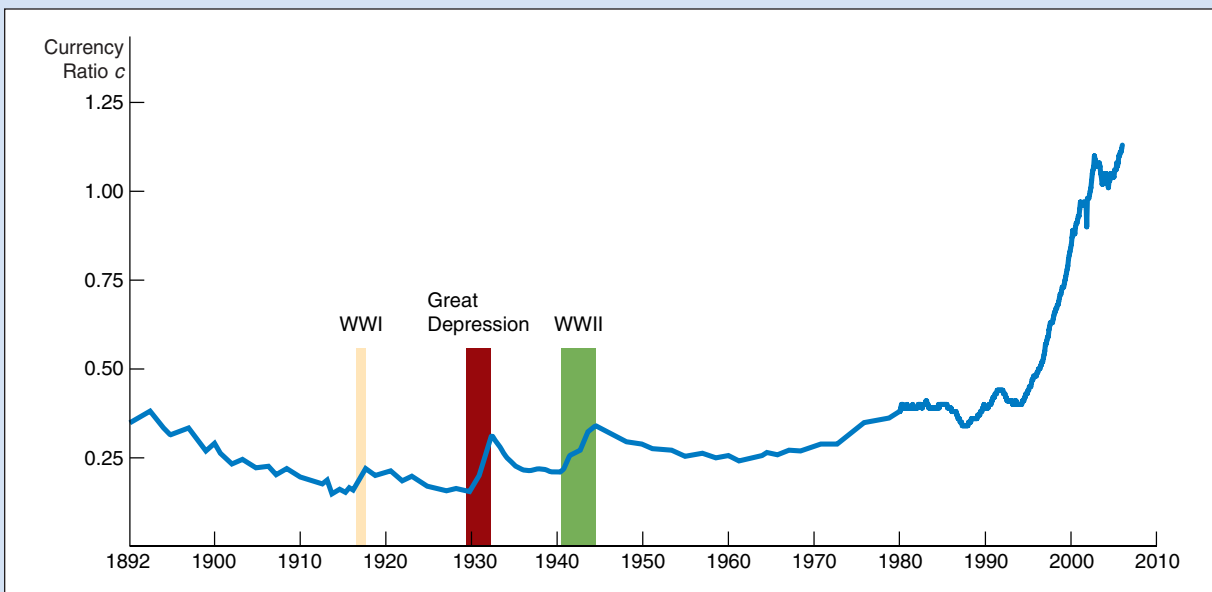


# 17 Explaining the Behavior of the Currency Ratio

The general outline of the movements of the currency ratio  $c$  since 1892 is shown in Figure 1. As you can see, several episodes stand out:

1. The declining trend in the ratio from 1892 until 1917, when the United States entered World War I
2. The sharp increase in the ratio during World War I and the decline thereafter
3. The steepest increase in the ratio that we see in the figure, which occurs during the Great Depression years from 1930 to 1933
4. The increase in the ratio during World War II
5. The reversal in the early 1960s of the downward trend in the ratio and the rise thereafter
6. The halt in the upward trend from 1980 to 1993
7. The upward trend from 1994 to 2005



**FIGURE 1** Currency-Checkable Deposits Ratio: 1892–2005

Sources: Federal Reserve Bulletin and Banking and Monetary Statistics. [www.federalreserve.gov/releases/h6/hist/h6hist1.txt](http://www.federalreserve.gov/releases/h6/hist/h6hist1.txt)

To be worthwhile, our analysis of  $c$  must be able to explain these movements. These movements, however, will help us develop the analysis because they provide clues to the factors that influence  $c$ .

A natural way to approach the analysis of the relative amount of assets (currency and checkable deposits) people want to hold, hence the currency-checkable deposits ratio, is to use the theory of asset demand developed in Chapter 5. Recall the theory states that four categories of factors influence the demand for an asset such as currency or checkable deposits: (1) the total resources available to individuals, that is, wealth; (2) the expected return on one asset relative to the expected return on alternative assets; (3) the degree of uncertainty or risk associated with the return from this asset relative to the alternative assets; and (4) the liquidity of one asset relative to alternative assets. Because risk and liquidity factors have not changed independently of wealth and expected returns and lead to similar conclusions on the historical movements of  $c$ , we will focus only on how factors affecting wealth and expected returns influence  $c$ .

