

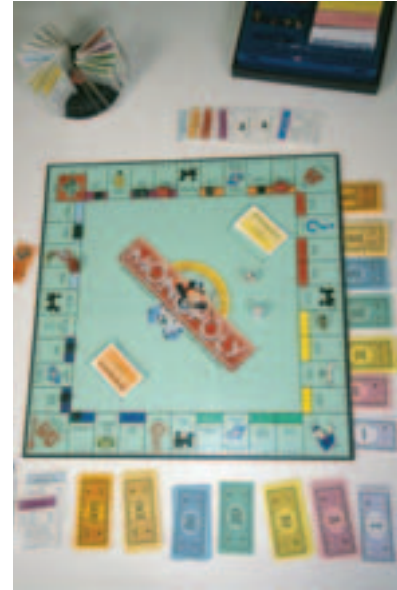
Chapter 2

Money and the Payments System

The makers of the board game Monopoly print about 50 billion dollars' worth of Monopoly money every year—coincidentally about the same as the amount of new U.S. currency issued in 2005. Every game has bills totaling 15,140 Monopoly dollars. At a cost of about 12 U.S. dollars per set, this “money” would be a good deal if you could buy things other than Boardwalk and Park Place with it. Unfortunately, attempts to pay for groceries, books, or rent with this particular form of money have been unsuccessful. And that’s probably a good thing. Since the mid-1930s, Parker Brothers has sold over 200 million Monopoly games, containing more than 3 trillion Monopoly dollars.¹

When we pay for our purchases in the real world, we have lots of choices: crisp new \$20 bills, credit cards, debit cards, checks, or more complicated electronic methods. Regardless of the choice we make, we are using *money* to buy our food and clothes and pay our bills. To make sure we can do it, thousands of people work through every night, for the payments system really never sleeps. And the volume of payments is astounding. The Federal Reserve reports that in 2003 there were over 81 billion non-cash payments made in the United States, 45 percent of which were paper checks. That means something like 150 million paper checks and 180 million electronic payments were processed on an average business day. And, regardless of how you choose to pay, the path that the payment follows is pretty complicated.

To understand why money is so important to the smooth functioning of the economy and how it improves everyone’s well-being, we need to understand exactly what money is. Just why is a \$20 bill issued by the U.S. government much more useful than \$20 in Monopoly money? Furthermore, to quantify the impact of money on the economy, we need to be able to measure it. Those are the goals of this chapter: to understand what money is, how we use it, and how we measure it.



Parker Brothers’ bestselling board game.

SOURCE: © Nancy P. Alexander/Photo Edit

¹For more fun facts about Monopoly, see www.monopoly.com.

Money and How We Use It

When people use the word *money* in conversation, they mean many different things. Someone who “makes lots of money” has a high income; a person who “has lots of money” is wealthy. We will use the word *money* in a narrower, specialized sense to mean anything that can readily be used to make economic transactions. Formally defined, **money** is *an asset that is generally accepted as payment for goods and services or repayment of debt*. Income, in contrast, is a flow of earnings over time. **Wealth** is the value of assets minus liabilities. Money is one of those assets, albeit a very minor one.

Money, in the sense we are talking about, has three characteristics. It is (1) a means of payment, (2) a unit of account, and (3) a store of value. The first of these characteristics is the most important. Anything that is used as a means of payment must be a store of value and thus is very likely to become a unit of account. Let’s see why this is so.

Means of Payment

The primary use of money is as a **means of payment**. Most people insist on payment in money at the time a good or service is supplied because the alternatives just don’t work very well. Barter, in which a good or service is exchanged directly for another good or service, requires that a plumber who needs food find a grocer who needs a plumbing repair. Relying on this “double coincidence of wants” surely causes the economy to run less smoothly. The plumber could pay for his breakfast cereal with a “promise” of plumbing services, which the grocer could then transfer to someone else. But while it would be possible to certify the plumber’s trustworthiness, certainly taking payment in money is easier. Money finalizes payments so that buyers and sellers have no further claim on each other. That is money’s special role. In fact, so long as a buyer has money, there is nothing more the seller needs to know.

As economies have become more complex and physically dispersed, reducing the likelihood that a seller will have good information about a buyer, the need for money has grown. The increase in both the number of transactions and the number of potential buyers and sellers (the vast majority of whom may never even have seen one another) argues for something that makes payment final and whose value is easily verified. That something is money.



Unit of Account

Just as we measure length using feet and inches, we measure value using dollars and cents. Money is the **unit of account** that we use to quote prices and record debts. We could also refer to it as a standard of value.

Having a unit of account is an incredible convenience. Remember from microeconomics that prices provide the information consumers and producers use to ensure that resources are allocated to their best uses. What matters are the *relative* prices of



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YOUR FINANCIAL WORLD

Debit Cards versus Credit Cards

When you go shopping, should you pay with a credit card or a debit card? To decide, you need to understand the difference between the two. First make sure you know which one of your cards is which. Usually an ATM card (the one that you got from the bank when you opened your checking account) is a debit card. But check to make sure.

What's the real difference, from the shopper's point of view? A debit card works just like a check, only faster. When you write a paper check, it usually takes a day or two to go through the system. A debit card transaction goes through right away. The electronic message gets to your bank on the same day, and your account is debited immediately. So, if you want to use your debit card, your account balance has to be higher than the payment you want to make.

A credit card creates a deferred payment. The issuer agrees to make the payment for you, and you repay the

debt later. That sounds good, but there's a catch. If you're late paying, there's a late fee. And if you don't pay the entire debt every month, you pay interest on the balance—at what is usually a very high interest rate. If you do pay the entire debt every month, however, there is no late fee and no interest charge. And since you don't pay right away, you get an interest-free loan from the time you make the purchase to the time you pay the balance. If you can pay off your credit cards in full and on time, it's to your advantage to use them.

Credit cards have another advantage over debit cards. They help you to build a credit history, which you'll need when the time comes to buy a car or a house. Because debit cards are just extensions of your bank account, they don't show potential lenders that you are creditworthy. In fact, some businesses, like car rental companies, require their customers to use credit cards for this reason.

goods and services. When the price of one product is higher than the price of another, that product is worth more to both producers and consumers. Using dollars makes these comparisons easy. Imagine what would happen if we needed to compute relative prices for each pair of goods. With two goods, we would need only one price. With three goods, we would need three prices. But with 100 goods, we would need 4,950 prices, and with 10,000 goods (substantially less than the 70,000 products in a typical supermarket), we would need nearly 50 million prices.² Using money as a yardstick and quoting all prices in dollars certainly is easier.

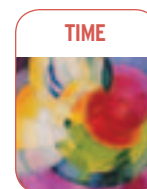
Store of Value

For money to function as a means of payment, it has to be a **store of value**, too. That is, if we are going to use money to pay for goods and services, then it must retain its worth from day to day. Sellers are much less likely to accept things that are perishable, like milk or lettuce. So the means of payment has to be durable and capable of transferring purchasing power from one day to the next. Paper **currency** does degrade with use (\$1 bills have an average lifetime of 18 months in circulation) but regardless of its physical condition, it is usually accepted at face value in transactions.

