

United States¹

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The financial history of the United States has received considerable attention from the research and statistical communities and a considerable volume of economic statistics with a lengthy historical component is available. That is especially true for financial statistics. Moreover, through the efforts of researchers, more statistics are being added on a regular basis. These statistics are stored in a variety of locations and repositories.

While there are great benefits to lengthy historical series, one must also be cautious in using them, as discussed in Borio et al (2022), Chapter 1. The size, liquidity and nature of various financial markets have evolved over time. Different regulatory regimes have affected the series and how they relate to each other and to the US economy as a whole.

In considering many of the monetary and financial statistics in the United States, a useful reference point is the founding of the Federal Reserve in 1913. The establishment of this central bank, as well as nearly coincident developments in the US Treasury securities market associated with financing needs related to World War I, helped reshape money markets and the market for US government debt. The needs of the Federal Reserve to understand the economy and track developments in the banking sector also reshaped banking statistics. Certainly banking, money market and government debt markets existed prior to the Federal Reserve and it is helpful to understand how these markets evolved prior to the establishment of the central bank. However, these earlier statistics are less a focus of this chapter.

Statistics on house prices are of a somewhat different nature. The very local nature of housing markets and data associated with land sales have posed challenges in constructing long-run house price indices. Consequently, the discussion of house price indices covers a much more recent period.

This chapter focuses on statistics that are generally publicly available. Nearly all these statistics may be found in the Federal Reserve Economic Data (FRED) repository maintained by the Federal Reserve Bank of St Louis or in the National Bureau of Economic Research (NBER) public use database.

1. Background

1.1 General background

An important driver of financial development in the United States was the westward migration of the population. The population was most densely settled on the Atlantic seaboard when the country was founded in 1776 but spanned the continent by the end of the 19th century. (Of course, in addition to financial development, this

¹ The material discussed in this chapter represents the views of the author and does not indicate concurrence either by other members of the Board's staff or by the Board of Governors.

migration also had tremendous effects on the indigenous populations, immigration and many other aspects of society.) The need to finance this migration and the associated infrastructure involved public and private debt issuance as well as the establishment of numerous new banks and other financial institutions to address the need of the migrating population. These needs only intensified over the course of the 1800s, with the enormous amounts of capital required by the advent of the railroad as well as the construction of new rail lines and towns along the railroad.

The United States has a federalist structure that splits power between the national government and governance of the states. One important power that resides at the state level is the ability to charter businesses, including financial businesses. States then oversee many of the rules regarding how these businesses operate. The national government also has the authority to charter banks, associated with its ability to coin money, and to oversee interstate commerce including financial activities that cross state lines. These overlapping authorities have been important in shaping the financial institutions, markets and the regulatory environment.

In the early years of the republic, the federal government played a much smaller role than is the case today. The federal government also operated with only a modest amount, if any, of debt outstanding. The first event to change that was the Civil War of the 1860s. Fighting the war required a significant expansion of the federal bureaucracy and the need to finance it had a significant effect on the financial structure. A further expansion of the role of the federal government occurred with Franklin Roosevelt's "New Deal" in the 1930s to respond to the Great Depression. Both of these events, in addition to the founding of the Federal Reserve, had notable effects on financial institutions and financial markets and, correspondingly, financial statistics.

1.2 Financial background

The Federal Reserve was not necessarily the first experiment in the United States with central banking. The First Bank of the United States was chartered by the US Congress in 1791 and operated for 20 years. The Second Bank was chartered in 1816 and also lasted for 20 years. Both these institutions have been characterised as "proto-central banks"; they were private institutions but carried out many functions typically associated with central banks.² Following the demise of the Second Bank of the United States in 1836, it was nearly 80 years before another central bank was established.

The period from 1837 to 1863 is known as the "Free Banking" era. It was so known because, at least in some states, entry into banking was freely allowed if investors raised a certain amount of equity and met other registration requirements set by the state. (Elsewhere, each new bank charter required a separate act of the state legislature.) All banks were chartered by state governments. Banks were allowed to issue their own bank notes, which in many cases was their main liability. Banks were required to hold collateral against their notes, typically state government bonds or real estate securities held in a security account with the state banking authority. Near to the bank's home office, where the notes could be redeemed for specie, the bank notes circulated at par. Farther away, these bank notes typically circulated at a

² For details of how these institutions operated, see eg Goodhart (1988), Krooss (1960) and Cowen (2000).

discount; sometimes that discount was small but at other times, such as during stress periods, it could have been quite large.