### Effect of Changes in Wealth

What is the relative response of currency to checkable deposits when an individual's resources change? Currency is a necessity because it is used extensively by people with low incomes and little wealth, which means that the demand for currency grows proportionately less with accumulation of wealth. In contrast, checkable deposits are held by people with greater wealth, so checkable deposits are less of a necessity. Put another way, as wealth grows, the holdings of checkable deposits relative to the holdings of currency increase, and the amount of currency relative to checkable deposits falls, causing the currency ratio  $c$  to decline. A decrease in income will lead to an increase in the amount of currency relative to checkable deposits, causing  $c$  to increase. ***The currency ratio is negatively related to income or wealth.***

### Effect of Changes in Expected Returns

The second factor that influences the decision to hold currency versus checkable deposits involves the expected returns on the checkable deposits relative to currency and other assets. Four primary factors influence expected returns (and hence the currency ratio): interest rates on checkable deposits, the cost of acquiring currency, bank panics, and illegal activity.<sup>1</sup>

**Interest Rates on Checkable Deposits.** By its very nature, currency cannot pay interest. Yet banks can and do pay interest on checkable deposits. One measure of the expected return on checkable deposits relative to currency is the interest rate on checkable deposits. As this interest rate increases, the theory of asset demand tells us that people will want to hold less currency relative to checkable deposits, and  $c$  will fall. Conversely, a decline in this interest rate will cause  $c$  to rise. ***The currency ratio is negatively related to the interest rate paid on checkable deposits.***

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<sup>1</sup>Changes in interest rates on other alternative assets (such as U.S. Treasury bills) could have a differential effect on the demand for currency versus the checkable deposits, resulting in some effect on  $c$ . However, the evidence for this effect is weak.

Between 1933 and 1980, regulations prevented banks from paying interest on most checkable deposits,<sup>2</sup> and before 1933, these interest rates were low and did not undergo substantial fluctuations. However, since 1980, banks have been allowed to pay any interest rate they choose on checkable deposits, suggesting that fluctuations in these rates can now be an important factor influencing  $c$  movements.

**Cost of Acquiring Currency.** If currency is made easier to acquire, thereby lowering the cost of using it, then in effect its expected return rises relative to deposits and the currency ratio  $c$  should rise. **Lowering the cost of acquiring currency leads to a rise in the currency ratio.** The explosion of ATMs in recent years has indeed made it easier for depositors at banks to get their hands on currency and should thus have increased its use, raising  $c$ .

**Bank Panics.** Our discussion of interest-rate effects suggests that they did not have a substantial impact on  $c$  before 1980. You might conclude that expected returns have had little importance in determining this ratio for most of its history. Figure 1 provides us with a clue that we are overlooking an important factor when measuring expected returns solely by the interest rates on assets. The steepest rise in  $c$  occurred during the Great Depression years 1930–1933, when the banking system nearly collapsed. Legend has it that during this period, people stuffed their mattresses with cash rather than keep it in banks, because they had lost confidence in them as a safe haven for their hard-earned savings. Can the theory of asset demand explain this phenomenon?

A bank failure occurs when the bank is no longer able to pay back its depositors. Before creation of the FDIC in 1933, if you had an account at a bank that failed, you would suffer a substantial loss—you could not withdraw your savings and might receive only a small fraction of the value of your deposits sometime in the future. The simultaneous failure of many banks is called a *bank panic*, and the Great Depression years 1930–1933 witnessed the worst set of bank panics in U.S. history. From the end of 1930 to the bank holiday in March 1933, more than one-third of the banks in the United States failed.