Of course, money is not the only store of value. We hold our wealth in lots of other forms—stocks, bonds, houses, even cars. Many of these are actually preferable to money as stores of value. Some, like bonds, pay higher interest rates than money. Others, like stocks, offer the potential for appreciation in nominal value, which

²The general formula is that for n goods we need $n(n-1)/2$ prices, so for 10,000 goods, the number would be $10,000(9,999)/2 = 49,995,000$.

money does not. Still others, like houses, deliver other services over time. Yet we all hold money because money is liquid. **Liquidity** is a measure of the ease with which an asset can be turned into a means of payment, namely money. For example, a bond is much more liquid than a house because it is so much easier and cheaper to sell. The more costly it is to convert an asset into money, the less liquid it is. Because constantly transforming assets into money every time we wished to make a purchase would be extremely costly, we keep some money around.



The Functions of Money

1. Means of payment: Used in exchange for goods and services.
2. Unit of account: Used to quote prices.
3. Store of value: Used to move purchasing power into the future.

The Payments System

The **payments system** is the web of arrangements that allow for the exchange of goods and services, as well as assets, among different people. Because the efficient operation of our economy depends on the payments system, a critical public policy concern is that it functions well. As we will see in Part IV, that is why central banks are directly involved.

Money is at the heart of the payments system. Whether we realize it or not, virtually every transaction we engage in involves the use of money at some point. Let's go through all the possible methods of payment to see how the system works.

Commodity and Fiat Monies

The first means of payment were things with intrinsic value. These **commodity monies** included everything from silk in China to butter in Norway, whale teeth in Fiji, and salt in Venice. All these things had value even if they were not used as money. The worth of a block of salt, for instance, came from its value as a preservative. But successful commodity monies had other characteristics: They were usable in some form by most people; they could be made into standardized quantities; they were durable; they had high value relative to their weight and size so that they were easily transportable; and they were divisible into small units so that they were easy to trade. For most of human history, gold has been the most common commodity money. It is widely accepted as payment; can be purified and made into standard weight units like coins; and is extremely durable since it does not corrode or tarnish. Moreover, gold is rare (there is only enough in existence to fill about one-third of the Washington Monument with solid gold), so it has high value relative to weight. And it can be cut into smaller pieces without losing its value.

In 1656, a Swede named Johan Palmstruck founded the Stockholm Banco. Five years later he issued Europe's first paper money.³ At the time, the Swedish currency

³The Chinese were the real monetary pioneers, issuing their first paper currency in the 7th century, 1,000 years before the Europeans.



A Revolutionary War “Continental” issued by the Continental Congress in 1775. The new government of the United States eventually printed \$200 million worth, and by 1781 they no longer had any value.



An assignat issued by the French Revolutionary Government in 1793. Faced with the need to finance wars and food shortages, the government eventually printed 40 billion of them and by the late 1790s they were worthless.

was copper ingots, which works poorly as money because of its low value per unit of weight. (Today, copper is worth only about 18 cents per ounce, or roughly 1/50 the value of silver and 1/2,500 the value of gold.) Thus, easy-to-handle paper was welcomed, at least at first.

After a few years of printing paper currency, Palmstruck and his sponsor, the King of Sweden, became overly enamored of the new money. The king needed to finance some wars he was fighting, so he convinced Palmstruck to print more and more notes. Since the bills were redeemable on demand for metal, the system worked only as long as people believed there was enough metal sitting in Palmstruck’s vaults. As the number of notes increased, Swedes lost confidence in them and started to redeem them for the metal they supposedly stood for. But Palmstruck had issued too many notes, and his bank failed.

Other people tried issuing paper money during the early 1700s. Eventually governments got into the act. In 1775, the newly formed Continental Congress of the United States of America issued “continentals” to finance the Revolutionary War. Twenty years later, revolutionary France issued the “assignat.” Lacking any other source of funding for their wars, both governments issued huge quantities of the currencies, and both currencies eventually became worthless.

The reaction was predictable: People became suspicious of government-issued paper money. But governments need funds and will use all available means to get them. In the United States, the Civil War put pressure on government finances and the two warring parties had little choice but to issue paper money to pay for salaries and supplies. Beginning in 1862, both the Confederate and the Union governments printed and used paper money with no explicit backing. The North’s “greenbacks” are still legal tender in the United States, but collectors are the only people who value the Confederate currency.

After the Civil War, the United States reverted to the use of gold as money. Both gold coins and notes backed by gold circulated well into the 20th century. Today, though, we use paper money—high-quality paper, nicely engraved, with lots of special security features. This type of currency is called **fiat money**, because its value

comes from government decree, or *fiat*. Some countries print notes that are durable and attractive, bearing famous works of art in multiple colors. The Australians make their notes out of plastic. But in all cases the money has very little intrinsic worth, and the cost of production is only a small fraction of the face value. The U.S. Treasury's Bureau of Engraving and Printing pays less than 6 cents to print a note, regardless of whether it's a \$1 or a \$100 bill.

Why are we willing to accept these bills as payment for goods or in settlement of debts? There are two reasons. First, we take them because we believe we can use them in the future; someone else will take them from us. Second, the law says we must accept them. That is, the U.S. government stands behind its paper money. Since the first greenbacks were issued in 1862, all U.S. currency has borne the short and simple phrase "This note is legal tender for all debts, public and private." In practice, this means that private businesses must accept dollar bills as payment. More important, the U.S. government is committed to accepting the currency it has issued in settlement of debts. We will always be able to pay our taxes in dollars. As long as the government stands behind its paper money and doesn't issue too much of it, we will use it. In the end, money is about trust.

Checks

Checks are another way of paying for things. Unlike currency, the checks you use to pay your rent and electric bill are not legal tender. In fact, they aren't money at all. A **check** is just an instruction to the bank to take funds from your account and transfer them to the person or firm whose name you have written in the "Pay to the order of" line. Thus, when you give someone a check in exchange for a good or service, it is not a final payment—at least, not in the same sense as currency. Instead, your check sets in motion a series of transactions that eventually lead to the final payment.

Here are the steps. You hand the check over to a merchant, who then takes it to the bank. Depending on the arrangement, the bank will credit the amount of the check to the merchant's account either immediately or with a short lag. At the end of the day, the bank sends the check (or an electronic image) through the check-clearing system along with the other 150 million checks to be processed that night by shipping them to a check-processing center run by the Federal Reserve or to a private check clearinghouse. (The first check clearinghouses were pubs where bank employees met to have a drink and exchange checks.) At the center, the check is transferred from the bank that sent it in to the bank on which it is written—your bank. The account of the bank presenting the check is credited, and the account of the bank on which the check is written is debited (see Figure 2.1). This is the step that uses *money*.

Finally, on receipt of the check, your bank debits your account. (If the balance in your account is insufficient to cover the check, your bank has a few days to return it to the sending bank, so the transaction isn't actually final until that period has passed.) In the past all paper checks were returned to the people who originally wrote them. Today, they are scanned and customers can view electronic images on their bank's Web sites. (See Your Financial World: Paper Checks Become Digital Images.)

Recently check volumes have begun to fall, but paper checks are still with us for several reasons. A canceled check is legal proof of payment and, in many states, laws require banks to return checks to customers. Then there is force of habit. Over time, people may get used to receiving bank statements without their checks, but so far not many people have chosen the option.