With the Civil War, the need to finance that war, and a desire to bring stability and uniformity to the bank notes circulating, the Federal government returned to the bank chartering process. Banks chartered by the national government were known as national banks. Correspondingly, the period from 1863 to 1913 is known as the National Banking Era. National banks could issue national bank notes, but these notes had to be (over)collateralised with holdings of US government bonds and the notes were redeemable with the US Treasury for specie. Hence these notes were effectively fully backed by the US government and they circulated at par. State banks still existed, but the taxes placed on their notes resulted in those notes disappearing from circulation and state banks had to find alternative business models.³ For most of the national banking era, the US was on the gold standard.

In part due to the Federalist system, banks in the United States have tended to be small. For instance, states generally prohibited out-of-state banks from operating across state lines. There was also a preference for having local control of banks so that widespread branching was historically quite limited (see Calomiris and Haber (2014)).⁴ Because of the limited size of banks, but the larger financing needs of businesses with the westward migration and increasing industrialisation in the United States, there was a strong push to develop larger capital markets. Several regional stock exchanges emerged and the US corporate bond market became an important source of financing.⁵

Following the Panic of 1907, the United States chartered the Federal Reserve. The Federal Reserve issued a new form of money, Federal Reserve notes, in a more elastic manner, subject to certain constraints related to the gold standard, so that the money supply could expand and contract to meet seasonal demands as well as address the periodic panics that afflicted the country's financial stability. (National bank notes were retired through a gradual process.) One way that the money supply might expand was for banks to borrow at the Federal Reserve's discount window.

At first, national bank notes and later Federal Reserve notes were the dominant currencies. At various times, other paper currencies also circulated and their convertibility to specie or precious metals at times raised interesting questions. One notable example is the issuance during the Civil War by the US government of "greenback dollars" that could be used to pay obligations to the US government, such

³ As a side note, this tax expired in the late 20th century.

⁴ Banking laws in the states were also shaped by local needs. For instance, less initial investment was typically needed to establish state-chartered banks in states populated with large numbers of smaller rural cities and the laws in such states were more supportive of lending against real estate. National banks tended to face the strictest regulations but then tended to be viewed as higher quality. Thus, the choice of charter type was an important decision for aspiring bankers (see White (1983)).

⁵ One of the reasons that there are so many banks in the United States is that, for much of the country's history, banks faced substantial restrictions on establishing branches such that banks were confined to a single office. Some states did allow some branching within a state, but interstate branching was still generally prohibited. Banks attempted to circumvent these rules by establishing bank holding companies in which a non-bank company was set up to own banks in multiple locations; this allowed an imperfect form of branching. During the 1980s, there was a movement among states to enter into reciprocity agreements in which states would mutually remove restrictions on branches from the other state. The Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 removed many remaining restrictions. As a result of the removal of the restrictions on branching, there was a notable consolidation of the banking sector during the 1980s and 1990s.

as customs duties, but were not redeemable for specie. The discount of these greenback dollars to specie has been used by scholars as an indication about the credibility of the government's finances (see, for instance, Calomiris (1992)). As another example, from the 1870s until the 1960s, the US Treasury issued silver certificates that were redeemable in silver. For details of the history of money in the United States, readers are referred to the excellent history by Friedman and Schwarz (1963) as well as academic studies of particular issues.

When the Federal Reserve was established, the United States was on the gold standard and the Federal Reserve had a gold reserve requirement (among other requirements) associated with the notes that it issued. There were concerns about the credibility of that gold peg in the early 1930s and there was effectively a run on the US dollar in early 1933. Gold clauses in financial contracts were voided. At that point, the dollar revalued with respect to gold and convertibility was reserved mainly for official international transactions. There were a variety of legal challenges to the voiding of the gold clauses that were only resolved in 1935 by the US Supreme Court. The associated legal uncertainty may have had notable impacts on the value of US securities, especially those issued by the US Treasury. The revalued US peg to gold subsequently underpinned Bretton Woods monetary system and persisted until the 1970s.

In addition to changes to the gold standard, there were a variety of other changes to financial market regulation in the early 1930s. Nationwide deposit insurance was established and a new federal bank regulator, the Federal Deposit Insurance Corporation (FDIC), was introduced. Commercial banks (ie the business of making loans) were required to separate from investment banks (underwriting securities issues). Additional securities regulations were introduced to govern the rules regarding securities offerings and investment vehicles, and a new securities regulator, the Securities and Exchange Commission (SEC), was added.