Bank panics can have a devastating effect on the expected returns from holding deposits. When a bank is likely to fail during a bank panic, depositors know that if they have deposits in this bank, they are likely to suffer substantial losses, and the expected return on deposits can be negative. The theory of asset demand predicts that depositors will shift their holdings from checkable deposits to currency by withdrawing currency from their bank accounts, and  $c$  will rise. This is exactly what we see in Figure 1 during the bank panics of the Great Depression period 1930–1933 and to a lesser extent 1893 and 1907, when smaller-scale bank panics occurred. **The conclusion is that bank panics lead to a sharp increase in the currency ratio.** Bank panics have been an important source of fluctuations in this ratio in the past and could be important in the future.

**Illegal Activity.** Expected returns on checkable deposits relative to currency can also be affected by the amount of illegal activity conducted in an economy. U.S. law allows government prosecutors access to bank records when conducting a criminal

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<sup>2</sup>Although banks could not pay interest on checkable deposits, they provided services to their checking account customers that can be thought of as implicit interest payments. Because these services changed only slowly over time, these implicit interest payments were not a major factor causing the demand for checkable deposits to fluctuate.

investigation. So if you were engaged in some illegal activity, you would not conduct your transactions with checks, because they are traceable and therefore a potentially powerful piece of evidence against you. Currency, however, is much harder to trace. The expected return on currency relative to checkable deposits is higher when you are engaged in illegal transactions. Hence when illegal activity in a society increases, there is an increase in the use of currency relative to checkable deposits, and  $c$  rises. **There is a positive association between illegal activity and the currency ratio.**<sup>3</sup>

Looking at Figure 1, what types of increases in illegal activity would lead to an increase in  $c$ ? Beginning in the 1960s,  $c$  began to climb—just when the illegal drug trade began to experience phenomenal growth. Because illegal drug transactions are always carried out with currency, it is likely that the rise in drug trade is related to the rise in  $c$ . Supporting evidence is the current huge flow of currency into southern Florida, the major center for illegal drug importing in the United States.<sup>4</sup> Other illegal activities—prostitution, black markets, gambling, loan sharking, fencing of stolen goods, the employment of illegal aliens—could also be sources of a higher currency ratio.

Another interesting set of movements in  $c$  are the two increases during both world wars, which are associated with large increases in income taxes. Income taxes were raised substantially in 1917 to help finance America's entry into World War I. Although income tax rates were reduced after the war, they were again raised substantially during World War II to finance that conflict—never to return to prewar levels.

Increases in  $c$  when income tax rates rise can be explained in the following manner: Higher tax rates promote the evasion of taxes. When income tax rates rise, the incentive is high to evade taxes by conducting transactions in cash. If you receive an unreported cash payment for some service (for example, as a cab driver, waiter, or doctor), it is less likely that the Internal Revenue Service can prove that you are understating your income. If you are paid with a check or credit card, you would be wise to declare the income. The conclusion is clear: **Higher tax rates will lead to a rise in  $c$ .**

Not only does income tax evasion explain the rise in  $c$  during the two world wars, but it also helps explain the rise in the 1960s and 1970s. This may seem surprising because the income tax rate schedule was not raised during this period. However, the burden of income taxes was increasing because the American income tax system is progressive (as income increases, the tax rate rises). A rising price level in the 1960s and 1970s raised the nominal income and pushed more individuals into higher tax brackets (a phenomenon called *bracket creep*). This meant that the effective tax rate increased even though the tax schedule was unchanged. As a result, incentives increased to evade paying taxes by not declaring income, and people would avoid the use of checkable deposits. In other words, the expected return on checkable deposits fell, so  $c$  rose.

Increased tax evasion and other illegal activities not only reflect an increase in the currency ratio but also imply that more income will go unreported to the government.

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<sup>3</sup>One exception to this is an increase in street crime. Checkable deposits have the advantage over currency that if you are mugged, the loss from carrying checks is likely to be far less than the loss from carrying currency. So if muggings are on the rise, the expected return on currency will fall relative to the expected return on checkable deposits, and you would hold less currency relative to checkable deposits. The resulting negative association of the illegal activity of street crime and  $c$  is ignored in the text because it is not an important source of fluctuations in  $c$ .