YOUR FINANCIAL WORLD

Paper Checks Become Digital Images

For at least 30 years, there have been predictions that paper checks would disappear. Credit cards, ATM machines, debit cards, automatic bill payment, and Internet banking were all supposed to get rid of them. Instead, each month millions of people received thick envelopes from their banks that included canceled checks along with their monthly statements. Paper checks accounted for 60 percent of payments in 2000. But no more! On October 28, 2004 Check 21—the Check Clearing for the 21st Century Act—went into effect.

Banks are thrilled. Until the fall of 2004, the check verification and payment process required commercial banks to transport all paper checks to and from a Federal Reserve Bank, and eventually back to the people who wrote them. Paper checks were legal proof of payment, so customers wanted them back. But transporting tons and tons of checks around the country was an expensive headache for banks.

Check 21 gives banks the leeway to process checks electronically. Instead of shipping paper across the country, banks transmit digital images of each check that was written. These images create “substitute checks,” and have the same legal standing as the original checks.

Payments in long-distance transactions are now much less complicated. Before Check 21, if someone living in Houston sent a check to make a payment to a business in Chicago, the piece of paper had to go from Texas to Illinois, and then back again. Now, the check can be scanned and shredded in Chicago and the image is saved and transmitted. If the person who wrote it in Houston wants a paper copy of the canceled check, their bank can print a substitute check. A check processing system that used to take a few days now takes a few hours.

Processing checks electronically is definitely cheaper. Experts estimate that by scanning checks and transmit-

ting the images, the banks will save \$2 billion a year. These savings include \$250 million spent on courier services to move checks around the country.

In fact, reducing the risks of physically transporting checks was one of the big reasons for the passage of Check 21. For several days following the September 11, 2001, terrorist attacks, only military planes were allowed to fly in U.S. airspace and that disrupted the check transportation system eventually grounding \$47 billion worth of paper checks.

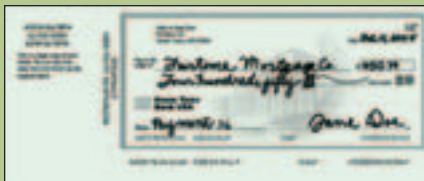
Speeding up paper check processing does have one downside: People can’t write checks with the expectation that they will have a day or two to make a deposit to cover it. There is no more float. The new rules shrink the time between when a check is written and when the account is debited, especially for out-of-town checks.[†]

By speeding up the processing of paper checks, Check 21 provides a further incentive for individuals to use debit cards, credit cards, or other forms of electronic payments. As digital imaging takes over, we may finally see the demise of paper checks.

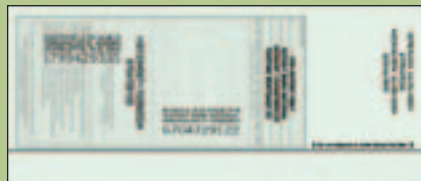
For more details on Check 21, payments system development and policies, see the Federal Reserve Board’s payment system Web site <http://www.federalreserve.gov/paymentsys.htm>.

[†]Just because banks are able to move checks through the clearing system more quickly doesn’t mean that they are going to offer the depositor more timely access to the funds. In an attempt to reduce fraud, banks restrict access to funds from so-called “high-risk checks,” such as those for more than \$5,000 that are deposited into newly opened accounts, for as long as 11 business days. If you have to shift large quantities of funds and use them quickly, it is important to find out the policies of the financial intermediaries involved before you do it.

Front of Substitute Check



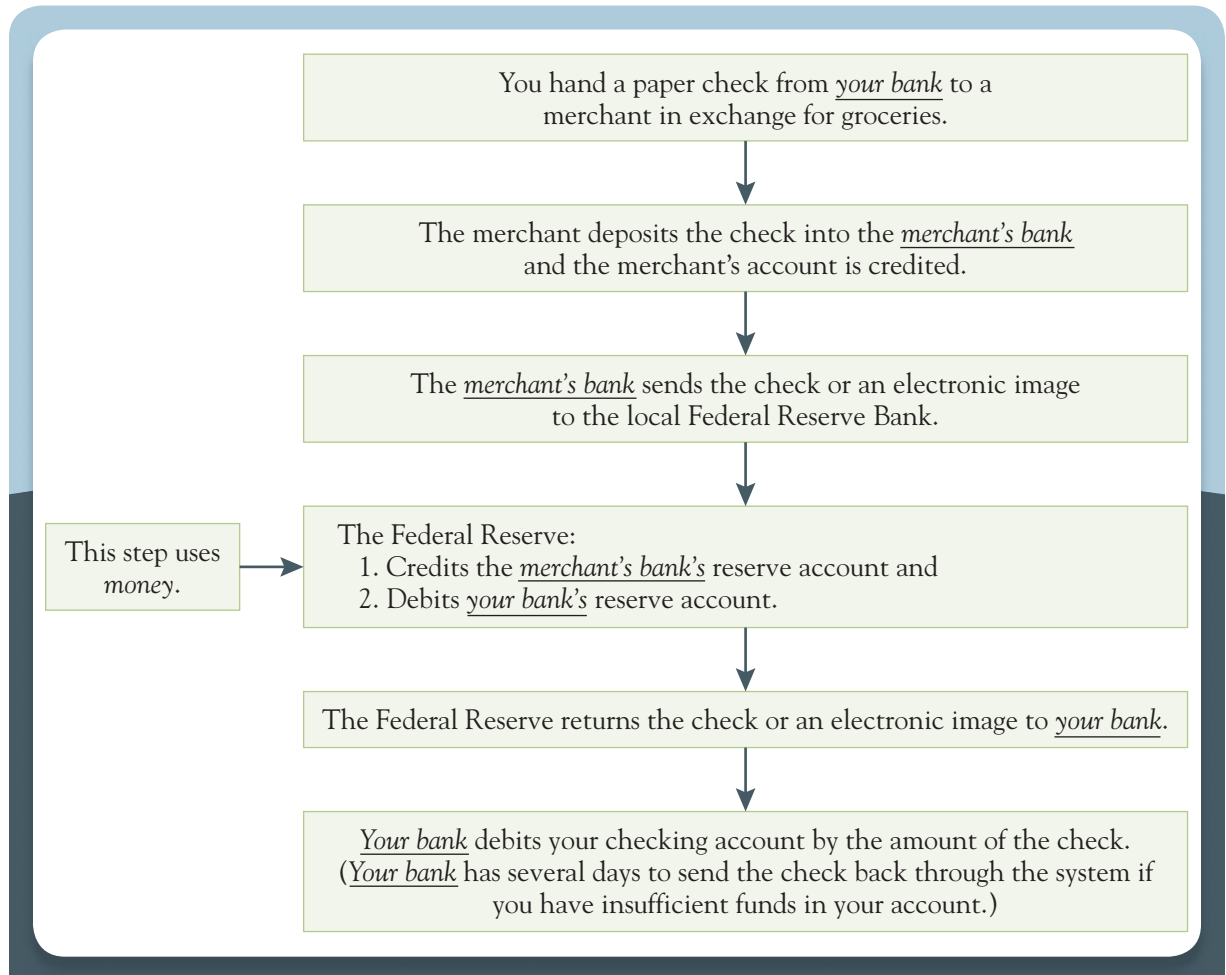
Back of Substitute Check



The front of the substitute check includes the following: “This is a legal copy of your check. You can use it the same way you would use the original check.”

