflation) erode the real value of money (the functional currency) and other items with an underlying monetary nature.

Debtors who have debts with a fixed nominal rate of interest will see a reduction in the "real" interest rate as the inflation rate rises. The real interest on a loan is the nominal rate minus the inflation rate.The formula $R = N$-

*I*approximates the correct answer as long as both the nominal interest rate and the inflation rate are small. The correct equation is $r = n/i$ where r, n and i are expressed as ratios (e.g. 1.2 for +20%, 0.8 for −20%). As an example, when the inflation rate is 3%, a loan with a nominal interest rate of 5% would have a real interest rate of approximately 2%. Any unexpected increase in the inflation rate would decrease the real interest rate. Banks and other lenders adjust for this inflation risk either by including an inflation risk premium to fixed interest rate loans, or lending at an adjustable rate.

Negative

High or unpredictable inflation rates are regarded as harmful to an overall economy. They add inefficiencies in the market, and make it difficult for companies to budget or plan long-term. Inflation can act as a drag on productivity as companies are forced to shift resources away from products and services in order to focus on profit and losses from currency inflation.[11] Uncertainty about the future purchasing power of money discourages investment and saving.[34] And inflation can impose hidden tax increases, as inflated earnings push taxpayers into higher income tax rates unless the tax brackets are indexed to inflation.

With high inflation, purchasing power is redistributed from those on fixed nominal incomes, such as some pensioners whose pensions are not indexed to the price level, towards those with variable incomes whose earnings may better keep pace with the inflation.[11] This redistribution of purchasing power will also occur between international trading partners. Where fixed exchange rates are imposed, higher inflation in one economy than another will cause the first economy's exports to become more expensive and affect the balance of trade. There can also be negative impacts to trade from an increased instability in currency exchange prices caused by unpredictable inflation.

Cost-push inflation
: High inflation can prompt employees to demand rapid wage increases, to keep up with consumer prices. In the cost-push theory of inflation, rising wages in turn can help fuel inflation. In the case of collective bargaining, wage growth will be set as a function of inflationary expectations, which will be higher when inflation is high. This can cause a wage spiral.[35] In a sense, inflation begets further inflationary expectations, which beget further inflation.

Hoarding
: People buy durable and/or non-perishable commodities and other goods as stores of wealth, to avoid the losses expected from the declining purchasing power of money, creating shortages of the hoarded goods.

Social unrest and revolts
: Inflation can lead to massive demonstrations and revolutions. For example, inflation and in particular food inflation is considered as one of the main reasons that caused the 2010–2011 Tunisian revolution[36] and the 2011 Egyptian revolution,[37] according to many observators including Robert Zoellick,[38] president of the World Bank. Tunisian president Zine El Abidine Ben Ali was ousted, Egyptian President Hosni Mubarak was also ousted after only 18 days of demonstrations, and protests soon spread in many countries of North Africa and Middle East.

Hyperinflation
: If inflation gets totally out of control (in the upward direction), it can grossly interfere with the normal workings of the economy, hurting its ability to supply goods. Hyperinflation can lead to the abandonment of the use of the country's currency, leading to the inefficiencies of barter.

Allocative efficiency
: A change in the supply or demand for a good will normally cause its relative price to change, signaling to buyers and sellers that they should re-allocate resources in response to the new market conditions. But when prices are constantly changing due to inflation, price changes due to genuine relative price signals are difficult to distinguish from price changes due to general inflation, so agents are slow to respond to them. The result is a loss of allocative efficiency.

Shoe leather cost
: High inflation increases the opportunity cost of holding cash balances and can induce people to hold a greater portion of their assets in interest paying accounts. However, since cash is still needed in order to

carry out transactions this means that more "trips to the bank" are necessary in order to make withdrawals, proverbially wearing out the "shoe leather" with each trip.

Menu costs

With high inflation, firms must change their prices often in order to keep up with economy-wide changes. But often changing prices is itself a costly activity whether explicitly, as with the need to print new menus, or implicitly.

