

Policy Analysis

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Competition in Currency The Potential for Private Money

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Executive Summary

Privately issued money can benefit consumers in many ways, particularly in the areas of value stability and product variety. Decentralized currency production can benefit consumers by reducing inflation and increasing economic stability. Unlike a central bank, competing private banks must attract customers by providing innovative products, restricting the quantity of notes issued, and limiting the riskiness of their investing activities. Although the Federal Reserve currently has a de facto monopoly on the provision of currency in the United States, this was not always the case. Throughout most of U.S. history, private banks issued their own banknotes as currency. This practice continues today in a few countries and could be reinstated in the United States with minimal changes to the banking system.

This paper examines two ways in which banks could potentially issue private money. First, U.S. banks could issue private notes redeemable for U.S. Federal Reserve notes. Considering that banks issuing private notes in Hong Kong, Scotland, and Northern Ireland earn hundreds of millions of dollars annually, it appears that U.S. banks may be missing an opportunity to earn billions of dollars in annual profits. Second, recent turmoil in the financial sector has increased demand for a stable alternative currency. Banks may be able to capture significant portions of the domestic and international currency markets with a private, commodity-based currency. Legislation clarifying the rights of private banks to issue currency could help clear the path toward a return to private money.

The competitive issue of private banknotes could improve price stability in the U.S. economy.

Introduction

In the United States and most countries around the world, money is produced and managed by the government's central bank. This paper discusses two potential opportunities for creating private money: private banknotes and commodity-based currency. For most of U.S. history, competing private banks issued paper currency redeemable for coins of gold and silver. A few countries today maintain similar semiprivate systems in which private banks issue their own banknotes redeemable for government currency. Allowing such a system in the United States would benefit all consumers by improving price stability and allowing banks to compete for customers. Alternatively, banks might issue money whose value is based on a commodity such as gold or silver. In international trade, the U.S. dollar is often used in transactions because of its relatively stable long-term value. The dollar is also the dominant form of currency used in many less-developed countries, yet economists generally agree that historically the international gold standard provided a more stable system of international trade than the current system of national fiat currencies.¹ If a commodity-based currency could replace the dollar in these foreign markets, it could improve economic stability and help facilitate international trade.

The competitive issue of private banknotes could improve price stability in the U.S. economy.² Private banks have the incentives and information necessary to provide the optimal quantity of money to encourage economic growth. In the past, the competitive production of currency helped the U.S. economy achieve high levels of gross domestic product (GDP) growth and low levels of price inflation. Creating a semi-private monetary system, in which private banknotes were redeemable for notes from the Federal Reserve, would reduce the government's involvement in monetary policy. The Federal Reserve would have less influence on the supply of currency but would

maintain substantial power over the overall money supply through its standard means of open-market operations, reserve ratios, and targeting of the federal funds rate. Allowing competition in currency would bring the United States one step closer to obtaining the full advantages of a decentralized system.

Private banknotes could easily be introduced in the United States. In Hong Kong, Scotland, and Northern Ireland, private banks issue banknotes redeemable for the national currency. Despite the availability of central banknotes in these locales, consumers transact almost exclusively in private currency.³ Private banks consequently earn hundreds of millions of dollars annually in the private currency market. For each unit of private currency withdrawn by a customer, the bank retains one unit of government currency, which can be invested or loaned out to other customers. The bank earns revenue on these investments and loans for as long as its private notes remain in circulation. If U.S. banks were able to capture even a small percentage of the domestic market for banknotes, they likely could earn billions of dollars in annual profits.

The idea that American consumers might enjoy using private banknotes is far from implausible. Imagine if dollar bills carried pictures of local sports teams, or if Wells Fargo produced its own dollar bills embossed with images of stage coaches and the Old West. Perhaps customers would debate the relative merits of the LeBron James banknote versus the Michael Jordan, or admire a special note commemorating Independence Day or dedicated to American veterans. Consumers in Hong Kong, Scotland, and Northern Ireland already enjoy these experiences, with private notes depicting heroes, sports figures, and famous historical events. Once banks establish reciprocal exchange agreements, private banknotes in the United States would trade at equal value with Federal Reserve notes as they passed from person to person throughout the economy. Banks might even pay customers to use their notes. For example, an

ATM might give customers a cash bonus for withdrawing “B. of A. Bucks” issued by Bank of America rather than regular U.S. dollars, or Citibank might pay interest on its private notes akin to earning points on a credit card.

Private note issue appears to be legal in the United States today. The regulations prohibiting the issuance of private notes were repealed almost two decades ago, yet no banks have chosen to enter this potential market. This may be because there is still some question as to whether private currency would be accepted by the Federal Reserve, or whether its producers would be subject to legal action. Private issuers might be prosecuted under gray areas of the law, or Congress might choose to resurrect the prohibitions on private notes. A few small-scale local currencies have been issued with the Fed’s blessing. These local currencies provide examples of how a new private currency might be introduced, but since none compete directly with Federal Reserve notes, they provide little clarification of the legal status of a large-scale private currency, and do little to inform a prediction of the Fed’s reaction thereto.

One might ask: if a system of privately issued currency is profitable, why is it not already in place? To answer this question, we estimate the potential profit from the issue of private banknotes in the United States, and find that capturing even a small percentage of this market could lead to billions of dollars in annual profit. We then consider alternative explanations for the lack of private notes. Banks might be deterred from entering the market for private banknotes if they fear a shrinking demand for paper currency or a lack of demand for private notes on the part of skeptical American consumers. The most plausible explanation for the lack of participants in this would-be-profitable market, however, appears to be the uncertain legal status of private note issue, and the rigorous federal prosecution of currency-related crimes.

Another way that banks could enter the market for private money would be to create a new currency whose value is based on

a commodity or basket of commodities. A commodity-based currency would likely be most valuable for international transactions. International traders rely on the stability of exchange rates among nations, which in turn rely on a vast array of variables that are affected by each country’s economic performance. To avoid the risk of currency volatility, a large percentage of trade is conducted in currencies with stable values, such as the U.S. dollar and the Swiss franc. A new currency based on a commodity such as gold, whose value is well established, might reduce currency risk in international transactions and capture some portion of this large potential market. The value of such a currency would rely not on the economies of the countries but on the value of gold itself, which has remained remarkably stable over time.

Poor performance by the Federal Reserve has motivated some policymakers to call for a return to a gold standard. Such a transition would be difficult domestically since it would alter the entire U.S. money supply. An easier option might be to simply end the Federal Reserve’s monopoly on paper currency by opening the market to competition. If a currency redeemable for gold were introduced as an alternative to the U.S. dollar, it might become popular domestically and/or abroad. A commodity-based currency would have a slower adoption rate than one based on U.S. dollars (since the domestic market is currently based on dollars), but the long-term advantage of value stability could provide greater macroeconomic benefits in terms of lower inflation and increased economic stability.

There are substantial benefits to allowing competition in currency. In the next section, we outline the benefits of private note issue and the costs of government note issue. We then discuss the history of private note issue in the United States; current practices in Hong Kong, Scotland, Northern Ireland; and the use of local currencies. Finally, we evaluate the potential profitability of private banknotes and commodity-based currency as well as the barriers to their introduction.

The lack of participants in the private banknote market appears to be due to the uncertain legal status of private note issue and the rigorous prosecution of currency-related crimes.

Benefits and Costs

Benefits of Private Note Issue

Privatizing the supply of banknotes would have both individual and systemic benefits. Unlike a monopoly currency provider, a system of competing banks must match the quantity of banknotes issued to the quantity demanded by the public, and each bank faces incentives not to issue too many or too few notes. Such systems have historically led to lower inflation and more stable economic conditions than central banking. These benefits would be only partially captured in a semiprivate system, where private banknotes were redeemable for central bank currency. Any potential harm from the Fed's monetary policy, however, would at least be diminished. In addition, private-note-issuing banks might attempt to satisfy their customers by competing on other margins such as security and aesthetics. These individual benefits would complement the systemic improvements in price stability.

Private banks create money through fractional reserve lending. Banks that issue their own banknotes have an incentive to expand their note issue and reduce their reserves in order to improve profit margins. For perhaps less obvious reasons, however, banks also have incentives to increase reserves and restrict their note issues. Each bank must hold some capital on reserve to pay out to depositors, or in the case of a note-issuing bank, to the redeemers of banknotes. If a bank holds too few reserves, it runs the risk of defaulting on these obligations. To most profitably manage reserves and note issue, a bank regularly assesses its optimal levels of reserves based on the variability in redemptions of notes and deposits.

In a system of decentralized note issue, competing banks each issue banknotes in the quantities they perceive as demanded by their customers. The law of large numbers indicates that the money supply will be more accurately set through decentralized provision than by a single monetary authority. Allowing multiple issuers of banknotes

means that, on average, the market demand for banknotes will match the supply. The Federal Reserve, on the other hand, has no such luxury. Having a monopoly supplier of banknotes means the country must rely on a single set of experts to determine the proper supply of notes. Any underprovision or overprovision of notes will adversely affect the price level and, therefore, the entire economy.

In setting its reserve ratio, each private bank faces a tradeoff between its expected return and its risk of default. Like any firm, a bank must finance its operations through a combination of debt and equity. Increasing the ratio of debt to equity amplifies the return to equity, making the firm more profitable—but also more risky. A bank can earn more revenue by loaning out a greater portion of its funds, but it must keep enough money on reserve to satisfy any redemptions demanded by its depositors. For example, suppose the bank offers to pay 4 percent on deposits, can earn 12 percent on its loans, and customers have deposited \$100 in the bank. If the bank uses a 10 percent reserve ratio, then \$10 of its funds will be kept on reserve while the other \$90 is lent out to customers at an interest rate of 12 percent. If no customers redeem their deposits, then the bank earns \$10.80 from its loans and must pay \$4 on its deposits, resulting in a net gain of \$6.80. Had the bank kept less money on reserve and made more loans, its profits would have been even higher. Because customers can redeem their deposits at any time, however, the bank faces the risk that many customers will choose to redeem within a short time period, and the bank will be drained of its reserves. Since the bank has only \$10 on reserve, its managers must hope that less than \$10 will be withdrawn. If more than \$10 is withdrawn, the bank will be unable to pay its obligations and will go into default, or possibly even bankruptcy.⁴ If the bank were to hold less than \$10 in reserves, then its risk of default would be even greater. Thus, bank managers must choose a level of reserves that balances the marginal benefit

Privatizing the supply of banknotes would have both individual and systemic benefits.

of higher revenues against the marginal cost of risk of default.

Any bank that issues private notes faces an additional financing decision, since its liabilities are drawn from a combination of both deposits and banknotes. Managers must weigh the marginal benefits and costs of additional banknotes versus additional deposits. Hence, managers choose a target level of reserves for their notes and deposits and must replenish their reserves whenever notes or deposits are redeemed. To maintain their chosen reserve ratio, any note-issuing bank must be careful not to issue more notes than demanded by the market. This is particularly important because note redemptions disproportionately decrease the holdings of reserves relative to notes outstanding. For example, suppose that Greene Bank issues banknotes redeemable for gold, and its managers have determined that the optimal reserve ratio is 1 over 10. This means that if the bank holds \$10 worth of gold on reserve, it will issue \$100 in banknotes. Now suppose a customer redeems \$5 worth of banknotes for gold. The bank now has \$95 in notes outstanding, but only \$5 worth of gold on reserve. This indicates a reserve ratio of 1 over 19, which is far below the optimal rate set by the bank's managers. Thus, note redemptions have a much larger effect on the bank's reserves than on its notes outstanding. In order to return to its ideal reserve ratio, the bank must either buy \$5 worth of gold or recall \$45 of its outstanding notes. This effect is what economists call the "law of adverse clearings."⁵

Adverse clearings discourage any individual bank from issuing too many notes relative to other banks in the economy. A bank may seek to increase its profitability by reducing its reserve ratio and issuing more banknotes. As the above example shows, however, clearings are "adverse" since, percentagewise, they affect the bank's reserves much more than they affect its notes outstanding. When the bank issues more banknotes without increasing its reserves, the bank's notes will increase as a portion of the money supply, so more notes will be returned to the bank

and redeemed for gold. The bank will soon be drained of its gold reserves and will be unable to support the amount of banknotes it has issued. As described above, the bank will be forced either to acquire more gold reserves or to recall some of its notes outstanding. In this way, adverse clearings prevent the overissue of banknotes. They also act as an indicator of the bank's level of risk. Adverse clearings provide constant feedback to bank managers regarding their optimal quantity of notes outstanding.