These new regulations resulted in a relatively sedate financial system for some time. New financial vehicles arose to take advantage of the new rules. In time, especially as interest rates rose in the 1970s amid higher inflation, some of these new vehicles became particularly attractive as a way of getting around financial regulations and some of the walls between different types of financial institution began to erode. Financial holding companies, which utilised state business charters, enabled some financial institutions to engage in a variety of previously prohibited activities. To provide clarity and adapt the regulatory landscape to the evolving situation, Congress passed legislation deregulating the financial services industry. Some of this deregulation allowed consolidation and rationalisation of businesses, and permitted large financial institutions that were more globally competitive and able to provide their customers with a broad suite of financial services. Other deregulations resulted in considerable risk-taking and some disastrous outcomes (such as the Savings and Loan Crisis; see FDIC (1997)).

2. Credit

Many types of financial institution are involved in providing credit to businesses and households in the United States. As noted in Borio et al (2022), Chapter 3, measuring credit often starts with considering the financial institutions where statistics are most readily accessible. In the United States, such statistics are most widely available for

commercial banks. There are, of course, a myriad of other financial companies in the United States and it is important to acknowledge these institutions as well. The most comprehensive assessment of credit extended in the United States is the flow of funds accounts.

2.1 Banking

As noted above, both the federal government and the state governments were able to charter banks. When the national government returned to chartering banks in the 1860s, it required the banks to submit periodic balance sheet reports. These balance sheet reports were for (up to five) random days during the year; because banks could be called on to provide the information at any time, the reports were referred to as the Call Reports (they are also referred to as the “Reports of Condition” because they provide information about the bank’s condition). The banks had to publish an abbreviated version of the report in local newspapers and the bank examiners verified the numbers that the banks provided during the examination process. The Comptroller would select one of these dates (usually a fall submission) and publish the call report for each individual national bank in his annual report.

When the Federal Reserve was established, the national banks were required to join the Federal Reserve system. To ease reporting burdens on the banks, the frequency of Call Reports was reduced to four, or sometimes three, reports per year. Subsequently, their timing was changed so that they were to be submitted with quarter-end information. Finally, as increased computing power added to record-keeping abilities and to prevent window-dressing, banks were also required to submit quarterly average information in addition to quarter-end information.

The information in the Call Report evolved over time. For instance, the level of detail about the types of loan has evolved. At first all loans were grouped together, but later this category was separated into business, residential real estate, commercial real estate, and consumer loans.

The experience of state chartered banks varies considerably across states. Some states had active supervisory agencies and substantive bank reporting requirements from a very early time. Other states had one or the other. A few states had neither until after 1900. States with reporting requirements might publish annual information, or biannual, or biennial information. And reporting frequency might change over time. Thus information about the credit extended by state chartered banks is not as comprehensive until much later than is the case for national banks.

While national banks were required to join the Federal Reserve system, state banks had the option to join.⁶ Those that did were required to complete Call Report forms. Banks that became members of the FDIC were required to file Call Report information; as nearly all banks became FDIC members, Call Report data are now available for all banks.

⁶ When the Federal Reserve was established, it interacted mainly with member banks and had much less connection to non-member banks. For instance, only member banks were subject to the reserve requirements set by the Federal Reserve (although state regulators could set their own reserve requirements) and only member banks had access to the discount window. The Depository Institutions Deregulation and Monetary Control Act of 1980 forced all banks to comply with the Fed’s rules on reserve requirements but also gave all depository institutions access to the discount window (and other Fed services, such as payments).

To monitor bank conditions, the Federal Reserve began to collect high-frequency information on banks. Credit provided by commercial banks based on reports of some banks and extrapolated to the entire banking sector has been available on a weekly basis since 1947 from the Federal Reserve's FRED data repository (the sample is regularly benchmarked to the call report). Some care needs to be exercised to ensure a consistent sample is used. Prior to this year, abbreviated balance sheet information for "weekly reporting member banks" in the 100 largest cities is available from the Banking and Monetary Statistics (<https://fraser.stlouisfed.org/title/38>) back to 1919; these data have not yet been digitised.