SOURCE: Federal Reserve Board.

Figure 2.1 The Path of a Paper Check



Electronic Payments

The third and final method of payment is electronic. We are all familiar with credit cards and debit cards. A less well known form of payment is electronic funds transfers. While there are a large number of credit and debit card transactions, electronic funds transfers account for the bulk of the \$30 trillion worth of non-cash retail payments made each year in the United States.

What is the difference between debit cards and credit cards? A **debit card** works the same way as a check in that it provides the bank with instructions to transfer funds from the cardholder's account directly to a merchant's account. There is usually a charge for this; the processor of the payment takes a fee based on the size of the transaction.

A **credit card** is a promise by a bank to lend the cardholder money with which to make purchases. When a shopper buys a pair of shoes with a credit card, the shoe

store's bank account receives payment immediately, but the money that is used for payment does not belong to the buyer. Instead, the bank that issued the credit card makes the payment, creating a loan the cardholder must repay. For this reason, credit cards do not represent money; rather, they represent access to someone else's money.

Electronic funds transfers are movements of funds directly from one account to another. These transactions are used extensively by banks and are becoming increasingly popular for individuals as well. For individuals, the most common form is the **automated clearinghouse transaction (ACH)**, which is generally used for recurring payments such as paychecks and utility bills. Some merchants use them for one-time transactions as well (see Applying the Concept: Writing a Check at Wal-Mart). ACH transactions are just like checks except that they are entirely electronic. Your bank account is debited or credited automatically, and you receive periodic notifications of the activity in your account.

Banks use electronic transfers to handle transactions among themselves. The most common method is to send money through a system maintained by the Federal Reserve, called Fedwire. The volume and value of payments made through this system are substantial. On a typical day in 2006, the system completed 620,000 transactions with a total value of about \$3.8 trillion.

Retail businesses, together with their banks, are experimenting with a variety of new methods of electronic payment. One is the **stored-value card**, which looks like a credit or debit card except that it doesn't bear your name. To use one, you go to the bank or ATM machine and put the card into an electronic device that transfers funds from your checking account to your card. Then you take the card to a merchant who has a reader that is capable of deducting funds from the card and depositing them directly into the store's account. The stuff on the card is in fact money, and the system can be set up so that if you lose your card, its current value can be canceled.

So far, these cards have limited usefulness. The New York City Metropolitan Transit Authority and other city transit systems sell stored-value cards, but it's hard to buy anything with them other than subway and bus rides. The same is true of long-distance phone cards and gift cards sold by chain stores like Barnes & Noble. Attempts to implement the stored-value card more broadly haven't worked very well because most merchants lack the hardware to read the cards. And few of us know how to use them.

E-money is another new method of payment. It can be used to pay for purchases on the Internet. You open an account by transferring funds to the issuer of the e-money. Then, when you are shopping online, you instruct the issuer to send your e-money to the merchant.

E-money is really a form of private money. It is not issued or guaranteed by the government, so you can't use it to pay your taxes. It's hard to even define what the term *e-money* means. One definition that seems helpful is "monetary value, as represented by a claim on the issuer, which is (a) stored on an electronic device, (b) issued on receipt of funds, and (c) accepted as a means of payment by persons other than the issuer."⁴

But at this point, e-money is questionable at best. Will individuals develop enough trust in e-money to be willing to use it? Will merchants install the expensive equipment to handle it? Who will be allowed to issue e-money? Still, the day may come

⁴This definition comes from Directive 2000/46 of the European Parliament and the Council of 18 September 2000, "On the Taking Up, Pursuit and Prudential Supervision of the Business of Electronic Money Institutions," *Official Journal of the European Communities*, 275/39, 27 October 2000.



APPLYING THE CONCEPT
WRITING A CHECK AT WAL-MART

When you get to the checkout counter at some Wal-Mart stores, you can pay in a way that isn't available in most other places. If you write out a check, the cashier will scan it and then give it back to you. A moment later you will be asked to sign something that looks like a credit card slip. Then you will get a receipt that looks like a credit card receipt. But you never used a credit card, and you got your check back. What's going on?

Wal-Mart is using a technology called "check conversion," which turns paper checks into ACH transactions. The check itself is not the method of payment; it is just a source of information for a one-time electronic funds transfer, just like the automatic one you may use to pay your electric bill. A machine scans your account number and your bank's routing number and uses them to initiate the one-time transaction.

From Wal-Mart's point of view, this technology is a breakthrough. In 2001, the giant retailer handled a billion checks—about 1.5 percent of all the checks written in the United States that year. Imagine how much work it is to keep track of all that paper. Check conversion is not only efficient, since the entire transaction is done at the point of sale, but more

The format of a typical check in the United States.



Account number
 ABA or bank routing number
 always 9 digits and placed
 between the "⑆" characters

secure. The more often a check is handled, the more likely it will be lost or subject to fraud from some unscrupulous employee finding a way to deposit it in his or her own bank account. Ultimately, the cheaper and safer it is to pay for our purchases, the lower the prices of the things we buy.

when you can park your car and pay the parking meter by simply punching a series of numbers into your cell phone that transfers e-money issued by your phone provider to the city government that owns the parking meter. (See In the News: Paying via Text Message.)

The Future of Money

Let's speculate about what might happen to money and each of its three functions in the future. As a *means of payment*, it has already undergone big changes. The time is rapidly approaching when safe and secure systems for payment will use virtually no money at all.

We will always need money as a *unit of account* in which to quote values and prices; the efficiency of quoting prices in commonly understood terms isn't going to change. But the question is, how many units of account will we need? Today, many countries have their own currencies, which give rise to their own units of account. In the future, though, there will be little reason to maintain different units of account across different countries. Price systems will be more like systems of weights and measures. Today, there are two commonly used systems of weights and measures: English ounces and yards and metric grams and meters. We will likely see a similar sort of standardization of money and a dramatic reduction in the number of units of account.

Finally, money as a *store of value* is clearly on the way out. With the advances in financial markets, many financial instruments have become highly liquid. They are easily bought and sold and can be converted into a means of payment quickly and



IN THE NEWS

Paying via Text Message

The Wall Street Journal

by Mylene Mangalindan
and Jessica E. Vascellaro

April 26, 2006

A wave of new options are offering cell phone users a way to transfer money and make purchases on the fly, using text-messaging technology.

EBay Inc.'s PayPal unit this month introduced a service called PayPal Mobile that allows consumers to send payments to others, purchase items from select retailers, or donate money to some charities by punching a short text code into a cell phone. Obopay Inc. a Palo Alto, Calif., start-up, began enrolling consumers in its mobile-payment service this month. And start-up TextPayMe Inc. of Redmond, Wash., launched a service in December allowing people to send money to each other via text messaging.

These services come on top of efforts by credit-card companies and cell phone makers to create so-called mobile wallets that allow users to store credit-card information on cell phones that can then be waved over special terminals at the checkout counter to make purchases.

The two categories of services are very different and are unlikely to compete. Mobile wallets are intended as a quick way for consumers to make purchases anywhere their credit

card is accepted, without having to carry their wallets.

Text-payment services are designed primarily as cash-swapping services between parties that don't accept credit cards, say when people pay a babysitter or someone selling goods through classified ads. PayPal, though, does have a way to allow limited purchases from merchants.