There is much historical evidence that adverse clearings prevent banks from overextending their note issues. Lawrence H. White's *Free Banking in Britain* details the emergence of a system of private banknotes in Scotland, where multiple private banks each issued their own notes. White explains how the banks developed a clearinghouse for banknotes which prevented banks from over-issuing notes. Through the law of adverse clearings, each bank acted as a check on the others.⁶ The Suffolk Banking System used a similar note-clearing mechanism in New England during the early 19th century.⁷ It is an oft-cited example of a stable free banking system. Other regional clearinghouses developed after the Civil War.⁸ Perhaps in response to adverse clearings, early American banks tended to underissue rather than overissue banknotes. There is a lengthy discussion in the economic literature on why early U.S. banks issued fewer notes than economists would have predicted.⁹ Banking in the 19th century was once thought to be chaotic and economically unstable. Recent evidence has shown, however, that the economy was in fact equally, if not more, stable before the establishment of a central bank. Later sections will discuss this period of U.S. history in more detail, along with the current systems of private-note issue in Hong Kong, Scotland, and Northern Ireland.

When many individual banks issue currency, each has some indication of the percentage its notes compose of the total currency supply, and whether the demand for currency is growing or shrinking. In con-

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trast, the Fed has neither the incentive nor the information to optimize the size of the money supply. Without adverse clearings, the Fed has no simple means of assessing the optimality of its level of note issue and faces no market discipline on the question. Although the Fed does monitor some measures of currency turnover, its homogeneous bills are generally re-issued by banks without being individually tracked, and the Fed has no incentive to initiate such a note-tracking scheme. As discussed in the next section, the Fed faces different incentives than a private bank and sometimes prioritizes other activities above the proper management of the money supply.

In addition, the law of large numbers favors a system of many note issuers over the Fed's monopoly. When many banks each attempt to issue the "right" quantity of banknotes, some will create too many and some too few, but they will tend to get it right on average. The Fed, in contrast, manages only one money supply and must do its best to match supply to demand. Any under- or overprovision of notes will adversely affect the price level, and therefore, the entire economy. Even with the collective knowledge of the world's foremost monetary experts, the Fed has a systematic disadvantage relative to a system of many decentralized issuers.

Private notes tend to have more stable values than those produced by a central bank, even in a semiprivate system where the private banknotes are only redeemable for a central bank's notes. This is because private banks must respond to demand; they cannot inject more notes into the money supply than customers are willing to accept. When the central bank increases the money supply, private banks cannot increase their note issue proportionately unless there is customer demand for these additional notes. If no such demand exists, private notes will lose part of their value since the money supply as a whole has been devalued by the central bank's excessive issue, but the resulting inflation is tempered at least in part by the private banks' inability to add still *more* superfluous

notes to the currency supply.¹⁰ Similarly, if the central bank were to provide less money than demanded in the economy, private banks could issue more notes to compensate, thereby preventing deflation and furthering stability.

There are two main components of the money supply: cash and deposits. The Fed can affect the supply of money in the economy by influencing either of these. Although the Fed does decide how many dollars to print, it is more likely to affect deposit holdings by influencing the market interest rate. The amount of money that an individual chooses to deposit in a bank and the amount he chooses to take out in loans depends on the interest rate he can earn on his deposits or must pay on his loans. A lower interest rate means that fewer people will deposit their money in the bank, and more individuals and businesses will take out loans. These effects cause more money to circulate in the economy and, therefore, more economic activity. In contrast, a higher interest rate will cause individuals to deposit more money into banks and fewer people to take out loans, thus reducing the amount of money in the economy and slowing economic activity.

The degree to which the Fed's actions affect the money supply is determined by the "money multiplier," a formula which calculates how much the total money supply will be affected by a change in cash or bank reserves. The size of the multiplier depends mostly on the reserve ratio chosen by private banks and on the amount of cash held by consumers relative to deposits. The influences of cash and reserves counteract one another. As the quantity of currency in the economy increases above the quantity demanded by consumers, banks tend to increase their reserves, so each new influx of cash has less of an effect on the money supply. Alternatively, a lack of cash in the economy causes banks to reduce their reserves, so changes in cash affect the money supply more. These feedback effects help align the quantity of money supplied by banks with the quantity demanded by consumers.¹¹

In a free banking system, the reserve ratio is optimized by bank managers as previously described. Under the current system, however, banks are less sensitive to the risk of default since they do not face adverse clearings. Bank reserve ratios are predominantly determined by the minimum level of reserves set by the FDIC. In a semiprivate system, the central bank's monetary policy would be dampened by the feedback effects of the money multiplier and adverse clearings on the quantities of currency created by private note issuers.

Private banks must limit the riskiness of their investing activities because they are accountable to owners and creditors. Several empirical studies have shown that, as with all firms, the price of a bank's equity and debt reflect perceptions of the bank's riskiness.¹² Not every bank refrains from taking excessive risk, but those that do are subject to the discipline of the market. Unfortunately, government intervention often creates distortions in market incentives, causing bank managers to increase their risk-taking activities. This is markedly true in the case of banks for several reasons. First, FDIC deposit insurance creates a problem of "moral hazard." Banks increase the riskiness of their investing activities since any losses to depositors will be paid for by the government. Second, the government's recent "too big to fail" policy encourages risky investing, since bank managers have reason to believe they will be bailed out in times of crisis. Third, the Fed's policy of maintaining artificially low interest rates increases the profitability of lending. Throughout the first decade of the 21st century, these policies encouraged irresponsible mortgage lending and greatly contributed to the recent financial crisis. It is likely that risky investing by private banks would have been curtailed in the absence of these policies.

While most consumers care only about the value of their money in exchange, some customers might prefer private notes for aesthetic reasons, such as the colors or pictures they carry. In Hong Kong, Scotland, and

Northern Ireland, customers have the option of using notes issued by the central bank, but they overwhelmingly prefer those issued by private banks.¹³ Since these banks must compete for customers, private notes feature a variety of pictures and designs. Notes tend to be decorated in national themes, but not those of politicians or government. Hong Kong notes have animals such as lions, horses, turtles, and dragons. Notes from Northern Ireland and Scotland often portray notable sportsmen or historical figures, such as famous Scots Robert the Bruce, Lord Kelvin, and Alexander Graham Bell. Irish notes have featured inventor Harry Ferguson and Irish footballer George Best. Notes in all countries also show famous buildings, castles, and landscapes, or commemorate historical events, such as the launching of the U.S. Space Shuttle and the defeat of the Spanish Armada, which are portrayed on banknotes in Northern Ireland. Private notes come in a variety of colors and sizes to improve aesthetics, security features, and ease of use.

When customers can choose between multiple banks, competition encourages innovation. Competition does not, however, guarantee that private notes will necessarily be more colorful or have better security than government banknotes. Unlike the government, private banks attempt to balance the marginal benefits of additional features against the marginal increases in the cost of production. Central banks, on the other hand, are less responsive to customer preference since their spending levels are based on government budgets, and they often operate as monopolies rather than facing competition. Allowing a variety of firms to produce banknotes would not necessarily guarantee better banknotes, but it would give customers more variety in the money they use and accept, and customers with different tastes would be more likely to get the types of money they like best.

Costs of Public Note Issue

In contrast to private banks, central banks do not face the competitive pressures

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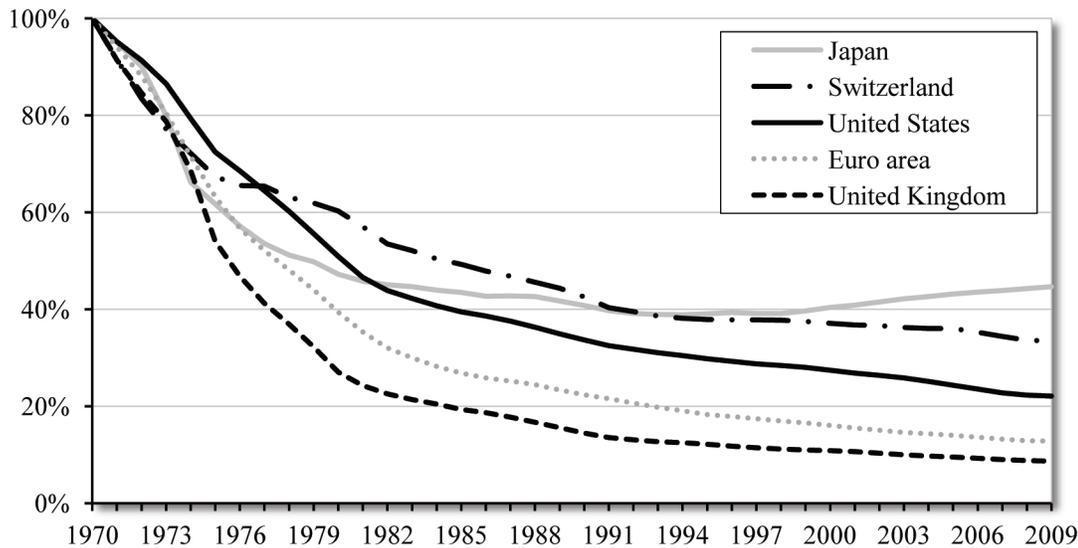
of the market. Having no customers to satisfy, they have no reason to offer better products or protect the value of their banknotes. Having no equity holders to satisfy, they need not worry about the riskiness of their note issue or investing activities. In fact, it is considered an advantage for the central banker to be “independent” and not beholden to any individual or political party.¹⁴ Without profit-maximizing incentives such as adverse clearings to help manage reserves, central banks lack an explicit mechanism for determining the optimum quantity of money and can only make adjustments with what Milton Friedman called “long and variable lags.”¹⁵ Some have likened the Fed’s adjustment process, dictated by past performance rather than forward-looking indicators, to driving a car by looking in the rear-view mirror.¹⁶ Central banks are often more focused on influencing economic activity than protecting the value of their banknotes.

Central banks regularly devalue their own currency by inflating the money supply. Inflation is defined as an increase in the average level of prices in the economy. This occurs when the supply of money in the economy grows faster than the supply of goods. As more money enters the economy, the proportion of money to goods increases, so the prices of goods tend to rise. An increase in prices is equivalent to a fall in the value of a dollar, since it takes more dollars than it did before to buy any particular good. In this way, an increase in the supply of money in the economy causes the value of the currency to fall. Inflation is often considered to be a hidden tax that benefits the government at the expense of money holders.¹⁷ Deadweight economic losses are created as individuals change their behavior to avoid the effects of inflation.¹⁸ Inflation also has a distributional effect of benefitting debtors at the expense of creditors.¹⁹ Even moderate amounts of inflation can severely damage the economy by distorting relative prices, redirecting resources away from their optimal uses, and causing businesses to make unprofitable investments.²⁰

In the United States, the Federal Reserve most often influences the money supply through its open-market operations. The Fed buys U.S. Treasury bonds, which raises the market price and lowers the market interest rate.²¹ U.S. Treasuries are considered the one and only risk-free security, since it is considered unlikely that the U.S. government will ever default on its obligations.²² Because of its size and liquidity, the Treasury market is considered the foundation of the entire financial markets sector. Consequently a reduction in the yield on Treasuries is passed on to other financial markets. These lower rates reduce the rate at which banks are willing to lend, which in turn makes it more profitable for firms to borrow, creating an increase in economic activity. For consumers, lower interest rates mean lower earnings on any money they might save, so they are less likely to save and more likely to spend—which also increases economic activity.