Business cycles

According to the Austrian Business Cycle Theory, inflation sets off the business cycle. Austrian economists hold this to be the most damaging effect of inflation. According to Austrian theory, artificially low interest rates and the associated increase in the money supply lead to reckless, speculative borrowing, resulting in clusters of malinvestments, which eventually have to be liquidated as they become unsustainable.[39]

Positive

Labor-market adjustments

Nominal wages are slow to adjust downwards. This can lead to prolonged disequilibrium and high unemployment in the labor market. Since inflation allows real wages to fall even if nominal wages are kept constant, moderate inflation enables labor markets to reach equilibrium faster.[40]

Room to maneuver

The primary tools for controlling the money supply are the ability to set the discount rate, the rate at which banks can borrow from the central bank, and open market operations, which are the central bank's interventions into the bonds market with the aim of affecting the nominal interest rate. If an economy finds itself in a recession with already low, or even zero, nominal interest rates, then the bank cannot cut these rates further (since negative nominal interest rates are impossible) in order to stimulate the economy – this situation is known as a liquidity trap. A moderate level of inflation tends to ensure that nominal interest rates stay sufficiently above zero so that if the need arises the bank can cut the nominal interest rate.[*citation needed*]

Mundell–Tobin effect

The Nobel laureate Robert Mundell noted that moderate inflation would induce savers to substitute lending for some money holding as a means to finance future spending. That substitution would cause market clearing real interest rates to fall.[41] The lower real rate of interest would induce more borrowing to finance investment. In a similar vein, Nobel laureate James Tobin noted that such inflation would cause businesses to substitute investment in physical capital (plant, equipment, and inventories) for money balances in their asset portfolios. That substitution would mean choosing the making of investments with lower rates of real return. (The rates of return are lower because the investments with higher rates of return were already being made before.)[42] The two related effects are known as the Mundell–Tobin effect. Unless the economy is already overinvesting according to models of economic growth theory, that extra investment resulting from the effect would be seen as positive.

Instability with Deflation

Economist S.C. Tsaing noted that once substantial deflation is expected, two important effects will appear; both a result of money holding substituting for lending as a vehicle for saving.[43] The first was that continually falling prices and the resulting incentive to hoard money will cause instability resulting from the likely increasing fear, while money hoards grow in value, that the value of those hoards are at risk, as people realize that a movement to trade those money hoards for real goods and assets will quickly drive those prices up. Any movement to spend those hoards "once started would become a tremendous avalanche, which could rampage for a long time before it would spend itself."[44] Thus, a regime of long-term deflation is likely to be interrupted by periodic spikes of rapid inflation and consequent real economic disruptions. Moderate and stable inflation would avoid such a seesawing of price movements.

Financial Market Inefficiency with Deflation

The second effect noted by Tsaing is that when savers have substituted money holding for lending on financial markets, the role of those markets in channeling savings into investment is undermined. With nominal interest rates driven to zero, or near zero, from he competition with a high return money asset, there would be no price mechanism in whatever is left of those markets. With financial markets effectively euthanized, the remaining goods and physical asset prices would move in perverse directions. For example,

an increased desire to save could not push interest rates further down (and thereby stimulate investment) but would instead cause additional money hoarding, driving consumer prices further down and making investment in consumer goods production thereby less attractive. Moderate inflation, once its expectation is incorporated into nominal interest rates, would give those interest rates room to go both up and down in response to shifting investment opportunities, or savers' preferences, and thus allow financial markets to function in a more normal fashion.

Causes

The Bank of England, central bank of the United Kingdom, monitors causes and attempts to control inflation.

Historically, a great deal of economic literature was concerned with the question of what causes inflation and what effect it has. There were different schools of thought as to the causes of inflation. Most can be divided into two broad areas: quality theories of inflation and quantity theories of inflation. The quality theory of inflation rests on the expectation of a seller accepting currency to be able to exchange that currency at a later time for goods that are desirable as a buyer. The quantity theory of inflation rests on the quantity equation of money, that relates the money supply, its velocity, and the nominal value of exchanges. Adam Smith and David Hume proposed a quantity theory of inflation for money, and a quality theory of inflation for production.[*citation needed*]

Currently, the quantity theory of money is widely accepted as an accurate model of inflation in the long run. Consequently, there is now broad agreement among economists that in the long run, the inflation rate is essentially dependent on the growth rate of money supply relative to the growth of the economy. However, in the short and medium term inflation may be affected by supply and demand pressures in the economy, and influenced by the relative elasticity of wages, prices and interest rates.[29] The question of whether the short-term effects last long enough to be important is the central topic of debate between monetarist and Keynesian economists. In monetarism prices and wages adjust quickly enough to make other factors merely marginal behavior on a general trend-line. In the Keynesian view, prices and wages adjust at different rates, and these differences have enough effects on real output to be "long term" in the view of people in an economy.