Cooper Marcus, a 33-year-old Berkeley, Calif., resident, recently used TextPayMe's service when he wanted to split a \$40 restaurant bill with his fiancée and collect \$88 from a friend who owed him money for a wireless router. "I always have my phone with me but I don't have cash," says Mr. Marcus, who is chief executive of a parking management company.

These services are all part of a range of efforts from telecommunications companies, financial-services firms and retailers to enable mobile financial transactions. As consumers become more technologically adept, businesses see cell phones as a potential tool to speed financial transactions, encourage impulse buying and potentially reduce payment-processing costs.

Mobile payments have already taken off in Europe and Asia—where many consumers pay for restaurant meals and public transportation by pushing buttons on a cell phone. But such services haven't yet taken off in the United States for a variety of reasons. For one, the "mobile wallet" concept would require retailers to invest in special payment terminals, and consumers to buy specially equipped cell phones. In addition, text-messaging services often require users to turn

cheaply. These instruments and the financial markets in which they trade are the subject of the next chapter. For now, though, we can conclude that in the future, there will almost surely be less and less money.

One caution is in order. As we look into the future and try to discern what will happen to money, we should remember that 150 years ago there was virtually no paper currency in circulation. The first credit card was issued in the early 1950s; the first ATM was installed around 1970. Not until the mid-1990s could we shop via the Internet. Forecasting most of these developments, as well as any other trend in technology, is nearly impossible. After all, who could have predicted even 10 years ago that today we would be able to check our bank balances, buy and sell stocks, and pay our utility bills 24 hours a day, seven days a week from the comfort of our homes?

over financial information to third parties like PayPal, which could make some users wary.

Fees are another issue. Obopay, for instance, charges 10 cents per payment to send mobile payments to another person. TextPayMe, which is free now to early users, will soon start charging new customers to send money, though it hasn't decided how much.

With TextPayMe, users can transfer money between online accounts that can be linked to a credit card or a bank account by sending a text message with the word “pay,” a dollar amount and the phone number of the recipient. The service works on virtually any phone with text messaging.

Obopay also issues a MasterCard-branded debit card linked to the mobile-payments account, so consumers can use an ATM to withdraw cash that has been text-messaged into the account. While the company charges 10 cents to send payments, there is no fee for receiving payments.

Deirdre Hancock, an 18-year-old San Francisco resident, says Obopay has helped her and her fiancée when they've been stuck without cash because it lets them text-message money to each other and access it through the companion debit card immediately. “It's so convenient,” she says, adding that the 10-cent fee for transactions is insignificant.

Among some “mobile wallet” payment methods being developed, MasterCard International will soon begin U.S. testing of a service that lets users download account information to their cell phones and then pay for purchases by tapping it against MasterCard PayPass terminals. The account

information would be sent wirelessly to a chip embedded in the phone.

Meanwhile, Motorola is preparing to launch a mobile wallet service later this year that will allow users to store credit-card and banking information in their cell phones, which they can use to make payments by holding the device before a chip reader.

LESSONS OF THE ARTICLE

Technological advances are constantly creating new methods of payment. While their adoption depends on many things, one thing is for certain: Someone will always be searching for easier and cheaper ways for us to pay for things. And as the payments system evolves, so will the assets that we need to hold. As our cell phones transform into a part of the payments system, we will need to carry less and less cash.

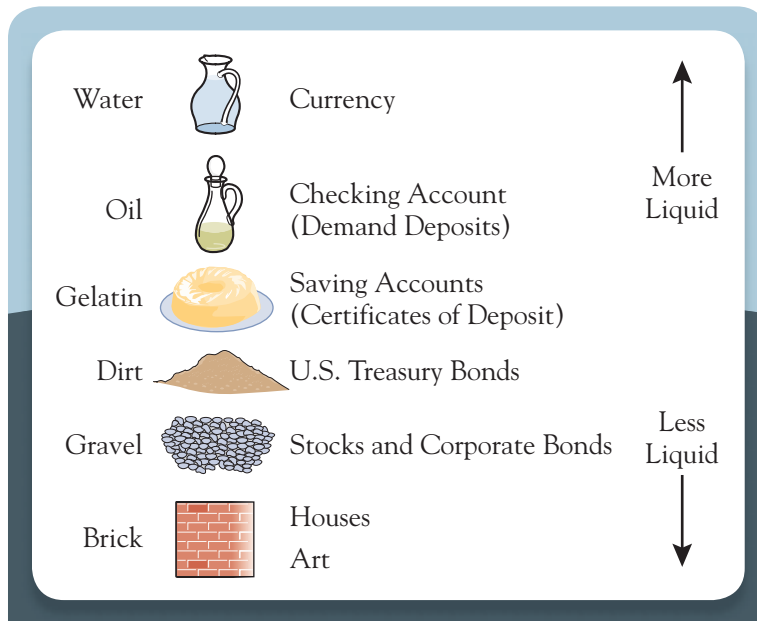
SOURCE: *The Wall Street Journal Online*. “Paying via Text Message,” by Mylene Mangalindan and Jessica E. Vascellaro, April 26, 2006. Copyright 2006 by Dow Jones & Company, Inc. Reproduced with permission of Dow Jones & Company, Inc., via Copyright Clearance Center.

Measuring Money

Changes in the amount of money in the economy are related to changes in interest rates, economic growth, and most important, **inflation**. Inflation is the rate at which prices in general are increasing over time—and the **inflation rate** is a measure of that process.⁵ With inflation, you need more units of money to buy the same basket of goods you bought a month or a year ago. Put another way, inflation makes money

⁵The terms “inflation” and “inflation rate” are often used interchangeably. We will refer to inflation as the process of prices rising, and inflation rate as the measurement of the process. The relationship between these terms is analogous to that between “heat” and “temperature.” The second is the measure of the first.

Figure 2.2 The Liquidity Spectrum



Liquidity is the ease with which you can turn an asset into a means of payment without loss of value.

less valuable. And the primary cause of inflation is the issuance of too much money. When the Continental Congress issued too much currency to finance the Revolutionary War, the number of Continentals people needed to purchase food and shelter rose dramatically. Continentals slowly became less valuable. So the value of the means of payment depends on how much of it is circulating.

To use the insight that money growth is somehow related to inflation, we must be able to measure how much money is circulating. This is no easy task. Let's start with money's primary function, as a means of payment. If that were the definition of money, we would measure the quantity of money as the quantity of currency in circulation—an unrealistically limited measure, since there are many ways to complete transactions (effect final payment) without using currency.

A reasonable alternative would be to consider the functionality of a broad category of financial assets and sort them by their degree of liquidity. That is, we could sort them by the ease with which they can be converted into a means of payment, arranging them along a spectrum from the most liquid (currency) to the least liquid (art, antique cars, and the like). Figure 2.2 shows what our liquidity spectrum would look like.