When the Fed increases the money supply, the corresponding increase in economic activity is due, at least in part, to confusion on the part of consumers. This is true for two reasons. First, businesses and consumers are not fully aware of the Fed’s monetary policy. When interest rates fall, managers do not consider that the change was caused by the Federal Reserve. All they know is that the low interest rate makes potential investment projects more profitable. Similarly, a consumer who is deciding how much of his wages to put into his savings account only considers the return on his account and not the Fed’s role in influencing the interest rate. Second, even if these parties were completely aware of the Fed’s activities, they would be unable to perceive exactly how they would be affected since prices do not change uniformly throughout the economy. It would be overly simplistic to assume that if the money supply increases by 10 percent then all prices will rise by 10 percent. In reality, all prices in the economy will change by different amounts, so no individual or firm can know exactly how much they will be affected by an increase in the money supply.

Figure 1
Indexed Values of Major Currencies, 1970–2009



Source: Author’s calculations based on World Bank GDP deflators (NY.GDP.DEFL.KD.ZG).

When the Fed injects money into the economy with the purchase of Treasury bonds, banks and financial institutions who participate in the Treasury markets are the first to be affected by the change. These institutions pass the effects on to businesses in the form of loans, which the businesses then use to purchase equipment and raw materials, pay wages and operating expenses, et cetera. The bank may also change the rate it pays on savings accounts, which will cause consumers to save less and spend more on other goods. With all of these forces influencing prices throughout the economy, it is impossible to know how any one business or individual will ultimately be affected by the Fed’s interest rate manipulation. Only later, after the Fed ends its monetary expansion, do consumers discover how much the value of the dollar has fallen. This “money illusion” is widely discussed in the economic literature on monetary policy.²³ Not only does the Fed fail to protect the value of the dollar, but its monetary policies intentionally deceive dollar holders in order to influence spending and economic activity.

Figure 1 shows the declining value of several major currencies since 1970. Each line represents the value of a particular currency as a percentage of its purchasing power in 1970.²⁴ Since that time, the value of the U.S. dollar has fallen by 78.9 percent. The British pound and the currencies of the European Monetary Union have fared even worse, falling 94.1 percent and 87.1 percent, respectively, during the same period. The Japanese yen and Swiss franc both experienced large initial declines, but they have recently slowed their devaluations, falling by only 55.3 percent and 66.5 percent. The problem of inflation is even more pronounced in less-developed nations since cash payments are more common and central banks are more likely to inflate national currency. As described in the 2010 paper, “Economic Development and the Welfare Costs of Inflation,” by Edgar Ghossoub and Robert Reed, “gains from eliminating inflation would be the most significant in the developing world.”²⁵

One common justification for allowing central banks to inflate the money supply is that they are able to use this tool to smooth

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The Fed has failed to achieve its stated goals of furnishing and maintaining the currency and improving economic stability.

the business cycle and increase economic stability. Historical evidence, however, shows that just the opposite is true. A recent paper, “Has the Fed Been a Failure?” by George Selgin, William Lastrapes, and Lawrence H. White, shows that the creation of the Federal Reserve has substantially increased inflation in the U.S. economy without improving economic stability or preventing bank runs.²⁶ Their study draws together evidence from several sources that have made similar points to show that the Fed has failed to achieve its stated goals of furnishing and maintaining the currency and improving economic stability.²⁷ Another paper by Selgin, “Central Banks as Sources of Instability,” compares the performance of the U.S. economy before and after the creation of the Fed, as well as to the less-regulated Canadian banking system. The study finds that the Fed has led to worse, not better, economic performance.²⁸

Many economists argue that a little inflation is not such a bad thing. The Federal Reserve, for example, tends to have an inflationary bias—of which most economists approve. In his 2002 speech, “Deflation: Making Sure ‘It’ Doesn’t Happen Here,” Fed governor and future chairman Ben Bernanke advised that “The Fed should try to preserve a buffer zone for the inflation rate, that is, during normal times it should not try to push inflation down all the way to zero.”²⁹ Central bankers generally prefer to allow a small amount of inflation rather than risk even a small possibility of deflation—which is often regarded as a greater danger to the economy.

The inflationary bias exhibited by central bankers does not exist in a free banking system for several reasons. First, deflation is not always dangerous. Although it is true that when deflation is caused by a shortage of money it can push an economy into recession, deflation also occurs when real increases in productivity make the goods we buy less expensive to produce. For example, the episodes of mild productivity deflation in the 19th-century United States represent-

ed improvements in the economy. By contrast, the Fed-induced monetary deflation of the 1930s led to (or at least prolonged) the Great Depression. Second, problems with the money supply are more likely under a central bank than under a system of competing private banks. When a central bank controls the entire money supply, it alone is responsible for any potential harm, so bankers err on the side of cautionary inflation despite the long-term harm to consumers. By contrast, when money is produced by many private banks, each bank attempts to maximize its profits by providing the amount of currency demanded in the market. If one bank produces too much, another might produce too little, and there is no tendency to oversupply or undersupply. Third, although a small amount of inflation is not harmful in any single year, it can have grave effects when compounded over time. For example, the Fed’s target inflation rate of 2 percent per year implies that over 50 years the value of the dollar will decrease by 36.4 percent. As demonstrated in Figure 1, the historical decline in the value of the U.S. dollar has actually been much worse.

Central banks are unconcerned with the riskiness of their investing activities. Private banks must balance the marginal increases in the return on their investments against the marginal risk of potential default, but central banks face no such tradeoff. As agents of government, they are not constrained by the risk of potential default. Thus, central banks can often invest in any asset they choose without reprisal. This problem was once thought not to apply to the Federal Reserve, which invested only in U.S. Treasuries. However, the Fed has changed its policies dramatically in recent years. Through its quantitative easing programs and bank bailouts, the Fed *intentionally* made very risky investments with taxpayer dollars, which included loans to AIG and Bear Stearns and the purchase of over \$1.25 trillion in mortgage-backed securities.³⁰

Private banks cannot make such ill-advised gambles because they are subject to the

discipline of the market. For private banks, risky investing is a path to bankruptcy—unless the bank is rescued by government regulation or bailout. To satisfy shareholders, private banks must invest in profitable projects rather than subsidizing other firms for the general good. To satisfy customers, private banks must protect the value of the notes they issue. In doing so, they not only protect their own interests but also provide a stable money supply, thereby benefitting the entire public.³¹

Note Issue in Practice

U.S. History

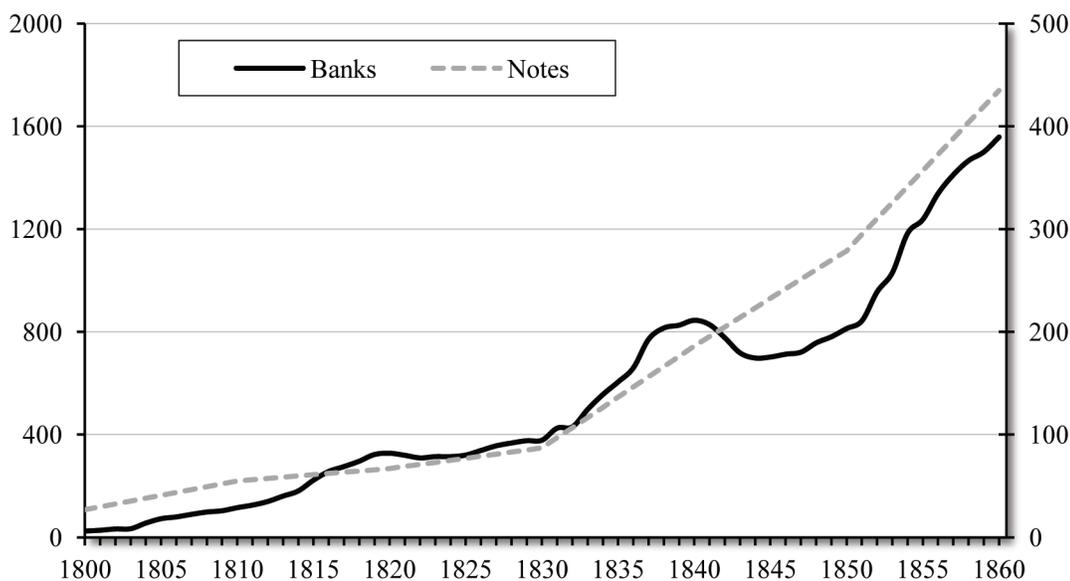
For most of U.S. history, private banknotes comprised a significant portion of the money supply. In early American history, private, state-chartered banks issued their own banknotes redeemable for gold or silver dollars produced by the U.S. Mint.³² After the Civil War, note-issuing banks required a na-

tional charter, and their activities became increasingly regulated. This period of relatively free banking came to an end in 1913 with the establishment of the Federal Reserve, which maintains a de facto monopoly on the issue of paper currency. Since then, the Fed has continually expanded its powers while devastating the value of the dollar.

The prime era of free American banking was the pre-Civil War period from 1783 to 1861, when banks issued paper banknotes redeemable for official U.S. coins. The Coinage Act of 1792 provided that the U.S. Mint would produce several denominations of gold and silver coins, including the silver dollar coin (made from 371.25 grains of pure silver) and the gold eagle coin (worth 10 dollars, with a weight of 247.50 grains of pure gold). Private banknotes redeemable for these coins were soon being exchanged at equal value throughout the nation. The number of state-chartered banks and the quantity of notes they supplied grew strongly during this period. Figure 2 shows the

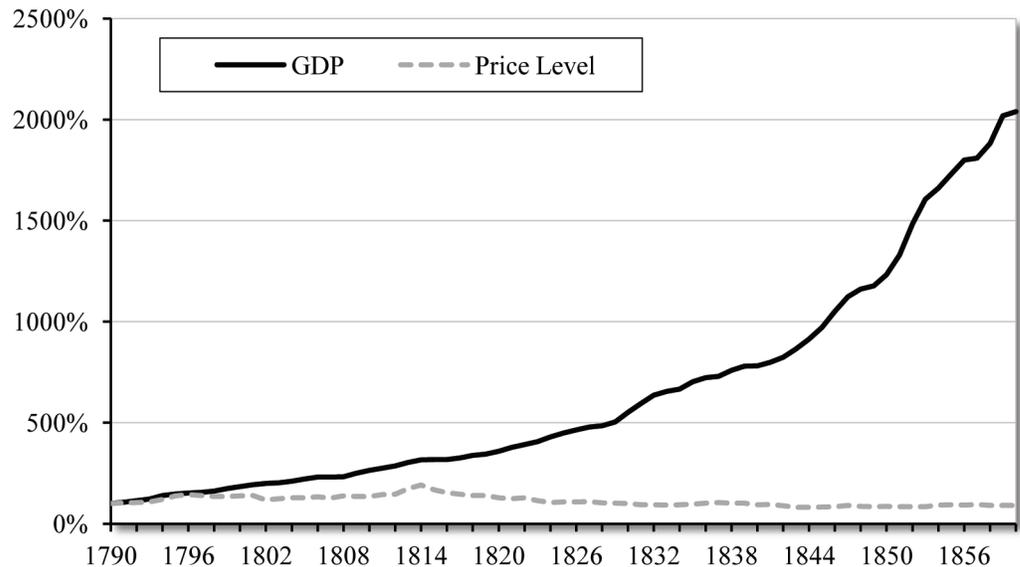
The Fed has continually expanded its powers while devastating the value of the dollar.

Figure 2
Growth in Banks and Banknotes, 1800–1860



Source: Warren E. Weber, “Early State Banks in the United States: How Many Were There and Where Did They Exist?” Federal Reserve Bank of Minneapolis *Quarterly Review* 30, no. 1 (2006): 28–40; and John E. Gurley and E. S. Shaw, “The Growth of Debt and Money in the United States, 1800–1950: A Suggested Interpretation,” *Review of Economics and Statistics* 39, no. 3 (1957): 250–62.

Figure 3
Indexes of Prices and Production, 1790–1860



Source: Louis Johnston and Samuel H. Williamson, “What Was the U.S. GDP Then? Annual Observations in Table and Graphical Format 1790 to the Present,” MeasuringWorth, 2011, <http://www.measuringworth.com/usgdp/>; and Lawrence H. Officer, “The Annual Consumer Price Index for the United States, 1774–2011,” MeasuringWorth, 2012, <http://www.measuringworth.com/usdpi/>.

growth in banks and banknotes from 1800 to 1860.³³ The solid line represents the number of banks (listed on the right y axis), while the dotted line represents the value of notes outstanding (listed on the left y axis) in millions of dollars.