Keynesian view

Keynesian economic theory proposes that changes in money supply do not directly affect prices, and that visible inflation is the result of pressures in the economy expressing themselves in prices.

There are three major types of inflation, as part of what Robert J. Gordon calls the "triangle model":[45]

- *Demand-pull inflation* is caused by increases in aggregate demand due to increased private and government spending, etc. Demand inflation is constructive to a faster rate of economic growth since the excess demand and favourable market conditions will stimulate investment and expansion.
- *Cost-push inflation*, also called "supply shock inflation," is caused by a drop in aggregate supply (potential output). This may be due to natural disasters, or increased prices of inputs. For example, a sudden decrease in the supply of oil, leading to increased oil prices, can cause cost-push inflation. Producers for whom oil is a part of their costs could then pass this on to consumers in the form of increased prices. Another example stems from unexpectedly high Insured Losses, either legitimate (catastrophes) or fraudulent (which might be particularly prevalent in times of recession).[*citation needed*]
- Built-in inflation is induced by adaptive expectations, and is often linked to the "price/wage spiral". It involves workers trying to keep their wages up with prices (above the rate of inflation), and firms passing these higher labor costs on to their customers as higher prices, leading to a 'vicious circle'. Built-in inflation reflects events in the past, and so might be seen as hangover inflation.

Demand-pull theory states that the rate of inflation accelerates whenever aggregate demand is increased beyond the ability of the economy to produce (its potential output). Hence, any factor that increases aggregate demand can cause inflation.[46] However, in the long run, aggregate demand can be held above productive capacity only by increasing the quantity of money in circulation faster than the real growth rate of the economy. Another (although

much less common) cause can be a rapid decline in the *demand* for money, as happened in Europe during the Black Death, or in the Japanese occupied territories just before the defeat of Japan in 1945.

The effect of money on inflation is most obvious when governments finance spending in a crisis, such as a civil war, by printing money excessively. This sometimes leads to hyperinflation, a condition where prices can double in a month or less. Money supply is also thought to play a major role in determining moderate levels of inflation, although there are differences of opinion on how important it is. For example, Monetarist economists believe that the link is very strong; Keynesian economists, by contrast, typically emphasize the role of aggregate demand in the economy rather than the money supply in determining inflation. That is, for Keynesians, the money supply is only one determinant of aggregate demand.

Some Keynesian economists also disagree with the notion that central banks fully control the money supply, arguing that central banks have little control, since the money supply adapts to the demand for bank credit issued by commercial banks. This is known as the theory of endogenous money, and has been advocated strongly by post-Keynesians as far back as the 1960s. It has today become a central focus of Taylor rule advocates. This position is not universally accepted – banks create money by making loans, but the aggregate volume of these loans diminishes as real interest rates increase. Thus, central banks can influence the money supply by making money cheaper or more expensive, thus increasing or decreasing its production.

A fundamental concept in inflation analysis is the relationship between inflation and unemployment, called the Phillips curve. This model suggests that there is a trade-off between price stability and employment. Therefore, some level of inflation could be considered desirable in order to minimize unemployment. The Phillips curve model described the U.S. experience well in the 1960s but failed to describe the combination of rising inflation and economic stagnation (sometimes referred to as *stagflation*) experienced in the 1970s.

Thus, modern macroeconomics describes inflation using a Phillips curve that *shifts* (so the trade-off between inflation and unemployment changes) because of such matters as supply shocks and inflation becoming built into the normal workings of the economy. The former refers to such events as the oil shocks of the 1970s, while the latter refers to the price/wage spiral and inflationary expectations implying that the economy "normally" suffers from inflation. Thus, the Phillips curve represents only the demand-pull component of the triangle model.