Recent banking industry aggregate data at an annual or call report frequency may be found on the websites of the FDIC and the Federal Reserve. Data prior to what is available electronically may be found at an annual frequency from 1896 in the "All-Bank Statistics, 1896–1955" published by the Federal Reserve in 1959 or in the Banking and Monetary Statistics volumes published by the Federal Reserve. Copies of these publications are available in the Federal Reserve's FRASER document repository.

Prior to 1896, data on national and state level aggregates of credit extended by banks with national charters are available at the Call Report frequency back to around 1870 in the Annual Reports of the Comptroller of the Currency. These reports are available from the Federal Reserve Bank of St. Louis (<https://fraser.stlouisfed.org/title/56>). (Warren Weber digitised this information from 1880 to 1910; the data are available from the Federal Reserve Bank of Minneapolis.) The Comptroller periodically provided some information on state banks, but the quality of this information is uncertain. Various state banks provided information on their banks, but this is typically available only in print, if at all.

Also prior to 1896, there were bankers' directories that listed most banks in the United States (these directories were used for payment routing and so it was advantageous for banks to submit their information). Banks were able to voluntarily submit information, which included some balance sheet characteristics. While these have not been digitised, this might provide additional information about credit extended by banks.

2.2 Non-bank financial companies

Non-banks have been important financial intermediaries in the United States. Part of that reflects the smaller size of the banks and the correspondingly greater importance of capital markets, and thus financial institutions involved in underwriting, trading or holding these securities. Other reasons for the growth of non-bank financial companies include regulations that created incentives for these firms to expand their operations.

One example of this regulation is the Banking Act of 1933, also referred to as the Glass-Steagall Act, which was an important part of the New Deal legislation that reshaped the banking industry during the Great Depression. Prior to this legislation, banks could operate broker-dealers either in house or as affiliates. This Act separated institutions that were doing commercial banking from those engaged in investment banking or other activities, such as insurance-taking. This law was enacted owing to the perception that, during the stock market and asset price boom in the 1920s, banks had engaged in suspect underwriting activities. Slowly banks found ways around these restrictions, partly through the use of holding company structures and partly

by taking advantage of exemptions that allowed them to engage in *de minimis* amounts of investment banking and other financial service activities. The Gramm-Leach-Bliley Financial Services Modernization Act of 1999 removed the restrictions on combining various financial services within one company.

Another provision of the Banking Act of 1933 allowed the Federal Reserve to impose interest rate ceilings on various types of bank deposit. These restrictions were imposed through Regulation Q. Amid rising inflation in the late 1960s and the 1970s, short-term interest rates sometimes rose above the ceilings imposed by Regulation Q. That dynamic helped promote the rise of the Eurodollar market. (As the Eurodollar market was located offshore, it was not subject to the regulations on interest rates.) This dynamic also boosted the growth of the money market mutual fund industry, which could hold money market instruments that were not subject to the interest rate ceilings and could provide limited payment options. Interest rate ceilings on all types of deposit account, except demand accounts, were eliminated in the 1980s with the Depository Institutions Deregulation and Monetary Control Act of 1980.

Two types of deposit-taking institution that have existed alongside banks but are differently regulated include thrifts and credit unions. Thrift institutions, which include building and loan societies and savings and loan societies, historically offered deposit or deposit-like contracts and made residential mortgages. They have periodically gotten into serious trouble given the concentrated nature of their portfolios. The first time was in the Great Depression, when residential real estate prices collapsed. More recently, many institutions of this type failed in the late 1980s and early 1990s. Credit unions, which tend to be smaller, are mutually owned institutions that take deposits from their members and make loans to them. Membership is restricted to individuals with some common characteristic such as an employer, industry or community. Data on these institutions are collected through reports quite similar to the call report, but these are not necessarily as easily accessible.

Broker-dealers are financial intermediaries that are heavily involved in the smooth operations of capital markets. They are important in underwriting the initial offerings of both equity and debt securities and in promoting secondary markets in these securities. They promote the functioning of secondary markets by acting as market-makers and either maintaining an inventory of securities or facilitating the matching of buyers and sellers. Broker-dealers also promote secondary market functioning by extending credit to financial market participants that enable those other participants to trade. Prior to the 2007–09 financial crisis, there were a number of large standalone broker-dealers; since the crisis, many of these have either closed or reorganised into bank holding companies. A large number of smaller broker-dealers still exist as standalone entities. Broker-dealers are regulated by the SEC and file quarterly reports.