By 1860 there were more than 1,600 private corporations issuing banknotes and an estimated 8,370 varieties of notes “in form, color, size, and manner of security.”³⁴ Figure 3 shows indexes of GDP and the consumer price index (CPI) from 1790 to 1860.³⁵ The U.S. economy grew at an average rate of 4.4 percent per annum over this period, while prices fell at an average annual rate of 0.1 percent. GDP was 20 times higher at the end of the period, while the price level remained roughly constant, indicating that competing banks provided neither too many nor too few notes during this period of strong economic growth. Economists and historians once considered this period an era of untrustworthy “wildcat” banks, fraught with inflation and economic instability. Recent

research, however, has shown these notions are more popular myth than historical fact.³⁶ Comparing figures 1 and 3, we can see that the price level during the era of free banking was quite stable compared with recent times.

Banknotes in this era were not issued by state banks alone. The First Bank of the United States was granted a 20-year charter that began in 1791 and lasted until 1811. The charter for the Second Bank of the United States began in 1816 and expired in 1836. As Richard Timberlake described in *Monetary Policy in the United States*, “[t]he Banks of the United States were not created as central banks, nor dared they consider themselves as such.”³⁷ They had neither a monopoly on the production of currency nor the responsibility of regulating the banking system. These banks simply acted as agents of the federal government in matters of finance, particularly the sale of Treasury bonds. The driving force for the establishment of the First Bank of the United States was to raise funds to finance the newly formed national gov-

The price level during the era of free banking, from 1790 to 1860, was quite stable compared with recent times.

ernment; the Second Bank was established to finance the War of 1812. After the expiration of the Second Bank, the Treasury occasionally issued government banknotes and small-denomination bills that were sometimes used as currency, but these accounted for only a small fraction of the money in the economy. By 1860, government currency accounted for less than 10 percent of circulating U.S. currency and less than 4 percent of the total money supply.³⁸

The Suffolk banking system is a prime example of effective free and private banking in the United States. From 1825 to 1858, the Suffolk Bank administered a clearinghouse for banknotes that was used by banks throughout New England. This system allowed the notes of many competing banks to be exchanged at equal value and prevented any bank from overextending its note supply.³⁹ At its peak, the Suffolk system included over 300 banks and was clearing \$30 million worth of banknotes per month.⁴⁰ The Suffolk system was slightly impaired by regulations on interstate banking, however. The nationally chartered Banks of the United States had the advantage of being allowed to open branch banks nationwide, whereas the state-chartered banks of Suffolk did not.

With the onset of the American Civil War, the issuance of private banknotes ground to a halt. To raise funds for the war, Congress arranged in 1861 to take out loans from many Northern banks; especially in New York, Boston, and Philadelphia. The Treasury then demanded that these loans be paid in gold specie, and “[m]uch against their will the banks complied.”⁴¹ This left the banks with insufficient reserves to satisfy redemptions for their banknotes. Most private banks were forced to suspend redemption of their banknotes, and in December of 1861, the U.S. government followed suit by suspending redemption of government-issued currency. The First Legal Tender Act of 1862 allowed the U.S. government to issue large quantities of nonredeemable paper currency, commonly known as the “greenback” for its singular hue. The greenback was effectively a

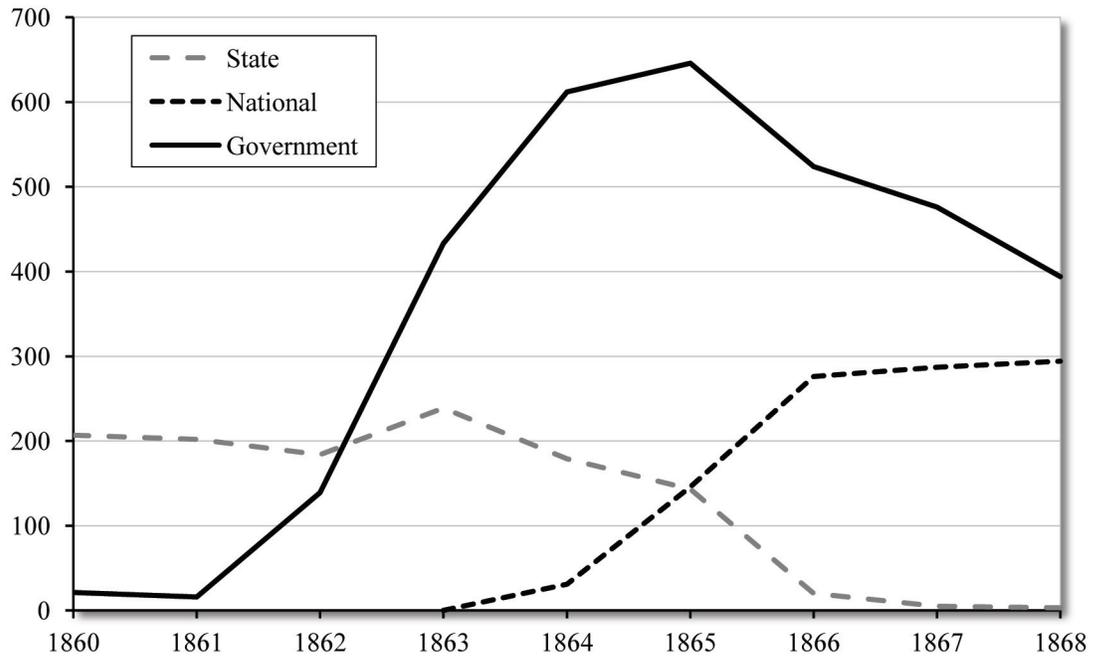
fiat money whose value depended upon the number of notes in circulation rather than the value of any redeemable asset. The Treasury proved incapable of controlling the supply of greenbacks, issuing such a quantity that their value was halved in less than four years.⁴² The government eventually resumed the redemption of greenbacks for gold or silver with the Specie Resumption Act of 1879.

During the Civil War, the government also strengthened its control of the banking industry with the National Banking Acts of 1863 and 1864. These acts imposed strict capital requirements and a substantial semi-annual tax of 5 percent on the note issuance of all state banks. This tax made the issuance of private notes prohibitively costly and caused many state banks to seek national charters. Figure 4 shows the increase in banknotes issued by national banks and those issued by the U.S. government from 1860 to 1868. The rise in national banknotes is mirrored by a decline in state banknotes over the period.⁴³ The note supply from state banks fell from \$207 to \$3 million in these eight years, while the note issue by national banks and the U.S. government rose from \$0 to \$294 million and from \$21 to 394 million, respectively.

In his essay, “Debate on the National Bank Act of 1863,” John Million shows that, like the First and Second Banks of the United States, “[t]he immediate purpose of the National Banking Act was to assist in providing funds for war purposes.”⁴⁴ Banks were forced to invest more than 100 percent of the value of their outstanding notes in U.S. bonds, which were effectively loans to the Treasury department.⁴⁵ Banks were also required to pay a semi-annual tax of 0.5 percent on their notes outstanding (a much lower rate than the 5 percent tax on state banks). Additionally, a national banking system was a tool to standardize American currency and limit the independence of the states. Million notes that, “[f]rom the political rather than from the economic side argument was often brought forward that uniformity would prove a safe bond of union between the states.”⁴⁶

With the onset of the American Civil War, the issuance of private banknotes ground to a halt.

Figure 4
Value of State, National, and Government Banknotes, 1860–1868



Source: Richard H. Timberlake, *Monetary Policy in the United States: An Intellectual and Institutional History* (Chicago: University of Chicago Press, 1978), Table 7.1, p. 90.

Competition in U.S. currency production ended completely with the passage of the Federal Reserve Act of 1913, which created a new monetary authority with a monopoly on the provision of banknotes. In the century since, the Fed’s inflationary policies have slowly eroded the value of the dollar. Federal Reserve notes redeemable for gold were first printed in 1914, although previously issued notes and certificates redeemable for gold and silver continued to circulate. In 1933, President Roosevelt issued Executive Order 6102, requiring that all gold coin and bullion in the United States be confiscated by the federal government.⁴⁷ Thereafter, Federal Reserve notes were altered to be redeemable only for “lawful money.” In 1963, their value was again altered, and Federal Reserve notes were relabeled as non-redeemable “legal tender.” The dollar’s final tentative link to gold was broken in 1971, when President Richard Nixon withdrew the United States from

the Bretton Woods pseudo-gold system of international exchange rates. Through this process, the dollar was reduced to a pure fiat currency. The Fed now uses money as a policy instrument and is no longer primarily concerned with maintaining a stable value for the dollar. Since ending the practice of note redemption, the Fed’s inflationary policies have caused the value of the dollar to fall by almost 80 percent of its 1970 purchasing power, as shown in Figure 1.

Over the past century, the Federal Reserve has consistently expanded the scale and scope of its authority. Since the recent financial crisis, “[t]he Fed has invested more than \$2 trillion in a range of unprecedented programs,” and gained “sweeping new authority to regulate any company whose failure could endanger the U.S. economy and markets.”⁴⁸ Yet despite the Fed’s growing power, changes in financial regulation may have inadvertently paved the way toward

Since ending note redemption, the Fed’s inflationary policies have caused the dollar to fall by almost 80 percent of its 1970 value.

the revival of private note issue. According to the article, “Note Issue by Private Banks: A Step toward Free Banking in the United States?” by Kurt Schuler, recent financial reforms have actually repealed the prohibitions on private banknotes. As Schuler describes, “Nobody seems to have noticed that state-chartered banks have been effectively free to issue notes since 1976, and national (federally chartered) banks have been free to issue notes since 1994.”⁴⁹ Specifically, the Tax Reform Act of 1976 repealed the 5 percent semi-annual tax on notes issued by state-chartered banks (Public Law 94-455, §1904(a)(18)). The Community Development Banking and Financial Institutions Act of 1994 repealed the restrictions on note issue by nationally chartered banks (Public Law 103-325 §602(e)-(h)), although the semi-annual note tax of 0.5 percent (1 percent annually) (12 U.S.C. §541) remains. Thus, it appears that U.S. banks have the right to issue private banknotes redeemable for currency from the central bank, thereby creating a semiprivate currency system.

Scotland and Northern Ireland

Scotland and Northern Ireland employ a semiprivate system in which private banks issue banknotes redeemable for notes from the central bank, the Bank of England. Although Bank of England notes are legal tender throughout the United Kingdom, consumers in Scotland and Northern Ireland overwhelmingly prefer notes issued by local private banks. In Scotland, private banks supply an estimated 95 percent of notes in circulation.⁵⁰ Because banks in both countries fall under the regulatory authority of the Bank of England, we consider them a single market for the purposes of this paper.