Once we have our list, we could draw a line and include everything on one side of the line in our measure of money. Over the years, figuring out just where to draw the line has proven very difficult, especially since the introduction of new types of checking accounts. There really is no perfect solution. Instead, we have drawn the line in a number of different places and computed several measures of money, called the **monetary aggregates**: M1 and M2.⁶

Table 2.1 shows the components of the two monetary aggregates as defined by the Federal Reserve, along with the size of each as of February 2007. Let's go through each one to understand how it is constructed. **M1**, the narrowest definition of money, includes only currency and various deposit accounts on which people can write checks. These are the most liquid assets in the financial system. The components of M1 include *currency in the hands of the public*, which is the quantity of dollar bills outstanding excluding the ones in the vaults of banks; *travelers checks* issued by travel companies, banks, and credit card companies, which are guaranteed by the issuer and

⁶On March 23, 2006, the Federal Reserve Board ceased collection and publication of a third monetary aggregate, M3. In announcing their decision, officials wrote: "M3 does not appear to convey any additional information about economic activity that is not already embodied in M2 and has not played a role in the monetary policy process for many years."

Table 2.1 The Monetary Aggregates

Monetary Aggregates	Value as of February 2007 (US\$ billions)
M1 = Currency in the hands of the public	749.9
+ Traveler's Checks	6.7
+ Demand Deposits	300.0
+ Other Checkable Deposits	302.9
Total M1	1359.5
M2 = M1	
+ Small-denomination time deposits	1179.4
+ Savings Deposits and Money Market Deposit Accounts	3746.6
+ Retail Money Market Mutual Fund Shares	826.7
Total M2	7112.2

SOURCE: Board of Governors of the Federal Reserve.

usually work just like cash; **demand deposits** at commercial banks, which are standard checking accounts that pay no interest; and other checkable deposits, which are deposits in checking accounts that pay interest.

M2 equals all of M1 plus assets that cannot be used directly as a means of payment and are difficult to turn into currency quickly. These assets in M2 include small-denomination **time deposits** (less than \$100,000) that cannot be withdrawn without advance notice; *savings deposits*, including *money-market deposit accounts*, which pay interest and offer limited check-writing privileges; *retail money-market mutual fund shares*, or shares in funds that collect relatively small sums from individuals, pool them together, and invest them in short-term marketable debt issued by large corporations. Money-market mutual fund shares can be issued by nonbank financial intermediaries, such as brokerage firms. They do carry check-writing privileges. M2 is the most commonly quoted monetary aggregate, since its movements are most closely related to interest rates and economic growth.

To clarify what the monetary aggregates mean, let's compare their size to the size of the economy. In winter 2007, nominal U.S. **gross domestic product (GDP)** was \$13.6 trillion. Putting that number into the same units as those in Table 2.1, that's \$13,600 billion. So GDP is 10 times as large as M1 and just under twice as large as M2.

Which one of the Ms should we use to understand inflation? That's a difficult question whose answer has changed over time. Until the early 1980s, economists and policymakers looked at M1. But with the introduction of substitutes for standard checking accounts, especially money-market mutual fund shares, M1 became less useful than M2. These innovations enabled people to shift their balances out of the noninterest-bearing accounts in M1 and into accounts that paid interest. As Table 2.1 shows, demand deposits and other checkable deposits in M1 total about \$600 billion,



TOOLS OF THE TRADE

The Consumer Price Index

Understanding how to measure inflation is central to understanding economics and finance. Most of us keep a close eye on measures like the Consumer Price Index (CPI) to help gauge the value of our salary increases or the purchasing power of the money we hold. And adjusting interest rates for inflation is critical for making investment decisions. (See Chapter 4.)

The CPI is designed to answer the following question: How much more would it cost for people to purchase today the same basket of goods and services that they actually bought at some fixed time in the past?

To calculate the CPI, every few years statisticians at the Bureau of Labor Statistics (BLS) survey people to find out what they bought. This gives us the basket of goods and services bought by the typical consumer. Next, every month the BLS collects information on the prices of thousands of goods and services—everything from breakfast cereal to gasoline to washing machines to the cost of cable television. Combining the expenditure and price surveys allows statisticians to compute the current cost of the basket. Finally, this current cost is compared to a benchmark to yield an index. And the percentage change in this index is a measure of inflation.

To see how this works, let's look at an example. Assume people spend 25 percent of their income on food, 50 percent on housing and 25 percent on transportation. That's the survey information. Examples of the prices are in Table 2.2. Importantly, these are the prices of exactly the same bundle of food, the same size and quality of housing, and the same transportation for each year.

Using the numbers in Table 2.2 we can compute the cost of the basket of goods in each year:

Cost of the basket in 2007

$$\begin{aligned} &= 0.25 \times \text{Price of food} + 0.5 \times \text{Price of housing} \\ &\quad + 0.25 \times \text{Price of transportation} \\ &= 0.25 \times \$100 + 0.5 \times \$200 + 0.25 \times \$150 \\ &= \$150 \end{aligned}$$

And for 2008, we get \$180. Choosing 2007 as the base year, the index level in each year equals

$$\text{CPI} = \frac{\text{Cost of the basket in current year}}{\text{Cost of the basket in base year}} \times 100$$

The result of this computation is the fifth column of the table.

Finally, we can use the index number to compute the inflation rate from the previous year. From 2006 to 2007, this means that

$$\text{Inflation Rate 2008} = \frac{\text{CPI in 2008} - \text{CPI in 2007}}{\text{CPI in 2007}} \times 100.$$

Using the numbers from Table 2.2 to compute the inflation rate in 2008, we get that

$$\frac{110 - 100}{100} \times 100 = 10\%,$$

which represents less than 5 percent of GDP. By comparison, the savings deposits, money-market deposit accounts, and retail money-market mutual fund shares in M2 total over \$5.7 trillion, representing over 40 percent of GDP. M1 is no longer a useful measure of money.

Looking at Figure 2.3 on page 34, you can see that from 1960 to 1980 the growth rates of the two measures of money moved together. After 1980, however, M1 behaved very differently from M2. Here's what happened. In the late 1970s and early 1980s, inflation climbed to over 10 percent for a few years. Needless to say, people who had money in zero-interest checking accounts were upset. Their money was losing value at a rapid rate. They went looking for ways to get checking services along with interest. Soon financial firms began to offer "money market" accounts that compensated depositors at least in part for inflation. These accounts are part of M2. The movement of funds into the non-M1 portion of M2 meant that the two measures no longer moved together. At the same time, the new money market accounts made M2 accounts more liquid. Analysts stopped looking at M1 and began to look at M2.

and for 2009 the result is

$$\frac{120 - 110}{110} \times 100 = 9.1\%.$$

(These numbers are just for illustration. The U.S. inflation rate is closer to 2 percent.)

Inflation measured using the CPI tells us how much more money we need to give someone to restore the purchasing power they had in the earlier period when the survey was done. But adjustments in wages based on fixed-expenditure-weight inflation indices like the CPI are known to overcompensate people in an unintended

way. This overstatement of inflation comes from what is known as *substitution bias*. Since inflation is not uniform, the prices of some products will increase by more than the prices of others. People can escape some of the inflation by *substituting* goods and services that have sustained less inflation for those that have sustained more. By assuming that any substitution makes people worse off, the index *overstates* the impact of price changes. To address this problem, and take into account changes in spending patterns, the Bureau of Labor Statistics now changes the weights every two years. As a result, today's CPI is a much more accurate measure of inflation than the one published a decade ago.