Mutual funds are institutions that facilitate access to the money and capital markets. Rather than offering debt contracts, these institutions sell shares in a pool of assets. The value of the shares typically fluctuates with the value of the underlying assets held by the mutual funds. Most mutual funds invest in one type of instrument, such as equity securities, corporate debt securities, municipal debt securities or syndicated loans, but there are some funds that invest in multiple asset classes. Money market mutual funds (MMMFs) are firms that invest only in money market instruments; these funds also offer some limited payment services. Mutual funds are

regulated by the SEC and make available information on their asset holdings as well as the returns earned by investors and the fees charged by the managers.⁷

2.3 Flow of funds

The most comprehensive source of data on private sector credit – in terms of both borrowing by different sectors and lending by different sectors – is from the Federal Reserve’s flow of funds database (Financial Accounts of the United States – Z.1 statistical release). These data are available from the Board of Governors website at www.federalreserve.gov/releases/z1/current/default.htm. Many of the underlying series are also available from FRED. These data include information on the levels and changes in financial assets and liabilities, by sector and financial instrument; full balance sheets, including net worth, for households and nonprofit organizations, nonfinancial corporate businesses, and nonfinancial noncorporate businesses. These data are available at a quarterly frequency from 1945 to present.

3. Interest rates

3.1 Money market rates

Since the Federal Reserve was established, it has provided a liquidity backstop to the commercial banking sector by discounting paper or making collateralised advances through the discount window. When the Federal Reserve was established, the discount rate, the rate charged by the Federal Reserve when extending discount window credit, was expected to be the main way in which the Federal Reserve would influence money market conditions. While this tool was subsequently surpassed in importance as a policy tool by the open market operation purchases and sales of government securities, it has been important for shaping money market conditions.

Each of the 12 Reserve Banks oversees the operation of their own discount window operations. In the very early years, the Reserve Banks posted multiple discount rates that varied by maturity and included a preferential rate for advances secured by US government securities.⁸ During the early 1920s, the Reserve Banks adjusted the way they operated the discount window so that they each offered a single rate, although these rates typically differed across Reserve Bank. The rate on the discount window loans at this time was typically in line with market rates on short-term paper, although well above deposit rates. Following the Great Depression, the discount rate has been quite uniform across the Reserve Banks.

When the Federal Reserve was established, only a limited set of instruments was allowed to serve as collateral. That set was broadened in 1932, although the discount rate when borrowing against this expanded set of collateral was higher. When the US economy emerged from the Great Depression, the discount window rate served as a

⁷ There are of course many other types of non-bank financial company, including, but certainly not limited to, insurance companies, pension funds, hedge funds and private banks. Some of these are noted in Borio et al (2022), Chapter 3.

⁸ A few Reserve Banks also experimented with graduated rates in which higher discount window rates were charged when banks borrowed more (see Hackley (1973)).

ceiling on some short-term rates, such as the federal funds rate (see below), but not all money market rates. Concerns about the use of the discount window led Federal Reserve officials to discourage its use and, in the mid-1960s, the discount rate stopped being an effective ceiling on money market rates and use of the discount window diminished. For a detailed history of the discount window through this period, see Hackley (1973).

In 2003, the discount window was restructured to return it to an above-market rate. This restructuring set up two discount window lending programmes.⁹ The first – primary credit – is available to depository institutions in sound financial condition. The other – secondary credit – is available to depository institutions not eligible for primary credit. The rate on primary credit was initially set at a spread of 100 basis points to the Federal Reserve’s target for the federal funds rate. That spread has subsequently been revised several times. The rate on secondary credit is set 50 basis points higher than the rate on primary credit.

In 2008, the Federal Reserve was permitted to pay interest on reserves held by depository institutions and began offering overnight reverse repo operations. These rates served to provide a floor on most money market rates. In 2021, the Federal Reserve introduced a standing repo facility which, along with the discount rate, should help provide a ceiling on money market rates. Information on all these administered rates is available in FRED and, for the early years, in the Banking and Monetary Statistics.