Private banks have issued banknotes in Scotland for centuries. The Bank of Scotland was founded in 1696 and had a monopoly on note issue until the Royal Bank of Scotland was formed in 1727. As more banks entered the market, competition wrought increases and improvements in branches, products, and services. Peel’s Act

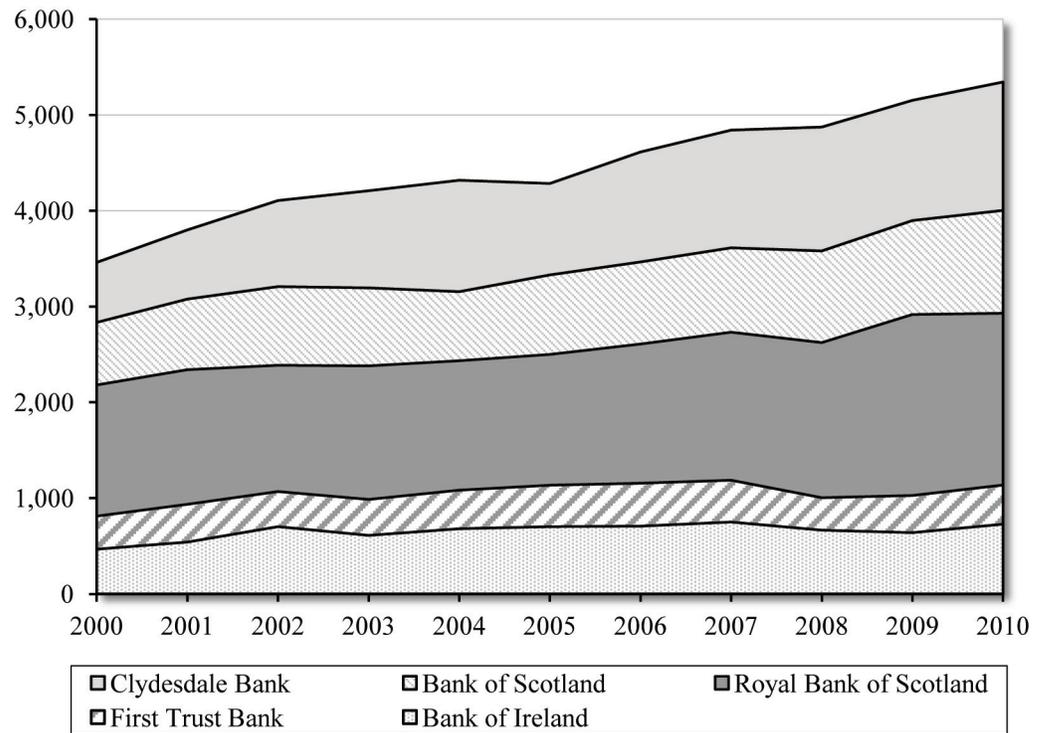
of 1844, however, ended the era of Scottish free banking by prohibiting new banks from entering the market. From the total of 19 note-issuing banks at that time, only three survive today: Bank of Scotland, Royal Bank of Scotland, and Clydesdale Bank. The Scottish system was replicated in Ireland, where banks began issuing private banknotes in 1929. Of the eight original note-issuing banks, only four continue the practice today: Bank of Ireland, First Trust Bank, Northern Banks, and Ulster Bank. The seven note-issuing banks in Scotland and Northern Ireland have increased their note issue continuously over the last decade, as shown in Figure 5. The total quantity of private notes outstanding in Scotland and Northern Ireland has been increasing since 2000 at an average annual rate of 3.9 percent. The British Treasury estimated that in 2005, Scottish and Northern Irish banks earned £80 million (approximately \$145 million) from the issue of private banknotes.⁵¹

Notes from banks in Scotland and Northern Ireland provide many of the previously discussed benefits of private banknotes. The major advantage to consumers is product variety among banknotes, which they clearly prefer to Bank of England notes. Unfortunately, there are several reasons this system does not capture the full advantages of free banking. First, the Bank of England has forbidden new banks from issuing notes. Second, since private notes are redeemable for Bank of England notes, the central bank retains a strong influence over the money supply. Third, on weekends (from Friday to Sunday) note issuing banks are required to hold 100 percent reserves for their notes outstanding in the form of “UK public sector liabilities.”⁵² This leaves the banks only four days to invest the capital they gain from their banknotes and thus their potential profits.

The British government has recently been hostile in its treatment of note-issuing banks. It has repeatedly threatened to require that private banks hold 100 percent reserves on their banknotes seven days a week,

Scotland and Northern Ireland employ a semiprivate system in which private banks issue banknotes redeemable for notes from the Bank of England.

Figure 5
Private Notes in Circulation in Scotland and Northern Ireland, 2000–2010



Source: Author's calculation based on the balance sheets of each bank. Ulster Bank is a subsidiary of the Royal Bank of Scotland and is included as part of their total. No data were available for Northern Bank, which is a subsidiary of Denmark's Dankse Bank Group. Data are presented in millions of British pounds sterling.

rather than the current three.⁵³ The banks have resisted, saying that if they are required to hold 100 percent reserves at all times, they will be unable to profit from their note issuance and will be forced to stop issuing banknotes. If private notes were issued in the United States, would the Fed be similarly hostile? The uncertain legal situation in the United States is a substantial barrier to the issuance of private banknotes, but it is not insurmountable. The potential profits from private note issue may be sufficient to entice some entrepreneurial bank to overcome this cost and enter the market.

Hong Kong

The monetary system in Hong Kong is a semiprivate system where the money supply and foreign exchange rate are managed by a currency board, the Hong Kong Monetary

Authority (HKMA). Since the 1860s, however, the vast majority of Hong Kong's currency has been composed of privately issued banknotes. Early notes were redeemable for Mexican (and later American) silver dollars. In 1935, the government established its own independent monetary unit, the Hong Kong dollar (HKD). The value of the HKD was originally pegged at a fixed exchange rate to the British pound sterling, but since 1971 it has been pegged to the U.S. dollar at varying rates. The HKMA was established in 1993 to ensure the stability of both the currency and the financial system.⁵⁴ The government has traditionally minted coins up to \$10 and has sometimes printed notes in denominations of \$1, \$5, and \$10. Before seizing authority over Hong Kong in 1997, the People's Republic of China committed to the "Basic Law," guaranteeing that Hong Kong be al-

Since the 1860s, the vast majority of Hong Kong's currency has been composed of privately issued banknotes.

lowed to function as a capitalist society until at least the year 2047.⁵⁵ This law is presumed to protect the independence of the HKMA until that time. The currency of Macau is managed through a similar system to that of Hong Kong but on a smaller scale.

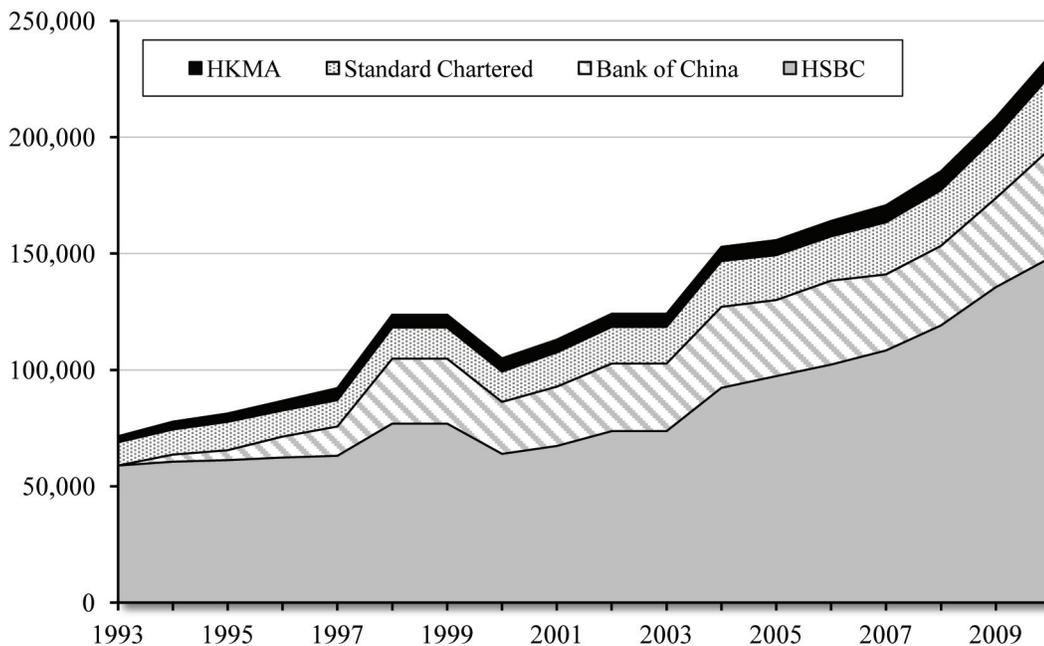
Three Hong Kong banks currently issue private banknotes: the Hong Kong Shanghai Banking Corporation (HSBC), Standard Chartered Bank, and the Bank of China. They each issue several denominations ranging from \$20 HKD to \$1000 HKD. All three banks have seen consistent growth over the past two decades in their quantity of notes in circulation. In addition, the HKMA issues coins and some banknotes with a \$10 HKD denomination. In 2010, government-issued banknotes represented approximately 3.7 percent of the supply of paper currency. Figure 6 shows the growing supply of private notes issued in Hong Kong from 1993 to 2010 in terms of millions of HKD.⁵⁶ The quantity of private notes outstanding in-

creased at an average annual rate of 7.3 percent during this period. Despite this high rate of money growth, Hong Kong has experienced low levels of inflation. Unlike Scotland and Northern Ireland, banks in Hong Kong are required to hold 100 percent reserves for any banknotes they issue.

Hong Kong's economy has been spectacularly successful not only because of its monetary policy but also because of its liberal economic policies of free trade, light regulation, and low taxes. This special administrative region of the People's Republic of China earned the top ranking in the *Economic Freedom of the World 2010 Annual Report*,⁵⁷ coming in first in both the size of government and freedom of international trade categories. Hong Kong also ranked 3rd in the category Regulation of Credit, Labor, and Business, 10th in Access to Sound Money, and 16th in Legal Structure and Security of Property Rights. These free-market policies have caused explosive growth in Hong

Hong Kong's economy has been spectacularly successful because of its monetary policy and its liberal economic policies.

Figure 6
Banknotes in Circulation in Hong Kong, 1993–2010



Source: Author's calculation based on the annual reports of the issuing banks and the Hong Kong Monetary Authority.

One exception to the Federal Reserve's banknote monopoly is the use of local currencies.

Kong's economy, facilitating the growth of its GDP from \$28.8 billion in 1980 to \$224.5 billion in 2010 (measured in 2010 U.S. dollars).⁵⁸ Despite its small size, Hong Kong boasts the world's 35th largest economy, and the Hong Kong dollar is the world's 8th most widely traded currency.⁵⁹ Hong Kong banks account for roughly 5 percent of worldwide currency exchange, the 6th most of any country.⁶⁰

Local Currencies

One exception to the Federal Reserve's banknote monopoly is the use of local currencies. Local currencies are usually "fiduciary money," meaning that they are neither redeemable for any specific asset nor guaranteed by the government as a means of legal tender. Their only value is derived from the expectation that they will be accepted by other parties as a form of payment. This is generally achieved by establishing a group of businesses that promise to accept the currency. There are dozens of local currency systems in the United States and hundreds in operation around the world.⁶¹

Most local currencies are established to encourage citizens to "buy local." They are described as "tools of community empowerment" intended to "support economic and social justice, ecology, community participation and human aspirations."⁶² Local currencies have been used since at least the 1930s and endorsed since the 1960s by economists E. F. Schumacher, Robert Swann, and Jane Jacobs as a means of creating sustainable local development (though the effectiveness of these efforts is debatable). Two of the best-known local currencies in the United States are BerkShares and Ithaca Hours.

BerkShares are a local currency issued since 2006 in the Berkshire region of Massachusetts by the nonprofit organization BerkShare, Inc. The notes have featured local heroes Norman Rockwell, Herman Melville, Robyn Van En, W. E. B. Du Bois, and the Stockbridge Indians. One BerkShare can be purchased for \$0.95 at local banks but has a spending power of \$1 at participating

businesses. This creates a 5 percent discount on local purchases which the participating firms hope will lead to increases in sales and therefore profits. BerkShares appear to have gained fairly widespread acceptance in the region. Five local banks exchange BerkShares for U.S. dollars at a dozen branches, almost 400 local businesses accept BerkShares as payment, and over 2.7 million BerkShares have been put into circulation.⁶³ Over the past few years, the BerkShares system has been the subject of dozens of reports in newspapers, on television, and online.

The Ithaca Hours currency is produced by the nonprofit organization Ithaca Hours, Inc., of Ithaca, New York. It is thought to be the oldest local currency system still in operation and has inspired dozens of similar local currencies around the world. The Ithaca Hour is valued at a fixed rate of 10 U.S. dollars to 1 Ithaca Hour, and over \$10 million worth of notes have been issued since its creation in 1991. The organization reports that over 900 businesses accept Ithaca Hours, and there are currently over \$100,000 worth of notes outstanding.⁶⁴ Like BerkShares, Ithaca Hours have been widely publicized in the mainstream and popular presses.

These examples send somewhat mixed messages to for-profit banks considering issuing their own banknotes. On one hand, local currencies show that privately produced banknotes can gain some degree of popular acceptance in small communities. Additionally, each local currency has its own system of acceptance and exchange, which might prove instructive for the introduction of private banknotes. On the other hand, local currencies are clearly intended to be local and stay local. As such, they provide little insight on how a privately issued currency could achieve widespread adoption, nor do they clarify the legal questions regarding private notes. Additionally, local currencies do not present a significant challenge to the Federal Reserve's banknote monopoly. Privately produced banknotes that are intended as substitutes for Federal Reserve notes will not necessarily be granted the same ex-

emptions from regulation nor be as well received by the government.