<sup>4</sup>The Drug Enforcement Agency has estimated that the retail value of the illegal drug trade exceeds \$100 billion, making it one of the largest businesses in the United States. Evidence that the drug trade has affected  $c$  is found in Ralph C. Kimball, "Trends in the Use of Currency," *New England Economic Review*, September–October 1981, pp. 43–53.

The result is an understatement of statistics on economic activity such as gross domestic product (GDP), which measures the total production of goods and services in the economy.

This unreported economic activity has been labeled the *underground economy*. Evidence of its scope is the fact that the amount of currency for every man, woman, and child in the United States (as measured by currency in circulation in 2002 divided by the population) is around \$1,000. Very few people hold this amount of currency; the likelihood is that much is used to conduct transactions in the underground economy. Calculations of the size of the underground economy indicate that it may exceed 10% of total economic activity. If this is true, and unreported income could be taxed, America would solve its budget deficit problems overnight!

**Foreign Holdings of Currency.** In many foreign countries, particularly ones in which the confidence in their own currency is not always high—Russia being one example—people often like to hold large quantities of U.S. cash. Estimates indicate that over half of U.S. currency is held outside of the United States.

## APPLICATION Explaining the Historical Record of $c$

The interaction of historical data with the theory of asset demand has helped us identify the factors that influence the currency ratio. We have seen that the theory of asset demand developed in Chapter 5 can help us understand how these different factors influence  $c$ .

To put our analysis in perspective, let us proceed to explain the major movements of  $c$  in Figure 1 by time periods.

## STUDY GUIDE

An excellent way to test your understanding of the factors influencing  $c$  is to explain the movements in Figure 1 before reading this section of the text. This exercise will give you practice in using the ideas developed in the preceding discussion and should help make the abstract analysis clearer.

**1892–1917.** The general decline in  $c$  reflected in this period is explained by the increase in wealth. Because checkable deposits have a higher wealth elasticity than currency, the general trend of rising wealth over this span implies that the holdings of currency will grow more slowly than the holdings of checkable deposits, thus lowering  $c$ .

The upward blips in the ratio seen in 1893 and 1907 were due to bank panics, which temporarily reduced the expected return on checkable deposits and increased the risk—these factors led to a temporary increase in the holdings of currency relative to checkable deposits, temporarily increasing  $c$ .

**1917–1919.** The upward surge in  $c$  when America entered World War I is explained by the use of the income tax to help finance the war. The resulting attempts at tax evasion encouraged people to avoid the use of checks, which would make their income

visible to the IRS; put another way, the increased desire to avoid taxes lowered the expected return on checkable deposits, resulting in a lower demand for them. The resulting increase in the use of currency relative to checkable deposits raised  $c$ .

**1919–1921.** When income taxes were reduced after the war, the demand for currency relative to checkable deposits began to fall back toward its old level, and the rise in  $c$  that occurred during the war was reversed. However, a severe recession in 1920–1921 led to a decline in wealth along with an increased number of bank failures, both of which might have caused a rise in  $c$  at that time. The decline in wealth led to a decline in the demand for both currency and checkable deposits, but the higher wealth elasticity of checkable deposits meant that they declined more than currency, raising the currency ratio. The increased number of bank failures also made checkable deposits less desirable because it lowered their expected return, also leading to a rise in  $c$ .

**1921–1929.** During the prosperous period of the Roaring Twenties, we would expect to see the downward trend in  $c$  reasserting itself. The rise in wealth would lead to a fall in  $c$  because the holdings of currency would grow more slowly than the holdings of checkable deposits.

**1929–1933.** The decline in income during the Great Depression was one factor in the rise in  $c$ , but far more important were the bank panics that began in late 1930 and ended in March 1933. The consequent sharp rise in  $c$  from 1930 to 1933 was a major factor in the financial and economic collapse. These panics (the most severe in all of U.S. history) lowered the expected return on deposits, thereby raising the demand for currency relative to checkable deposits.