Another concept of note is the potential output (sometimes called the "natural gross domestic product"), a level of GDP, where the economy is at its optimal level of production given institutional and natural constraints. (This level of output corresponds to the Non-Accelerating Inflation Rate of Unemployment, NAIRU, or the "natural" rate of unemployment or the full-employment unemployment rate.) If GDP exceeds its potential (and unemployment is below the NAIRU), the theory says that inflation will *accelerate* as suppliers increase their prices and built-in inflation worsens. If GDP falls below its potential level (and unemployment is above the NAIRU), inflation will *decelerate* as suppliers attempt to fill excess capacity, cutting prices and undermining built-in inflation.[47]

However, one problem with this theory for policy-making purposes is that the exact level of potential output (and of the NAIRU) is generally unknown and tends to change over time. Inflation also seems to act in an asymmetric way, rising more quickly than it falls. Worse, it can change because of policy: for example, high unemployment under British Prime Minister Margaret Thatcher might have led to a rise in the NAIRU (and a fall in potential) because many of the unemployed found themselves as structurally unemployed (also see unemployment), unable to find jobs that fit their skills. A rise in structural unemployment implies that a smaller percentage of the labor force can find jobs at the NAIRU, where the economy avoids crossing the threshold into the realm of accelerating inflation.

Monetarist view

Inflation is related to growth in money supply (using the M2 definition) over the long run.
For more details on this topic, see Monetarism.

Monetarists believe the most significant factor influencing inflation or deflation is how fast the money supply grows or shrinks. They consider fiscal policy, or government spending and taxation, as ineffective in controlling

inflation.[48] According to the famous monetarist economist Milton Friedman, *"Inflation is always and everywhere a monetary phenomenon."*[49] Some monetarists, however, will qualify this by making an exception for very short-term circumstances.

Monetarists assert that the empirical study of monetary history shows that inflation has always been a monetary phenomenon. The quantity theory of money, simply stated, says that any change in the amount of money in a system will change the price level. This theory begins with the equation of exchange:

$$MV = PQ$$

where

M is the nominal quantity of money.
V is the velocity of money in final expenditures;
P is the general price level;
Q is an index of the real value of final expenditures;

In this formula, the general price level is related to the level of real economic activity (*Q*), the quantity of money (*M*) and the velocity of money (*V*). The formula is an identity because the velocity of money (*V*) is defined to be the ratio of final nominal expenditure (PQ) to the quantity of money (*M*).

Monetarists assume that the velocity of money is unaffected by monetary policy (at least in the long run), and the real value of output is determined in the long run by the productive capacity of the economy. Under these assumptions, the primary driver of the change in the general price level is changes in the quantity of money. With exogenous velocity (that is, velocity being determined externally and not being influenced by monetary policy), the money supply determines the value of nominal output (which equals final expenditure) in the short run. In practice, velocity is not exogenous in the short run, and so the formula does not necessarily imply a stable short-run relationship between the money supply and nominal output. However, in the long run, changes in velocity are assumed to be determined by the evolution of the payments mechanism. If velocity is relatively unaffected by monetary policy, the long-run rate of increase in prices (the inflation rate) is equal to the long run growth rate of the money supply plus the exogenous long-run rate of velocity growth minus the long run growth rate of real output.[7]

Unemployment

A connection between inflation and unemployment has been drawn since the emergence of large scale unemployment in the 19th century, and connections continue to be drawn today. In Marxian economics, the unemployed serve as a reserve army of labour, which restrain wage inflation. In the 20th century, similar concepts in Keynesian economics include the NAIRU (Non-Accelerating Inflation Rate of Unemployment) and the Phillips curve.

Rational expectations theory

For more details on this topic, see Rational expectations theory.

Rational expectations theory holds that economic actors look rationally into the future when trying to maximize their well-being, and do not respond solely to immediate opportunity costs and pressures. In this view, while generally grounded in monetarism, future expectations and strategies are important for inflation as well.

A core assertion of rational expectations theory is that actors will seek to "head off" central-bank decisions by acting in ways that fulfill predictions of higher inflation. This means that central banks must establish their credibility in fighting inflation, or economic actors will make bets that the central bank will expand the money supply rapidly enough to prevent recession, even at the expense of exacerbating inflation. Thus, if a central bank has a reputation as being "soft" on inflation, when it announces a new policy of fighting inflation with restrictive monetary growth

economic agents will not believe that the policy will persist; their inflationary expectations will remain high, and so will inflation. On the other hand, if the central bank has a reputation of being "tough" on inflation, then such a policy announcement will be believed and inflationary expectations will come down rapidly, thus allowing inflation itself to come down rapidly with minimal economic disruption.