Reviving Private Note Issue

U.S. banks could profit by issuing their own private notes redeemable for Federal Reserve notes. This practice is currently legal in the United States—which begs the question—why have no banks issued their own notes? One possibility is that, in their judgment, there is simply no profit to be had in such an endeavor. This section estimates the potential profits from the issue of private banknotes in the United States, concluding that private notes could create sizable profits for U.S. banks and sizable benefits for American consumers.

Because of the preliminary nature of this exercise, we make three profit estimates: a base case, a best case, and a worst case. The base case is computed using the cost and revenue numbers we consider most likely. The best case assumes low-end costs and high-end revenues, while the worst case assumes high-end costs and low-end revenues. Assumptions and computations are explained so that, should the reader disagree with the assumptions, he might make similar calculations under numbers he deems reasonable.

We also consider potential barriers to entry. First we address the declining use of cash due to emergent payment technologies, noting that despite common perceptions, the use of paper currency has been stable or increasing in the United States over the past decade, as was shown to be the case in Hong Kong, Scotland, and Northern Ireland. Second we consider the willingness of American consumers to accept and use these new products, and the level of market penetration that can be expected. Considering the role of money as a medium of exchange, it seems that private notes are unlikely to be successful unless they gain some critical level of public adoption.

The issuance of private currency is technically legal, but the practical status is un-

clear since no firms have chosen to enter the market. We assume that private note issuers will be able to gain whatever legal exemptions the Fed has granted to local currencies; however, it is possible that large-scale currency producers might be treated differently since they would pose a threat to the Fed's de facto monopoly. Were the U.S. government to prohibit the issue of private notes, then any bank that had already entered the market would lose its initial investment and all future profits.

Potential Profit

The issuance of private banknotes appears to be a significant profit opportunity for American banks. Banks earn profits on the spread between the revenue they earn on their investments and the costs of raising the funds they invest. For note-issuing banks, the return on investment need only be higher than the cost of keeping notes in circulation in order for the bank to turn a profit. This simple formula of revenues minus costs has been used to estimate the historical profits of banks in the United States and Scotland, and it is used by the Federal Reserve to calculate profits on its own note issue. This section uses that formula to estimate the potential profit on private note issue in the U.S. market.⁶⁵

Since the Federal Reserve traditionally invests only in U.S. Treasuries, the Fed estimates its annual revenues by multiplying the yield on Treasuries by the quantity of its notes outstanding.⁶⁶ There are currently about \$1 trillion U.S. Federal Reserve notes outstanding. The current yield-to-maturity on 30-year U.S. Treasuries is about 4.2 percent. Using these numbers yields a quick approximation of \$42 billion in annual revenue for the Fed, which could be captured by private banks, but this overestimates potential profit in several ways. First, it is a revenue calculation, from which we must subtract all costs associated with issuing notes and keeping them in circulation in order to estimate profits. Second, private banks will not capture the entire banknote market cur-

Private notes could create sizable profits for U.S. banks and sizable benefits for American consumers.

The rate of market penetration private-note issuing banks would achieve in the United States is difficult to estimate.

rently monopolized by the Fed. Third, \$42 billion represents one year of the Fed's potential revenue under the current system. To judge whether private currency would be a profitable investment, we must calculate the net present value (NPV) of the profits, first putting the expected future profits in terms of today's dollars, then accounting for upfront costs such as legal services and marketing. An NPV greater than zero indicates that the issuance of banknotes would be a profitable opportunity for a private bank.

We begin by estimating the size of the potential market for private banknotes in terms of the current quantity of Federal Reserve notes outstanding. We calculate the expected money supply for each of the next 10 years and assume a constant growth rate after that time. The Federal Reserve currently has roughly \$1 trillion worth of notes outstanding worldwide.⁶⁷ The optimal rate of money growth should be equal to the growth rate of the U.S. economy, which typically averages 2 to 3 percent growth per year (although actual growth may be lower in the coming decade). In the base case we assume a rate of 2 percent annual growth in the currency base for the first 10 years and no growth thereafter. For the worst case, we assume 2 percent growth for the first 10 years and a growth rate of negative 2 percent per year forever after, and for the best case we assume 2 percent annual growth forever. Private banks, however, could not expect to capture all or even most of this market, at least not in the near future. Approximately 60 percent of these notes are currently thought to be outside the United States.⁶⁸ U.S. banks are unlikely to capture this international market because foreigners may hesitate to accept banknotes that are difficult or impossible to redeem in their home countries. Therefore, we assume that only 40 percent of U.S. Federal Reserve notes currently circulate inside of the United States and that domestic banks will only be able to capture a portion of this domestic market.

What level of adoption could banks expect? In the long-term, the rate could be very

high. Private banks in Scotland and Northern Ireland dominate the market with an estimated 95 percent adoption rate. Only a small percent of transactions are conducted using Bank of England notes. The same is true in Hong Kong, where the government produces only a small percentage of the note supply. It is unlikely that U.S. banks could capture similarly dominant market shares in the near future; Hong Kong, Scotland, and Northern Ireland each have long histories of private notes. Customers in these regions are already accustomed to using private notes, and businesses are in the habit of accepting them without worry. Introducing a new private note in the United States would be much more difficult and costly since Americans are not familiar with these products, and there is no existing network of businesses willing to accept them. Large, expensive marketing campaigns would likely be necessary to build customer awareness. Banks would need to build a network of businesses willing to accept private notes by paying the businesses (and maybe even the note holders).

Since the rate of market penetration private-note issuing banks would achieve in the United States is difficult to estimate, we make three estimates, each over a 10-year term. For the base case, we assume private banks will be able to capture 5 percent of the market for banknotes over a 10-year period. For the best case, we assume 10 percent market penetration, and 1 percent for the worst case. These rates are very low compared to countries that currently have private notes, but they are still fairly high in total quantity. For example, the estimate of 1 percent indicates that private banks will be able to issue \$4 billion in private notes. This is a large figure indeed, considering that there are \$0 in private notes in the United States today, but it seems to be an achievable goal over 10 years considering sales of other popular products. For example, the new computer game *Modern Warfare 3* generated sales of more than \$1 billion in its first 16 days on the market.⁶⁹

Although we assume a base rate of 5 percent market penetration after 10 years, we do not assume that adoption will be linear over this period. It is likely that few customers will choose to adopt a new currency when it is first introduced. These early adopters might be attracted to the new designs, the excitement of being the first to use a new currency, or any monetary reward for holding private money instead of U.S. Federal Reserve notes. Whatever the reason, each person who adopts the new currency and uses it in trade will make the currency easier to use for the next user. We therefore assume that market penetration will be low in early years but will increase at an accelerating rate. These increases could continue past our 10-year timeframe, but to keep these projections realistic, we assume that adoption will level off after the first 10 years. The rate of market penetration will therefore take on an S-curve as shown in Figure 7. Adoption will be low in early years, then high for a few years, then level out by year 10. After year 10, the market penetration will stay constant as a portion of the money supply (which may

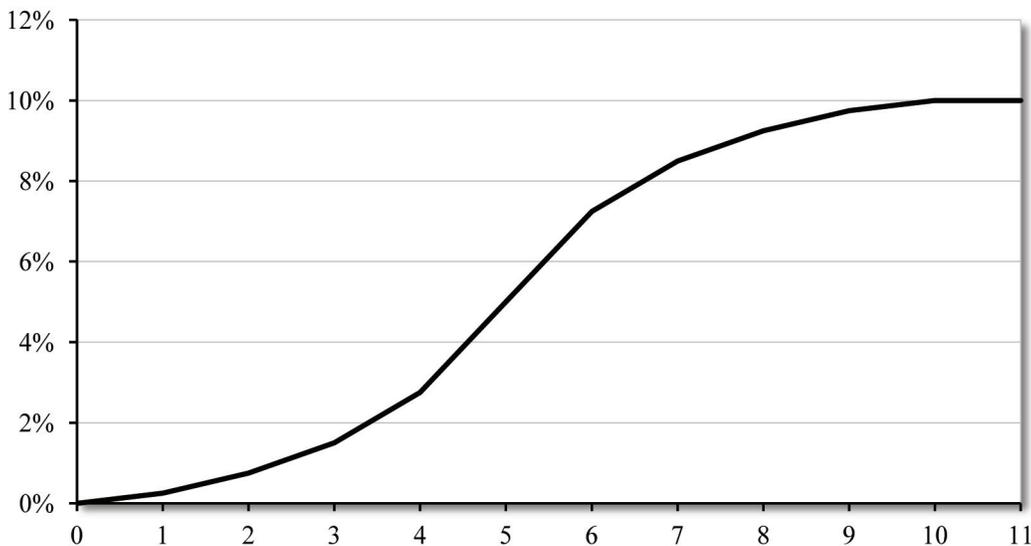
be growing, shrinking, or constant). An alternative estimate, assuming a linear adoption, would increase the projected NPV of an investment in private currency since profits would be higher in the early years of the project.

For calculation purposes, we estimate the percentage adoption in each year according to Table 1. For each year, we show the small percentage adopted out of some target rate of adoption after 10 years (the terminal rate). The quantity of private notes outstanding in each year is calculated by multiplying the total notes outstanding by 40 percent of notes within the country, and then by the market penetration rate in that year. For example, \$1 trillion in U.S. notes outstanding times 40 percent circulating in the United States times a rate of 5 percent would equal a total of \$20 billion private notes outstanding.

Now that we have an estimate of the quantity of private notes, we can estimate the expected revenues and costs. First, we must recognize that not all funds will be available for investment. As with deposits, some percentage of banknote funds must be

It is likely that few customers will choose to adopt a new currency when it is first introduced.

Figure 7
Market Penetration over 10 Years Assuming S-curve Adoption



Source: Best-case Market Penetration Rates Given in Table 1.

Table 1
Rates of Market Penetration

Year	0	1	2	3	4	5	6	7	8	9	10	Terminal
Percent of terminal	0.0%	2.5%	7.5%	15.0%	27.5%	50.0%	72.5%	85.0%	92.5%	97.5%	100.0%	100.0%
Best case	0.0%	0.3%	0.8%	1.5%	2.8%	5.0%	7.3%	8.5%	9.3%	9.8%	10.0%	10.0%
Base case	0.0%	0.1%	0.4%	0.8%	1.4%	2.5%	3.6%	4.3%	4.6%	4.9%	5.0%	5.0%
Worst case	0.0%	0.0%	0.1%	0.2%	0.3%	0.5%	0.7%	0.9%	0.9%	1.0%	1.0%	1.0%

held in reserve to satisfy banknote redemptions in each period. We assume a reserve rate of 10 percent, consistent with the current required reserve ratio for FDIC member banks.⁷⁰ Thus, a quantity of \$20 billion notes outstanding and a reserve rate of 10 percent indicate a total of \$18 billion worth of funds available for investment.

We calculate the annual revenue on these notes by multiplying the quantity of funds available for investment by the bank's rate of return. Estimating the rate of return on assets can be quite subjective, but the economic literature on bank profits often assumes a return of around 5 percent, which appears to be in line with current rates.⁷¹ Annual revenues over assets for the top four banks in 2010 were 5.9 percent for Bank of America, 4.8 percent for J.P. Morgan Chase, 3.2 percent for Citigroup, and 7.4 percent for Wells Fargo.⁷² The simple average of these is 5.3 percent, and these four banks together account for over 60 percent of all assets and deposits in the U.S. banking system. One might expect these banks to be the most likely to issue private currency, so it seems reasonable to use a 5 percent rate of return for the base- and best-case estimates. If private banknotes are instead issued by smaller regional banks, then their local reputations might allow them to earn even higher rates of return.⁷³ On the other hand, it may be that note-issuing banks would receive diminishing returns on their investments, or that they would choose to invest in safer assets. As a safer form of investment, the banks

could purchase 30-year U.S. Treasury bonds with a current yield-to-maturity of 4.2 percent. This rate will, therefore, be used as our worst-case estimate rate of return.