Table 2.2 Computing the Consumer Price Index

Year	Price of Food	Price of Housing	Price of Transportation	Cost of the Basket	Consumer Price Index
2007	\$100	\$200	\$100	\$150	100
2008	\$110	\$205	\$140	\$165	110
2009	\$120	\$210	\$180	\$180	120

How useful is M2 in tracking inflation? We already know that when the quantity of money grows quickly, it produces very high inflation. A cross-country analysis of money growth supports this conclusion. In Turkey, Venezuela, and Ukraine, where in the last half of the 1990s the inflation rate ranged from 30 to 75 percent per year, the money supply grew at comparable rates.⁷ By contrast, in the United States, Canada, and Europe, the inflation rate averaged only about 2 percent, and the money growth rate stayed in the range of 6 to 7 percent. Because high money growth means high inflation, controlling inflation means controlling the money supply. Imagine how much inflation there would be if people could spend the \$3 trillion in Monopoly dollars Parker Brothers has printed over the last seven decades!

⁷From 1995 to 2000, inflation averaged 74 percent, 42 percent, and 30 percent, respectively, in Turkey, Venezuela, and Ukraine. At the same time, a measure of money that is close to U.S., M2 grew at 86, 33, and 36 percent per year. Data for these comparisons come from the International Monetary Fund's *International Financial Statistics*.



APPLYING THE CONCEPT

WHERE ARE ALL THOSE \$100 BILLS?

A quick look at the Federal Reserve's Web site, www.federalreserve.gov, tells us that during the winter of 2007, the public held about \$750 billion in United States currency. That's a huge amount. To get some sense of the size of this number, you can divide it by the U.S. population, 300 million, to get roughly \$2,500 per person. For a household of four, that's an average of \$10,000 in cash. What's even more absurd is that over 70 percent of the \$750 billion is held in the form of \$100 bills, meaning that there must be eighteen \$100 bills for each United States resident. Clearly, we do not hold all this cash in our wallets or our homes, nor does it fill the cash registers of local businesses. Where are all those \$100 bills?

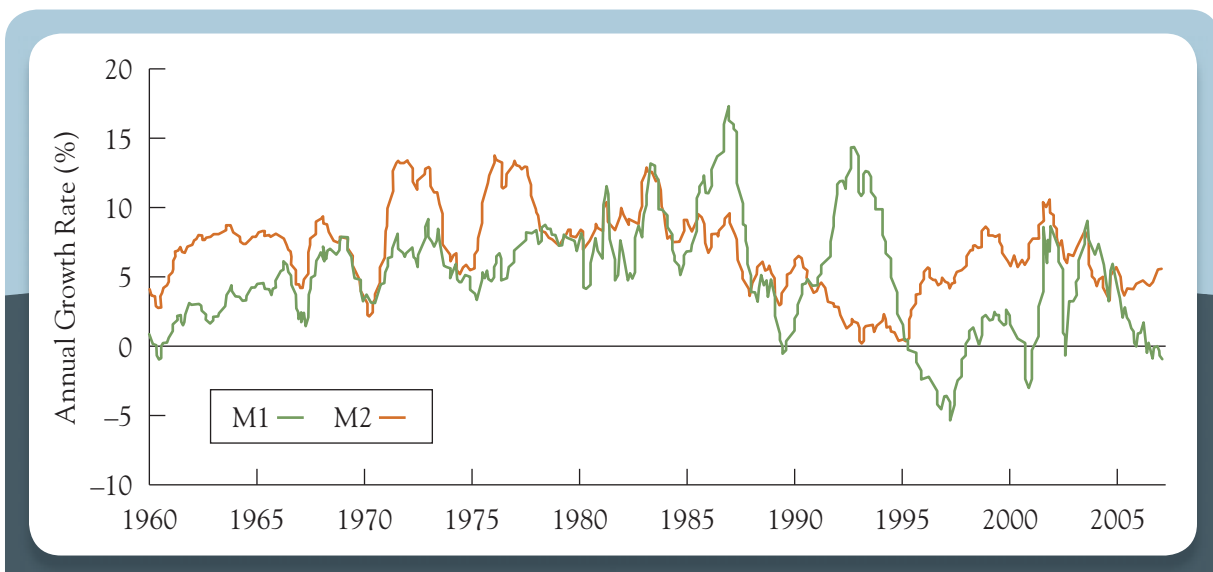
Not in the United States. In many countries, people do not trust their governments to protect the value of the currency they print. They fear the authorities will print

too much, creating inflation. And since money is all about trust, if you don't have confidence in your government, you don't want to hold your wealth in the government's money. In many cases, the lack of faith has been warranted. When the Soviet Union collapsed in the early 1990s, the currency issued by the old regime became nearly worthless. The same thing happened in Argentina in the 1980s.

When people stop trusting the local currency, they look for substitutes. The most sought-after is the U.S. dollar bill. With the stability of the constant addition of new security features, and the stability of the government, everyone seems to have faith in it.[†] The U.S. Treasury estimates that between two-thirds and three-quarters of U.S. currency is held outside the United States. That's more than \$500 billion—and most of it is in hundreds!

[†]For a guide to the security features in U.S. currency go to www.moneyfactory.gov. This constant redesign has been successful in thwarting counterfeiting. Estimates are that the total quantity [of counterfeit bills] is less than 10,000 bills outstanding. This is definitely not something that anyone should worry about.

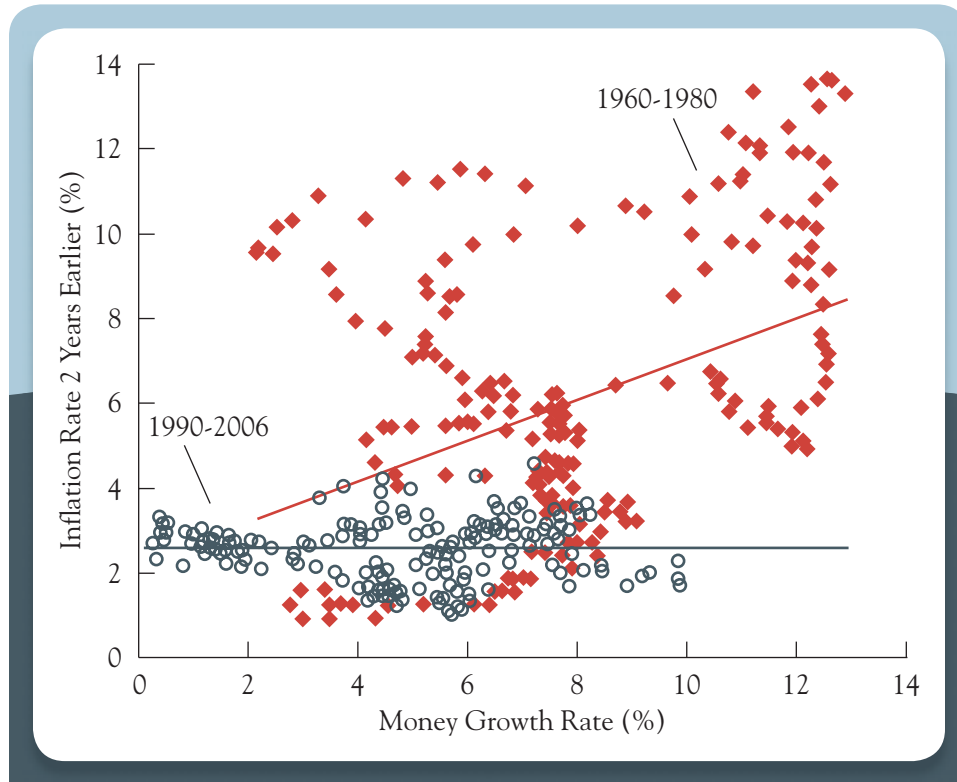
Figure 2.3 Growth Rates of Monetary Aggregates, 1960-2006



SOURCE: Board of Governors of the Federal Reserve System, Release H.6.