Austrian view

The Austrian School asserts that inflation is an increase in the money supply, rising prices are merely consequences and this semantic difference is important in defining inflation.[50] Austrians stress that inflation affects prices in various degree, i.e. that prices rise more sharply in some sectors than in other sectors of the economy. The reason for the disparity is that excess money will be concentrated to certain sectors, such as housing, stocks or health care. Because of this disparity, Austrians argue that the aggregate price level can be very misleading when observing the effects of inflation. Austrian economists measure inflation by calculating the growth of new units of money that are available for immediate use in exchange, that have been created over time.

Critics of the Austrian view point out that their preferred alternative to fiat currency intended to prevent inflation, commodity-backed money, is likely to grow in supply at a different rate than economic growth. Thus it has proven to be highly deflationary and destabilizing, including in instances where it has caused and prolonged depressions.[54]

Real bills doctrine

Within the context of a fixed specie basis for money, one important controversy was between the quantity theory of money and the real bills doctrine (RBD). Within this context, quantity theory applies to the level of fractional reserve accounting allowed against specie, generally gold, held by a bank. Currency and banking schools of economics argue the RBD, that banks should also be able to issue currency against bills of trading, which is "real bills" that they buy from merchants. This theory was important in the 19th century in debates between "Banking" and "Currency" schools of monetary soundness, and in the formation of the Federal Reserve. In the wake of the collapse of the international gold standard post 1913, and the move towards deficit financing of government, RBD has remained a minor topic, primarily of interest in limited contexts, such as currency boards. It is generally held in ill repute today, with Frederic Mishkin, a governor of the Federal Reserve going so far as to say it had been "completely discredited."

The debate between currency, or quantity theory, and banking schools in Britain during the 19th century prefigures current questions about the credibility of money in the present. In the 19th century the banking school had greater influence in policy in the United States and Great Britain, while the currency school had more influence "on the continent", that is in non-British countries, particularly in the Latin Monetary Union and the earlier Scandinavia monetary union.

Anti-classical or backing theory

Another issue associated with classical political economy is the anti-classical hypothesis of money, or "backing theory". The backing theory argues that the value of money is determined by the assets and liabilities of the issuing agency.[55] Unlike the Quantity Theory of classical political economy, the backing theory argues that issuing authorities can issue money without causing inflation so long as the money issuer has sufficient assets to cover redemptions. There are very few backing theorists, making quantity theory the dominant theory explaining inflation.[*citation needed*]

Controlling inflation

A variety of methods and policies have been used to control inflation.

Stimulating economic growth

If economic growth matches the growth of the money supply, inflation should not occur when all else is equal.[56] A large variety of factors can affect the rate of both. For example, investment in market production, infrastructure, education, and preventative health care can all grow an economy in greater amounts than the investment spending.[57][58]

Monetary policy

Today the primary tool for controlling inflation is monetary policy. Most central banks are tasked with keeping their inter-bank lending rates at low levels, normally to a target rate around 2% to 3% per annum, and within a targeted low inflation range, somewhere from about 2% to 6% per annum. A low positive inflation is usually targeted, as deflationary conditions are seen as dangerous for the health of the economy.

There are a number of methods that have been suggested to control inflation. Central banks such as the U.S. Federal Reserve can affect inflation to a significant extent through setting interest rates and through other operations. High interest rates and slow growth of the money supply are the traditional ways through which central banks fight or prevent inflation, though they have different approaches. For instance, some follow a symmetrical inflation target while others only control inflation when it rises above a target, whether express or implied.

Monetarists emphasize keeping the growth rate of money steady, and using monetary policy to control inflation (increasing interest rates, slowing the rise in the money supply). Keynesians emphasize reducing aggregate demand during economic expansions and increasing demand during recessions to keep inflation stable. Control of aggregate demand can be achieved using both monetary policy and fiscal policy (increased taxation or reduced government spending to reduce demand).

Fixed exchange rates

Under a fixed exchange rate currency regime, a country's currency is tied in value to another single currency or to a basket of other currencies (or sometimes to another measure of value, such as gold). A fixed exchange rate is usually used to stabilize the value of a currency, vis-a-vis the currency it is pegged to. It can also be used as a means to control inflation. However, as the value of the reference currency rises and falls, so does the currency pegged to it. This essentially means that the inflation rate in the fixed exchange rate country is determined by the inflation rate of the country the currency is pegged to. In addition, a fixed exchange rate prevents a government from using domestic monetary policy in order to achieve macroeconomic stability.