**1933–1941.** With the end of the bank panics and some restoration of the confidence in banks (helped by establishment of the FDIC),  $c$  fell. This decline was strengthened by a rise in wealth. However,  $c$  did not return to pre-Depression levels, primarily because a loss of confidence in the U.S. banking system lingered in the public mind. As a result, expected returns on deposits did not return to their pre-Depression levels, leaving a high level of  $c$ .

**1941–1945.** When income tax rates were raised to unprecedented levels to finance combat in World War II,  $c$  underwent a substantial rise. The incentive to evade taxes was especially strong; hence the expected return on checkable deposits fell. Price controls imposed during the war may also have contributed to the rise in  $c$  because they stimulated black market activity, whose transactions could be hidden using currency.

**1945–Early 1960s.** After the war, income tax rates were reduced slightly, but not to anywhere near their prewar levels. Income taxes remained at permanently higher levels because of the revenue needed to support an expanded role for the U.S. military as the “world’s police force” and enlarged social programs such as welfare, unemployment insurance, housing and urban development, and Social Security. Although some decline in  $c$  occurred after the war due to a reduction in tax rates, permanently higher income tax rates left strong incentives for tax evasion, and  $c$  remained high. The steady rise in wealth after the war promoted the return to a declining trend in  $c$ , but its effect was not sufficiently strong to reduce the ratio below prewar levels.

**Early 1960s–1980.** The declining trend beginning at the end of World War II began to reverse in the early 1960s for a number of reasons. Most important was the growth of the underground economy, both because of the spectacular rise in illegal drug trade and because of the increased desirability of evading taxes due to bracket creep, which raised the effective tax rates. The increase in illegal activity lowered the expected return on checkable deposits, leading to an increased use of currency in relation to checkable deposits, thereby raising  $c$ .

**1980–1993.** A halt in the upward trend in  $c$  can be attributed to the deregulation of the banking system that allowed banks to pay interest on checkable deposits. This raised the expected return on checkable deposits relative to currency, and the resulting reduced demand for currency helped lower  $c$ .

**1994–2005.** The upward trend in  $c$  can be explained by the increasing holdings of U.S. currency by foreigners. Another factor is the explosion in the number of ATMs starting in the 1990s, which has been discussed in Chapter 10. The increase in the number of ATMs has dramatically lowered the cost of acquiring currency and this has, in effect, raised the expected return on currency relative to deposits, thereby raising  $c$ .

## APPLICATION Predicting the Future of $c$

A good economic model not only explains the past but also helps predict the response of economic variables to new events. The analysis of factors that influence the currency ratio outlined here has this capability. Let us consider two possible changes in the economic environment of the future and ask what our analysis would predict will happen to the currency ratio as a result. These predictions could be of interest to policymakers, who would want to know how the money supply might be affected in each of these cases.

## STUDY GUIDE

Try to provide the reasoning for the predictions here without having to refer to the text. This will give you excellent practice with the economic analysis of  $c$  that we have developed in this chapter. You can get additional practice by answering problems at the end of the chapter, which also ask you to predict future movements in  $c$ .

### Rise in Income Tax Rates to Balance the Budget

Much talk is circulating about balancing the budget by increasing taxes. What would happen to the currency ratio if income taxes were raised?

Higher tax rates would increase the incentives to evade taxes. The expected return on checkable deposits would then effectively decline. The use of currency would increase relative to checkable deposits (if other factors are held constant), and we would predict a rise in  $c$ .

### Abolishment of Interest Payments on Checking Accounts

There have always been swings back and forth from deregulation to increased regulation. What if the present tide of deregulation were reversed and regulations were imposed that returned us to the situation when banks were not allowed to pay interest on checkable deposits? What would happen to the currency ratio in this case?

This policy would mean that the expected return on checkable deposits would fall below its current level, and the expected return on checkable deposits relative to currency would also fall. The resulting decreased attractiveness of checkable deposits relative to currency would mean that holdings of currency relative to checkable deposits would increase, raising  $c$ .

The usefulness of the foregoing analysis is not restricted to the predictions of the response of  $c$  to the events discussed here. With this framework, many other possible changes in our economic environment that would have an impact on  $c$  can be analyzed. (A few are discussed in the problems at the end of the chapter.)