To meet their reserve requirements, banks need to hold a certain amount of funds in their accounts at the Federal Reserve (or as vault cash). Such funds are referred to as “federal funds”. Banks also use these funds to process payments. Banks can lend and borrow federal funds to and from each other if the banks find that they have more funds or less funds than they would prefer; the federal funds rate is the interest rate on this borrowing and lending. The federal funds market started in the 1920s as a way to arbitrage differences in the discount window rates between the various Federal Reserve Banks (see Anbil et al (2020)). After fading during the 1930s amid abundant reserves, this market grew rapidly in the 1950s. By buying and selling Treasury securities, the Federal Reserve could affect the supply of reserves in the system and, with demand for reserves being fairly predictable in the short run, the price of reserves. Since the 1950s, the federal funds rate has been an important element of monetary policy decisions and, in the late 1980s or early 1990s, the federal funds rate became an explicit target for policy-setting (see Muelendyke (1989), Lindsey (2003)). Data on the history of the effective federal funds rate are available on FRED; data prior to 1951 reflect quotes in the Wall Street Journal as described in Anbil et al (2020), while subsequent quotes reflect data compiled by the Federal Reserve Bank of New York.

The “repo” market is another important money market in which a lender provides cash and is sold a security with the understanding that at the maturity of the contract, the security will be returned for the same amount of cash plus interest. There is a bilateral market where dealers lend to investors, such as hedge funds, and a tri-party market where dealers borrow from investors, such as money market funds. The securities used in repo contracts are often high-quality debt instruments, such as Treasury securities, but may also consist of a wide range of securities. This market is

⁹ A third lending programme, seasonal credit, is available to smaller institutions with large seasonal credit needs.

also continuing to evolve (see, for instance, Copeland et al (2021)). As noted in Borio et al (2022), Chapter 2, this money market, while important, generally received less attention prior to the global financial crisis. Rates specific to the repo market have only become available recently, with rates in FRED database extending back only to 2018. The lack of information on repo rates in earlier years is an important gap.

When the Federal Reserve was founded, the largest and most liquid money market was the call loan market. This market allowed brokers and dealers to borrow overnight, or at term, using high-quality equity securities. Many loans were rolled over from day to day, but the loans could be “called” by the lender on any particular day. In that case, the borrower would need to repay the lender and find another one. This market declined notably in volume during the 1930s. The rate was mostly a market rate, although in some periods of stress the official rate was set by the money desk at the New York Stock Exchange (see Anbil et al (2020)). While high-quality securities were used as collateral in this market, there was an element of risk that sometimes resulted in this rate rising notably (see Rappoport and White (1993)). Call loan rates, based on reports from the New York Stock Exchange, are available from the NBER and from FRED.

The commercial paper market has been an important money market since the late 19th century, but has changed considerably over time. At first it consisted mostly of unsecured short-term paper issued by mid-size non-financial companies that were rated as high-quality by rating agencies (see Beckhart (1932)). In the early 20th century, some non-bank financial companies began to use this market to finance their operations. The overall size of the commercial paper market diminished in the 1930s, but began to rebound in the 1950s. This rebound was driven by financial companies. Some of this paper was underwritten by investment banks while other segments by frequent issuers could be issued directly to investors; interest rates in these segments of the market could differ. Large high-quality non-financial companies began to return to this market in the late 1970s. All of this commercial paper was unsecured. The most recent variant of commercial paper is asset-backed commercial paper (ABCP), which is commercial paper issued by a special purpose vehicle (SPV) whose only assets are financial contracts (such as credit card loans or auto loans); the holder of the ABCP have specified recourse to the assets of the SPV in the event of a default; see Stigum (2007) for a review of this money market. Information on interest rates in the commercial paper market may be found in FRED, the website of the Board of Governors, and the Banking and Monetary Statistics. Given the evolution of this market, extreme care needs to be exercised in comparing rates over time. Rates since 1991 reflect data provided to the Federal Reserve by the Digital Trust and Clearing Corporation. Rates prior to that represent dealer quotes collected by the Federal Reserve Bank of New York or published in newspapers.

The final money market discussed here is the market for Treasury bills. These instruments are discount securities that were first offered by the Treasury in 1929. (Prior to that time, the Treasury had offered short-term certificates which were coupon securities that typically had maturities of about a year.) Early Treasury bills had maturities of 13 weeks, but the range of maturities was subsequently expanded to include four-week, 26-week, and 52-week bills. Issuance was ad hoc at first but quickly settled into regular issuance patterns. There are also irregular issues of cash management bills with varying maturities.