Under the Bretton Woods agreement, most countries around the world had currencies that were fixed to the US dollar. This limited inflation in those countries, but also exposed them to the danger of speculative attacks. After the Bretton Woods agreement broke down in the early 1970s, countries gradually turned to floating exchange rates. However, in the later part of the 20th century, some countries reverted to a fixed exchange rate as part of an attempt to control inflation. This policy of using a fixed exchange rate to control inflation was used in many countries in South America in the later part of the 20th century (e.g. Argentina (1991–2002), Bolivia, Brazil, and Chile).

Gold standard

The gold standard is a monetary system in which a region's common media of exchange are paper notes that are normally freely convertible into pre-set, fixed quantities of gold. The standard specifies how the gold backing would be implemented, including the amount of specie per currency unit. The currency itself has no *innate value*, but is accepted by traders because it can be redeemed for the equivalent specie. A U.S. silver certificate, for example, could be redeemed for an actual piece of silver.

The gold standard was partially abandoned via the international adoption of the Bretton Woods System. Under this system all other major currencies were tied at fixed rates to the dollar, which itself was tied to gold at the rate of $35 per ounce. The Bretton Woods system broke down in 1971, causing most countries to switch to fiat money – money backed only by the laws of the country.

According to Lawrence H. White, an F. A. Hayek Professor of Economic History "who values the Austrian tradition",[59] economies based on the gold standard rarely experience inflation above 2 percent annually.[60] However, historically, the U.S. saw inflation over 2% several times and a higher peak of inflation under the gold standard when compared to inflation after the gold standard.[61] Under a gold standard, the long term rate of inflation (or deflation) would be determined by the growth rate of the supply of gold relative to total output.[62] Critics argue that this will cause arbitrary fluctuations in the inflation rate, and that monetary policy would essentially be determined by gold mining.[63][64]

Wage and price controls

Main article: Incomes policies

Another method attempted in the past have been wage and price controls ("incomes policies"). Wage and price controls have been successful in wartime environments in combination with rationing. However, their use in other contexts is far more mixed. Notable failures of their use include the 1972 imposition of wage and price controls by Richard Nixon. More successful examples include the Prices and Incomes Accord in Australia and the Wassenaar Agreement in the Netherlands.

In general wage and price controls are regarded as a temporary and exceptional measure, only effective when coupled with policies designed to reduce the underlying causes of inflation during the wage and price control regime, for example, winning the war being fought. They often have perverse effects, due to the distorted signals they send to the market. Artificially low prices often cause rationing and shortages and discourage future investment, resulting in yet further shortages. The usual economic analysis is that any product or service that is under-priced is overconsumed. For example, if the official price of bread is too low, there will be too little bread at official prices, and too little investment in bread making by the market to satisfy future needs, thereby exacerbating the problem in the long term.

Temporary controls may *complement* a recession as a way to fight inflation: the controls make the recession more efficient as a way to fight inflation (reducing the need to increase unemployment), while the recession prevents the kinds of distortions that controls cause when demand is high. However, in general the advice of economists is not to impose price controls but to liberalize prices by assuming that the economy will adjust and abandon unprofitable economic activity. The lower activity will place fewer demands on whatever commodities were driving inflation, whether labor or resources, and inflation will fall with total economic output. This often produces a severe recession, as productive capacity is reallocated and is thus often very unpopular with the people whose livelihoods are destroyed (see creative destruction).

Cost-of-living allowance

For more details on this topic, see Cost of living.

The real purchasing-power of fixed payments is eroded by inflation unless they are inflation-adjusted to keep their real values constant. In many countries, employment contracts, pension benefits, and government entitlements (such as social security) are tied to a cost-of-living index, typically to the consumer price index.[65] A *cost-of-living allowance* (COLA) adjusts salaries based on changes in a cost-of-living index. Salaries are typically adjusted annually in low inflation economies. During hyperinflation they are adjusted more often.[65] They may also be tied to a cost-of-living index that varies by geographic location if the employee moves.

Annual escalation clauses in employment contracts can specify retroactive or future percentage increases in worker pay which are not tied to any index. These negotiated increases in pay are colloquially referred to as cost-of-living adjustments ("COLAs") or cost-of-living increases because of their similarity to increases tied to externally determined indexes.

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