Another potential source of revenue is interest paid on reserves. Cash reserves are often held in accounts at one of the regional Federal Reserve banks rather than being kept in the private bank's vault. In the past, the Fed has not paid interest on these deposits, but it began doing so (at up to 0.25 percent) to incentivize banks to hold more cash during the financial crisis of 2007–2009.⁷⁴ Although this interest provides revenue for commercial banks, it is uncertain how long the Fed will continue to pay it. We assume in the best case that interest is paid on reserves at a rate of 0.25 percent, but that no interest is paid on reserves in the base and worst cases.

We now consider the potential costs. The most obvious cost is the physical production and distribution of banknotes. The Fed estimates the production cost of an individual note at about \$0.045.⁷⁵ We assume a production cost of \$0.045 per note. Private note producers may be able to produce banknotes more cheaply than the government, but they may also wish to enhance their notes with additional features that might increase the cost of production. Given this cost per note, we must also know the distribution of notes in denominations of \$1, \$10, \$100, et cetera. We assume that the distribution is approximately the same as the current money supply, although banks may discover a more

profitable allocation over time. One final consideration is the durability of individual notes. The Fed replaces roughly 4.4 percent of the currency base each year, indicating that each Federal Reserve note lasts about 20 years on average.⁷⁶ Since our current estimate covers only a 10-year span, we assume there are no replacement costs for the first 10 years and that future annual replacement costs equal the cost of production of one-twentieth of the notes outstanding in every year after year 10.

The cost of producing banknotes might change over time, but it is difficult to tell whether it would rise or fall. On one hand, competition among the suppliers of banknotes might reduce the cost of production, assuming banks would have multiple potential printing companies competing for their business. On the other hand, private banks might choose to improve the aesthetics or security features of their currencies in order to attract customers. They might offer new pictures and designs, as banks in Hong Kong, Scotland, and Northern Ireland have done, and this might be costly. Banks might choose more elaborate security features in order to prevent counterfeiting, or they might create verification mechanisms that allow shopkeepers to check the authenticity of notes before accepting them. Of course, these costs too are likely to fall over time, but costs might rise or fall in the medium-run, depending on the elasticities of the cost of production and consumer demand.

The cost of keeping money in circulation is also likely to change, since no system currently exists for the clearing of private banknotes. This may require substantial investments in infrastructure depending on how private note clearing is designed and instituted. Note-issuing banks might be able to clear their notes through the Federal Reserve's existing system, or they might find it necessary to build a new system altogether. The simplest possibility is that the Fed could continue to facilitate note redemption. This could require new systems to sort banknotes and deliver them to the bank by which they

were issued. Building such a system might be costly for any individual bank, but, if coordinated through the Federal Reserve, the creation of a clearing system for private banknotes would involve the collective action of many member banks rather than being borne by any one bank alone.

In effect, the Fed already has a more complex system in place for the clearing of checks. A check requires verification of not only the bank but also the individual account holder and the amount of funds available in the individual's account. This verification process is more complex than would be necessary for a note-clearing system, which would only need to identify the issuing bank and not any particular account. A system for clearing banknotes could merely be a simplified version of the existing check clearing system. Or, if necessary for the short-term, banknotes could be verified as checks written by the issuing bank. The bank need only hold its reserves in a simple checking account, and its banknotes would effectively become checks payable from that account. This option would allow the clearing of notes with no new investment in infrastructure.

Beyond the costs of producing and issuing banknotes, introducing a new medium of exchange would undoubtedly require an extensive marketing campaign. Although the use of Federal Reserve notes is ubiquitous throughout the country, Americans are unfamiliar with private banknotes and might be hesitant to adopt them. Customers would need to be informed about this new type of money, how to obtain it, and how to use it. Most of all, they would need to be assured that these new banknotes would be accepted at regular places of business. The amount of money spent on such a campaign would depend on the form of advertisement, the effectiveness of the ads, and the market share the company expected to capture.

The marketing initiative might come in one large wave or successive small ones. One possibility is that a major bank might attempt to roll out its new notes across the

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entire nation at once with a nationwide advertising campaign. It is difficult to estimate the cost of such an endeavor. Recent national advertising campaigns with similar reach have included \$100 million efforts by Nike, Yahoo!, and Sprint; a \$150 million Tide campaign; and a \$200 million effort to promote the Nintendo Wii. Therefore, a national campaign to introduce private notes is likely to be priced in the hundreds of millions of dollars. We assume a base-case marketing expense of \$200 million. In the best case, we assume \$100 million, and in the worst case \$300 million, which would be among the most expensive national marketing campaigns ever. Alternative estimates, spreading this expense over time, might increase the expected NPV of the investment in private currency.

In addition to the initial marketing campaign, private banknotes would need to be continually marketed to encourage their continued adoption over time. This is especially true if adoption is likely to be low in early years and increase over time as more customers begin using the notes. Thus, we assume a variable annual marketing expense of 5 percent of the value of new banknotes issued in any year.⁷⁷

Another method of encouraging private note adoption might simply be to pay customers to use them. The first step might be to compensate businesses that accept private banknotes. For example, businesses could be paid to put up signs saying “We accept B. of A. Bucks.” Consumers would know where their private notes would be accepted and would be more willing to withdraw and use private banknotes. Any business that promised to accept private notes could be paid to advertise their involvement. Perhaps banks could distribute banknote readers to these businesses in order to verify the authenticity of their notes. Smartphone applications for the blind are already being used to read Federal Reserve notes and verify their denominations.⁷⁸ Alternatively, rather than paying a fixed fee to stores for accepting private notes, it might be possible to pay each business based on the quantity

of private notes they earn (measured by how much they return to the bank). If so, businesses could pass the savings on to their consumers by offering discounts to customers using private money—as is done with the BerkShares local currency.

Another way to incentivize the adoption of private money would be to pay the customer directly via interest or cash bonuses. A bonus could be paid each time a customer chooses to withdraw private notes from the bank instead of U.S. dollars. For example, when withdrawing money at an ATM, the screen might ask, “Would you like \$101 B. of A. Bucks instead of \$100 regular dollars?” Customers who fear that their favorite store might not accept the private money might find the risk worthwhile for an extra dollar. Similar programs are already being used by banks to attract depositors. For example, Happy State Bank of Texas offers its customers a monetary reward for using its ATM machines. The machines are filled with twenty-dollar bills, but they occasionally pay out a fifty-dollar bill for no extra charge.⁷⁹

The problem with paying an up-front cash bonus is that it encourages note cycling. Customers can make money simply by withdrawing banknotes, depositing the banknotes back into their bank accounts, and immediately withdrawing them again. For a cash bonus to be useful, it must not be easily exploitable. Potential ways to avoid this exploitation include paying a bonus when notes are returned to the bank rather than when they are withdrawn, or having bonuses randomly assigned or paid out as a lottery. These strategies, however, generally suffer from the same shortcoming as the withdrawal bonus: they depend on the amount of banknotes deposited or withdrawn rather than the time the dollars are in circulation. It is therefore unclear whether simple cash bonuses can effectively be used to encourage withdrawals while also keeping banknotes in circulation.

The most effective incentive for customers to both withdraw and use private banknotes would be to pay them interest for

as long as the notes they withdraw remain in circulation. Assuming the bank earns 5 percent on its investment, some portion of this revenue could be passed on to the consumer. The rate paid on notes might not even need to be very high in order to induce customers to hold private notes. Savings accounts in the United States currently pay 0.5 percent in interest per year or less. If private notes paid the same rate as savings accounts or higher, then customers could effectively have their own savings accounts at home and earn interest without even going to the bank or opening an account.

There is precedent for interest-bearing notes in United States history. Early U.S. notes did pay interest, and small-denomination bonds were sometimes traded as currency.⁸⁰ Using an interest-bearing note in exchange can be difficult, however, because the value of the note would be constantly changing. The bank would prefer to pay its customers for using private notes while still making its notes easy for customers to trade.

An easier way to reward customers might be to pay interest to the *withdrawer* of the note rather than to the person who redeems it. In this case, the individual who redeems the banknote is paid its stated face value, so the note will always be traded at face value. When the note is returned to the bank, the individual who initially withdrew it receives some interest payment according to the amount of time the note was in circulation. In this way, customers have an incentive to withdraw private notes but not to redeem them immediately. The withdrawer can hold the note as a savings bond, knowing that it will pay interest when returned to the bank, or he can pass the note on through exchange. The longer the note remains in circulation, the more money he gets when the note is finally returned to the bank. In this way, customers have an incentive to withdraw notes and keep them outside the bank, so note cycling is avoided. Interest-bearing currency might also be used as a hedge against inflation. Rather than paying interest at a prescribed rate, the issuing bank could make

payments based on the CPI or some other measure of inflation.

The downside to interest-bearing currency is that the benefit is not highly visible to consumers. Rather than being tempted by an immediate cash bonus, the customer is offered a future payment of unknown amount. Clearly the uncertainty regarding the time and amount of this payment makes it less attractive, but there is reason to think that such a mechanism would still be effective. After all, similar incentives are commonly used in payment systems such as credit card rewards and airline miles. Discover Card pays “cash back” bonuses at the end of each billing period. The company clearly believes that customers value these future payments and even advertises itself as “the card that pays you back.” Airline miles function in a similar fashion. Each can be redeemed for an unknown amount at some time in the future. The number of miles is known to the customer, but the future value of an airline ticket is unknown since the price of tickets constantly changes. These programs are effective for attracting customers, and it seems reasonable that interest-bearing banknotes would do so as well. In fact, interest on private notes would be better in at least one meaningful way, since interest would accrue for as long as the note remained in circulation. The customer can simply withdraw the note and spend it, and he will continue to earn interest with no further effort of his own. For our profit estimates, we assume that in the base and worst cases the bank pays 0.5 percent interest per year on its notes, and in the best case pays no interest on its banknotes.

Banks should also expect some initial legal expenses. The legal aspects of launching private currency are discussed further below, but for now we assume at least some cost associated with establishing note-issuing departments and becoming regulatory and tax compliant. Since there is also a threat of legal action should the government oppose private-note issue, we assume additional legal expenses to fund this potential litigation. For the worst-case scenario, we assume

The most effective incentive for customers to withdraw and use private banknotes would be to pay them interest for as long as the notes remain in circulation.

Even under our worst-case assumptions, the production of private banknotes would still turn a profit.

such litigation will occur and will be one of the most costly lawsuits in U.S. history, and arrive at a total legal cost of \$100 million. In the base and best cases, we assume total legal costs of \$50 million. Additionally, we expect there will be other expenses necessary to initiate the production and distribution of banknotes which are not included in this calculation. We assume these other initial expenses will be \$100 million in the best case and \$200 million in the base and worst cases.

Last, we include the standard business expenses of taxes and operating costs. For taxes we assume a flat corporate tax rate of 35 percent on net earnings. This seems a safe assumption, since all large banks can be expected to pay the highest marginal corporate tax rate. A more onerous tax may be applied to the volume of notes outstanding. Under 12 U.S.C. §541, the government assesses a semi-annual tax of 0.5 percent (totaling 1 percent per year) on the outstanding notes of all national banks.⁸¹ Recalling our assumption of a 5 percent return on assets, this tax would amount to approximately 20 percent of annual revenues, which is quite large. The tax does not apply to state-chartered banks, however, so it might be avoided if the major U.S. banks issue notes through state-chartered subsidiaries. For profit calculations, we assume a 1 percent tax for the worst case, 0.5 percent for the base case, and no tax in the best case.