How useful is money growth in helping us to control moderate inflation? We will address this question in detail in Chapter 20 of this book. For now, though, let's look at whether money growth helps to forecast inflation.

Figure 2.4 Money Growth and Inflation, Monthly 1960-2006



Money growth measured as the 12-month change in M2, and inflation measured as the 12-month change in the Consumer Price Index.

SOURCE: Board of Governors of the Federal Reserve and Bureau of Labor Statistics.

Figure 2.4 shows the inflation rate on the vertical axis and M2 growth *two years earlier* on the horizontal axis, both for the United States. The solid blue diamonds represent data from 1960 to 1980. Note that, while the relationship is far from perfect in those years, higher money growth was clearly associated with higher inflation two years later. In fact, the correlation was over 0.5.⁸ But look at what has happened to the relationship more recently. The hollow beige dots represent data from 1990 to 2006, when there was virtually no relationship at all between the two measures. (The correlation was slightly negative.) Growth in M2 stopped being a useful tool for forecasting inflation.

There are two possible explanations for the fact that M2 no longer predicts inflation. One is that the relationship between the two applies only at high levels of inflation. Figure 2.4 shows that during the period 1960–1980, the inflation rate often

⁸Correlation is a measure of how closely two quantities are related, or change together. The numerical value ranges from +1 to -1. A positive correlation signifies that the two variables move up and down together, while a negative correlation means that they move in opposite directions.

rose higher than 5 percent, but from 1990 to 2006, it rarely did. Maybe the relationship between money growth and inflation doesn't exist at low levels of inflation, or it shows up only over longer periods of time. All we really know is that at low levels of money growth, inflation is likely to stay low.

An alternative explanation is that we need a new measure of money that takes into account recent changes in the way we make payments and use money. Once economists have identified the right measure, we'll be able to predict inflation again.

Terms

automated clearinghouse transaction (ACH), 26	inflation rate, 29
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credit card, 24	M1, and M2, 30
currency, 20	means of payment, 19
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electronic funds transfer, 26	payments system, 21
e-money, 26	store of value, 20
fiat money, 22	stored-value card, 26
gross domestic product (GDP), 31	time deposits, 31
inflation, 29	unit of account, 19
	wealth, 19

Chapter Lessons

1. Money is an asset that is generally accepted in payment for goods and services or repayment of debts.
 - a. Money has three basic uses:
 - i. Means of payment
 - ii. Unit of account
 - iii. Store of value
 - b. Money is liquid. Liquidity is the ease with which an asset can be turned into a means of payment.
2. Money makes the payments system work. The payments system is the web of arrangements that allows people to exchange goods and services. There are three broad categories of payments, all of which use money at some stage.
 - a. Cash
 - b. Checks
 - c. Electronic payments
3. In the future, money will be used less and less as a means of payment.

4. To understand the links among money, inflation, and economic growth, we need to measure the quantity of money in the economy. There are two basic measures of money.
 - a. M1, the narrowest measure, includes only the most liquid assets.
 - b. M2, a broader measure, includes assets not usable as means of payment.
 - c. Countries with high money growth have high inflation.
 - d. In countries with low inflation, money growth is a poor forecaster of inflation.

Conceptual Problems

1. The country of Briemonia has an economy that is based largely on farming and agricultural products. The inhabitants of Briemonia use cheese as their money.
 - a. Not surprisingly, the Briemonians complain bitterly about the problems that their commodity money creates. What are they?
 - b. Modern medical science arrives in Briemonia, and doctors begin giving the Briemonians cholesterol tests. The results lead to the recommendation that the Briemonians reduce the amount of cheese they eat. What is the impact of this recommendation on their economy?
 - c. As the economy of Briemonia becomes industrialized, what changes in the monetary system would you expect to see, and why?
2. Describe at least three ways you could pay for your morning cup of coffee. What are the advantages and disadvantages of each?
3. Explain how money encourages specialization, and how specialization improves everyone's standard of living.
- 4.* Could the dollar still function as the unit of account in a totally cashless society?
5. As of March 2007, 13 of the 27 countries of the European Union have adopted the euro. The remaining 14 countries, including Great Britain, Denmark, and Sweden have retained their own currencies. What are the advantages of a common currency for someone who is traveling through Europe?
6. Using the current level of M2 from the Federal Reserve's Web site, compute the quantity of money divided by the (approximate) population of the United States. Do you think that your answer is large? Why?
7. Using data from the Federal Reserve's Web site, compute the four-quarter percentage change in M1 and M2 since 1980. Use the data to reproduce Figure 2.3. Comment on the pattern over the last five years. Would it matter which of the two monetary aggregates you looked at?
8. Despite the efforts of the United States Treasury and the Secret Service, someone discovers a cheap way to counterfeit \$100 bills. What will be the impact of this discovery on the economy?
- 9.* You have decided to issue your own currency and use your computer to produce some impressive looking notes. What could you do to increase the chances of these notes being accepted as a means of payment?

*Indicates more difficult problems

10. Over a nine-year period in the 16th century, King Henry VIII reduced the silver content of the British pound to one-sixth its initial value. Why do you think he did so? What do you think happened to the use of pounds as a means of payment? If you held both the old and new pounds, which would you use first, and why?

Analytical Problems

11. Under what circumstances might you expect barter to reemerge in an economy that has fiat money as a means of payment?
12. You visit a tropical island that has only four goods in its economy—oranges, pineapples, coconuts, and bananas. There is no money in this economy.
 - a. Draw a grid showing all the prices for this economy. (You should check your answer using the $n(n - 1)/2$ formula where n is the number of goods.)
 - b. An islander suggests designating oranges as the means of payment and unit of account for the economy. How many prices would there be if her suggestion was followed?
 - c. Do you think the change suggested in b) is worth implementing? Why or why not?
13. Consider again the tropical island described in question 12. Under what circumstances would you recommend the issue of a paper currency by the government of the island? What advantages might this strategy have over the use of oranges as money?
14. What factors should you take into account when considering using the following assets as stores of value?
 - a. Real estate
 - b. Stocks
 - c. Government bonds
- 15.* Under what circumstances might money in the form of currency be the best option as a store of value?
- 16.* Consider an economy that only produces and consumes two goods—food and apparel. Suppose the inflation rate based on the consumer price index is higher during the year than that based on the GDP deflator. Assuming underlying tastes and preferences in the economy stay the same, what can you say about food and apparel price movements during the year?
17. Assuming no interest is paid on checking accounts, what would you expect to see happen to the relative growth rates of $M1$ and $M2$ if interest rates rose significantly?
18. If money growth is related to inflation, what would you expect to happen to the inflation rates of countries that join a monetary union and adopt a common currency such as the euro?