Treasury bills have some features that make them a fairly distinct asset class. While most money market instruments are available to a limited set of investors

(depository institutions and some government agencies for federal funds, institutional investors for commercial paper) a very wide range of investors can purchase Treasury bills. Thus, some market segmentation occurs and the rate on Treasury bills will sometimes diverge from other money market rates. The pattern of tax receipts has a notable effect on Treasury bill issuance and bill rates. Also of note, from 1942 until 1951, the Federal Reserve pegged the rate on Treasury bills to be three eighths of a percent (see Anbil et al 2020), which allowed the US Treasury to influence monetary conditions through its decisions on bill issuance. The end of this peg with the Federal Reserve-Treasury Accord marked a return to central bank independence. Rates on Treasury bills are available in FRED or in Banking and Monetary Statistics and reflect quotations compiled by the Federal Reserve Bank of New York from dealers in US Government securities.

3.2 Long-term government rates

United States Treasury securities are a high-quality liquid security and have often provided a benchmark against which the yields on other securities are measured. Thus, as discussed in Borio et al (2022), Chapter 2, a historical time series of yields on these securities is of particular value. However, these securities also have a long and complex history and their role as a benchmark has evolved over time.

The increase in issuance of US government securities associated with World War I marks an important turning point. A large amount of debt was issued to finance the war effort. While some of this was subsequently repaid, there was still a considerable amount of debt outstanding at the time when additional issuance was needed to finance New Deal spending programmes and then to finance the war effort during World War II. The amount of Treasury debt outstanding and a wide investor base has been sufficient to create a relatively deep and liquid market subsequently (a detailed history of the growth of this market may be found in Garbade (2012)).¹⁰

Efforts to broaden the investor base have led to refinements in the market over time. Efforts to finance the wars resulted in widespread funding drives where many bonds were held by small investors. Efforts to refinance debts for a substantial part of the 20th century involved underwriting campaigns and efforts to convince investors to purchase the securities. These efforts sometimes led to newly issued securities having interest rates that were slightly off the existing yield curve and yields of outstanding securities had to adjust (one of the more memorable campaigns was for the "Magic 5s" offered in 1959). Sometimes holders of existing Treasury securities were given special preference during refinancing drives, which could lead to negative yields on securities nearing maturity (see Cecchetti (1988)).

Shifts to regular issuance and transparent pricing also helped expand the investor base and boosted market liquidity (see Garbade (2007, 2021)). For instance, in 1974, the Treasury adopted a Dutch auction pricing arrangement for issuing new securities. In the early 1980s, auctions of longer-term securities become more regular and predictable. These developments also gave rise to particular features of the market where the on-the-run (mostly recently issued) security trades at a premium and has the highest liquidity. This on-the-run premium is often used as a measure of

¹⁰ Although during some periods, high-quality corporate securities were the preferred market benchmark.

overall market liquidity. On-the-run securities are often excluded when constructing fitted yield curves.

Other developments have also affected Treasury yield prices. For instance, many Treasury securities issued prior to 1933 featured a gold clause in which repayment in gold could be demanded by the holder of the security, as noted above (and in Edwards (2018) and Borio et al (2022), Chapter 2). Legal uncertainty about the validity of these gold clauses in the wake of US government actions influenced the price of these securities until 1935. From 1942 until 1947, the Federal Reserve established various interest rate ceilings on Treasury securities that also affected their price.

A considerable amount of data exists on the yields and prices of US Treasury securities. Data from a fitted yield curve are available daily from 1961 to present from the Board of Governors.¹¹ Of particular interest may be the yield on the 10-year Treasury which is often cited as a benchmark. Estimates of constant maturity yields for selected points on the yield curve are available on FRED from 1953 onwards. Bond yields on a monthly basis using an unweighted average of yields on government bonds with at least eight years to callable maturity are available in the Banking and Monetary Statistics for the period 1919–53. Data on individual bonds may be found at the privately funded Center for Research in Security Prices (www.crsp.com/products/research-products/crsp-us-treasury-database). These data include month-end prices of individual securities from 1925 to present and daily prices from 1961 to present.

Quotes from 1919 to 1953 are typically from a Treasury Department Circular titled “Market Prices and Investment Values of Outstanding Securities”. Prices in the early years reflect prices quoted at 10:30 am on the New York Stock Exchange (which in these early years also oversaw active bond trading). As the market migrated from the stock exchange to the over-the-counter market, the quote in this circular similarly shifted. By the early 1930s the quotes reflect prices compiled by the Federal Reserve Bank of New York from dealers in US government securities. Modern quotes similarly reflect data compiled by the Federal Reserve Bank of New York.

Prior to World War I, US government securities were less consistently available in the market and these securities often had idiosyncratic features (for instance, there were variations in call options on these securities and some promised payment in gold while others promised payment in greenback dollars, with the exchange rate between greenbacks and gold coin fluctuating over time). These idiosyncrasies made the securities less comparable and have led some scholars to propose using high-quality municipal bonds as an alternative (see Homer and Sylla (2004)).

Recently, an effort has been made by Hall et al (2022) to develop a yield curve and time series of selected yields for the period from 1791 to 1933 using the prices only of Treasury securities. As there is a dearth of securities at some points in time, the yield curve fitting model at times requires some strong assumptions. However, the resulting long-run time series provides a more consistent measure of US government financing costs than one based on municipal securities. (There are notable differences in the two series at times.) Caution in using either series is likely to be warranted. The month-end Treasury security prices used in this analysis are

¹¹ The methodology is discussed in Gürkaynak et al (2007). Data are available at www.federalreserve.gov/pubs/feds/2006/200628/200628abs.html.

taken from newspapers and Treasury department circulars, both of which reported prices from morning trading on the New York Stock Exchange.

4. House prices

Construction of house price indices is inherently more challenging. Houses have many features – including size, location and amenities – that make them difficult to compare. As discussed by Borio et al (2022), Chapter 4, there are a variety of ways of adjusting for these features including the use of hedonic pricing models and by looking at repeat sales. In the United States, the most frequently cited house prices indices are based on repeat sales.

Constructing house price indices in the United States is made more difficult by the fact that house price data are typically collected at the state or local level. Thus constructing a national level house price index involves interacting with a considerable number of agencies and tackling the associated logistical challenges. Nevertheless, the value of being able to compare prices over time and location has resulted in a variety of such indices emerging in recent years. The discussion here focuses on two particular sets of indices that have considerable length and breadth. These sets of indices are available at the national level and for a large number of local areas. They are also available in FRED.

One of the most comprehensive house prices indices is the Core-Logic S&P Case-Shiller National Home Price Index. These data are subject to some copyright restrictions, but are probably some of the most consistent data on house prices in the United States. The series is available monthly from 1975 to present. The indices are constructed on a repeat sales methodology averaging over three months (to keep sample sizes sufficiently large). The sales data are the proprietary information of Core-Logic. Data on house prices in major US cities, also from Core-Logic S&P/Case-Shiller, are also available on FRED; these data are typically available on a monthly basis from 1987 to present.

The federal agency FHFA (formerly OFHEO) has created house price indices based on weighted repeat sales of single-family properties purchased or securitised by the two government agencies, Fannie Mae and Freddie Mac, since 1975. This index was one of the first to be created as the government agencies purchase a lot of mortgages from across the country. However, because Fannie Mae and Freddie Mac are able to purchase mortgages only below certain size limits (that have evolved over time), these indices do not cover all homes. Nevertheless, they cover a considerable number of homes and are thus useful as a reference series. This index is also referred to as a constant-quality index in that it does not take account of the particular attributes of the house and thus may not account for housing upgrades or renovations. These indices are available at monthly and quarterly frequencies for the United States as a whole and census divisions. Quarterly data are also available for individual states and 100 large metropolitan statistical areas. Monthly data are available from 1991 and quarterly data are available from 1975. They are available both from FRED and the FHFA, and the national index is included in the Federal

Reserve Bank of Dallas database. Detailed information on index construction is available from FHFA.¹²

Shiller (2015) presents an annual series of house prices since 1890. This series involves linking several individual series.¹³ The data for 1890–1934 are from Grebler et al (1956); this series – based on survey responses from 22 cities regarding current value of the house, year of purchase by current owner and original purchase price – is innovative but of uncertain quality. The data for 1934–53 reflect the median asking price advertised in newspaper from five major cities. The data for 1953 to 1975 are from the home price component of the consumer price index from the US Bureau of Labor Statistics. The data from 1975 to 1987 are from the FHFA/OFHEO index described above. The data for 1987 to present are from the Case-Shiller index. Given that a number of data sources and methodologies are used in the construction of the index, one should be cautious in how it is used; the index is useful for illustrating broad trends but one should not necessarily compare annual prices based on one series to annual fluctuations in another.

5. References

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¹² See www.fhfa.gov/DataTools/Downloads/Pages/House-Price-Index.aspx.

¹³ The data are available at www.econ.yale.edu/~shiller/data/Fig3-1.xls.

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