For administrative expenses we look to the Federal Reserve. On the \$1 trillion in notes outstanding, the Board of Governors had a 2010 operating budget of \$444.2 million.⁸² That is an average of 0.0444 cents per dollar outstanding. To simplify these calculations, we assume an annual operating expense of 0.05 cents per note outstanding. If, for example, a bank were able to put \$1 billion worth of notes into circulation, we would assume an operating cost of \$500,000 per year.⁸³

Using all of these figures, we can now estimate the potential profit from private-note issue. Since we have assumed a low rate of early adoption, net cash flows would be low

in early years and high in later years. In the base case, expected cash flows are negative in the first 5 years, but rise to \$429.1 million by year 10. In the worst case, they are negative for 6 years and reach only \$39.5 million by year 10. In the best case, cash flows are negative for the first 3 years, but rise to more than \$1.26 billion per year by year 10. Clearly there is large variation here because of the wide range of assumptions necessary to make these calculations. Even the worst-case estimates, however, include cash flows of tens of millions of dollars per year, while the best-case estimates are over one and a quarter billion. One could easily imagine that once 10 percent of the population became comfortable using private notes, many more Americans would become accepting of the idea. If market penetration could reach the levels it has in Hong Kong, Northern Ireland, and Scotland, annual cash flows might easily be in the tens of billions.

Of course, cash flow alone does not indicate whether a project will be profitable. To make this assessment, we must calculate the NPV of issuing private notes. The “time value of money” dictates that dollars received today are more valuable than dollars received in the future. We must divide the expected cash flows by some discount factor in order to find the present value of these future payments. The NPV is the present value of future cash flows minus any up-front investment. It represents the current value of all future profits. If the NPV is positive, then the future cash flows from the project are worth more than the initial investment, indicating that private note production will be a profitable endeavor. Our estimates assume that the discount rate for finding the present value of cash flows is equal to the expected rate of return on assets. In each case, we find a positive NPV—indicating that even under our worst-case assumptions, the production of private banknotes would still turn a profit.

In the base-case scenario, we find an NPV of over \$6.0 billion. This case assumes an up-front investment of \$450 million, comprised of \$200 million for marketing plus

\$50 million in legal expenses plus \$200 million in other expenses. Market penetration is assumed to grow to 5 percent over 10 years, while the total money supply will grow by 2 percent per year for 10 years and then level off. We assume a rate of return on assets of 5 percent and a reserve requirement of 10 percent. Expenses are assumed to be 0.05 percent for administrative expenses and 0.5 percent for taxes and interest (as percentages of notes outstanding), plus marketing expenses of 5 percent on all new notes. Given these assumptions, we find a base case NPV of \$6.0 billion. This figure represents the present value of the future profits from private note issue and is quite large relative to the \$450 million cost of up-front investment. Tables of these calculations are presented in Appendix A.

NPV is the best criteria for judging the profitability of a potential project, but it is not the only criteria. Another important statistic is the internal rate of return (IRR). If the IRR is greater than the discount rate for a project, then the project is expected to earn a profit. In the base case, we assumed a discount rate of 5 percent. We find an IRR of 37.3 percent, which is higher than the discount rate, indicating that project will turn a profit. The IRR is also useful because it can be used to compare dissimilar projects. Firms often demand an IRR in the range of 30 to 40 percent for risky projects, and the estimated profit from private-note issue appears to be in that range.

Another criterion for project evaluation is the payback period, or the length of time the project will take to pay back its original investment. Some firms require a short payback period for all projects in order to reduce the uncertainty of their investments. Because we have assumed a low rate of market penetration for private notes in the years following their introduction, the payback period will be longer. In the base case, the original investment will be paid back sometime between years six and seven, which is longer than many firms would like. Some slight changes in our assumptions, however,

could greatly reduce the payback period. For example, if the firm chooses an alternative marketing plan, spreading its marketing investment over several years, the payback period will be much shorter.

The best and worst case NPV estimates illustrate the extremes of our prior assumptions. The best-case scenario assumes a total investment of \$250 million today, made up of \$100 million in marketing expenses plus \$50 million in legal costs plus \$100 million in other expenses. Annual expenses are 5 percent of newly issued notes for marketing, 0.05 percent of notes outstanding for administrative expenses, and 0 percent for interest or taxes. The money supply is assumed to grow at an annual rate of 2 percent indefinitely. We assume 10 percent market penetration after 10 years, with an interest rate of 5 percent on investments and 0.25 percent on reserves. This scenario has an NPV of \$29.0 billion and an IRR of 68.9 percent.

Even the worst-case scenario can be expected to be profitable. We have assumed an up-front investment of \$600 million in marketing, legal, and other expenses, and expenses of 0.5 percent of note issue for interest, 1.0 percent for taxes, and 0.05 percent for administrative expenses, plus annual marketing expenses of 5 percent of the value of new notes. With market penetration of only 1 percent after 10 years, a rate of return of 4.2 percent, and a long-term money growth rate of negative 2 percent, the worst-case NPV is still positive at \$66.2 million, with an IRR of 5.2 percent.

Of course, these numbers are only estimates. We have tried to make reasonable and realistic assumptions, but many could be questioned, and changing them might lead to very different results. Recall that the best-case scenario assumes the best outcomes for all variables (high revenue, low costs, etc.) while the worst case assumes bad outcomes for all variables. The most likely outcomes lie somewhere between these two extremes.

One potential objection to these NPV estimates is that even the worst-case estimate assumes a market penetration rate of

Firms often demand an internal rate of return of 30 to 40 percent for risky projects, and the estimated profit from private-note issue appears to be in or above that range.

Electronic transactions, including debit cards and wire transfers, have increased dramatically but have primarily replaced the use of checks rather than cash.

1 percent, which still might be considered very high in absolute terms. It indicates that banks would have almost \$5 billion worth of private notes in circulation in 10 years. This is quite ambitious, considering there are none in circulation today. As previously discussed, however, private notes need not be initially introduced on a national scale. Banks would likely choose to test market their new currency in a small area before deciding on a nationwide rollout. Or smaller local banks might be able to introduce private notes intended to circulate only in their own region. In such cases, the previous analysis could still be applied on a smaller scale, using appropriate levels of investment and rates of market penetration. In addition to the question of scale, there are other factors which would affect the expected profitability of private notes. We now discuss a few of these legal and logistical challenges.

Barriers to Private Note Issue

First let us consider the question of the future demand for currency. It is often asserted that new methods of payment, especially debit cards and online transactions, have revolutionized commerce in the United States, and that fewer Americans use cash for ordinary transactions. If banks believe the use of banknotes in the United States is declining, they may be hesitant to enter this shrinking market. The situation, however, may not be as bad as is commonly perceived.

Although new forms of payment have become more common, they have not replaced cash at the rate one might expect. A 2009 Fed survey of consumer payment choice found that “During this period of relatively severe economic slowdown, consumers not only got and held more cash, but they also shifted toward using cash and related instruments for more of their monthly payments. The number of cash payments by consumers increased by 26.9 percent.”⁸⁴ A 2010 Fed study, *Non-Cash Payment Trends in the United States 2006–2009*, examined the increasing use of electronic payment systems, finding that both the number and value of ATM withdrawals rose over

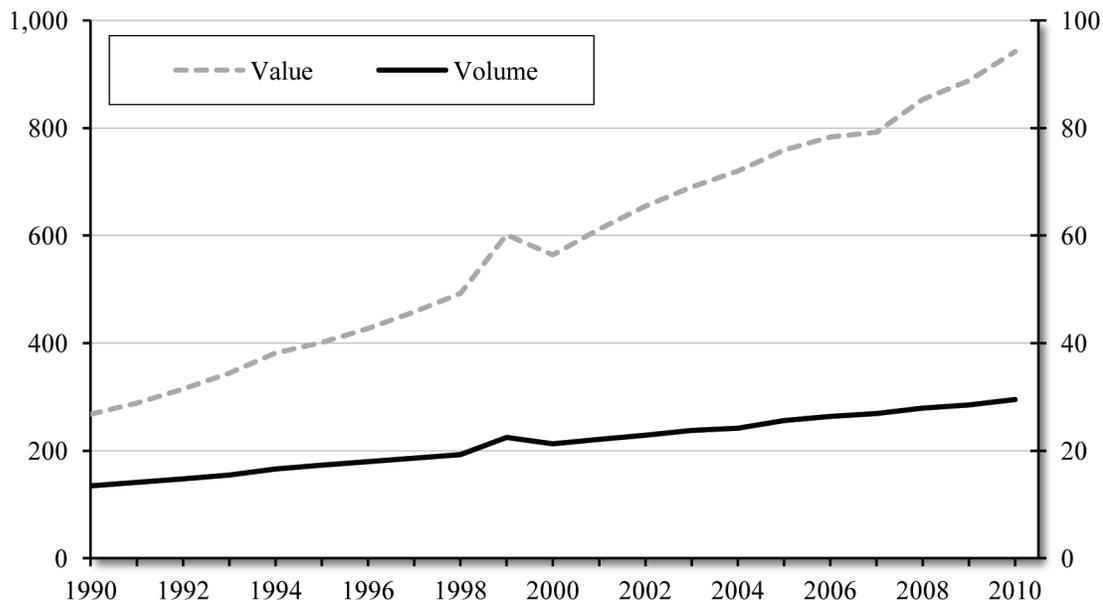
the period.⁸⁵ A similar 2008 study noted that electronic transactions, including debit cards and wire transfers, have increased dramatically but have primarily replaced the use of checks rather than cash.⁸⁶ Indeed, monetary economist Scott Sumner recently responded to the notion that the United States is moving toward an all-credit economy on his blog *The Money Illusion*:

If we were moving to a credit economy then the demand for currency and base money would be declining. But it isn't, [. . .] even the currency component of the base is larger than in the 1920s, even as a share of GDP! It is not true that the various forms of electronic money and bank credit are significantly reducing the demand for central bank produced money.⁸⁷

Figure 8 shows the growing quantity of U.S. banknotes from 1990 to 2010.⁸⁸ The volume of Federal Reserve notes outstanding is represented by the solid line, with the scale on the right y axis in terms of billions of notes. The dotted line represents the value of notes outstanding with the scale on the left y axis in billions of dollars. Both the volume and value of notes have consistently increased over the past two decades. The quantity of notes outstanding has grown at an average annual rate of 4 percent, while the value of notes has grown at 6.4 percent. The value of notes is increasing faster because of an increase in the portion of hundred-dollar bills and a decrease in small denomination notes, especially ones, tens, and twenties.

This evidence is consistent with the currency demand in countries where private notes are currently used. As shown in Figures 5 and 6, the market for private banknotes in Hong Kong, Scotland, and Northern Ireland has been growing consistently for at least the last decade. A 2009 Bank of England study, *The Future for Cash in the UK*, found that “the value of cash transactions increased by around 14 percent over the period 1996–2008.”⁸⁹ There is no reason to be-

Figure 8
Quantity and Value of Federal Reserve Notes Outstanding, 1990–2010



Source: “Currency in Circulation: Value,” The Federal Reserve, http://www.federalreserve.gov/paymentsystems/coin_currircvalue.htm, and “Currency in Circulation: Volume,” The Federal Reserve, http://www.federalreserve.gov/paymentsystems/coin_currircvolume.htm.

lieve that these countries were unaffected by the new payment technologies deployed in the United States.

Another objection to the possibility of privately issued notes is that such a system would be “too chaotic” for consumers. Americans are used to a single currency, the argument goes, and they would be unable to adopt a system of multiple private currencies. This objection is unfounded for at least two reasons. First, customers have no trouble using private notes in Hong Kong, Scotland, or Northern Ireland. Second, this objection overlooks the institutions that simplify note trading. As with any market, it need not be the case that *every* buyer is informed, but only the *marginal* buyer. When a few market participants are closely monitoring the value of banknotes, other consumers can assume that the notes are accurately priced. This was true historically of the Suffolk system and the national banking system in the United States. All brands of private notes were traded at their par prices, and customers traded notes indiscriminately without

checking each note individually. Newspapers and banks published daily lists of the note issuers they considered reliable.

A final reason not to fear complexity in a private system is that only a few major banks are likely to issue notes. As discussed, four U.S. banks control the majority of deposits in the banking system. It is these banks that are most likely to enter the currency market, at least on the national scale. Some small banks might also choose to enter the market at a regional level. A small bank might have trouble getting its notes accepted outside of its home region, but it may have the advantage of its reputation in the local market. Again, the problem of complexity presents little trouble for consumers who are likely to know the local brand.

Would Americans be willing to adopt privately printed banknotes as a medium of exchange? It seems clear from the example of local currencies that private banknotes can easily be adopted on a very small scale. The difficulty comes in transitioning these notes into the mass market. Rather than commit-

The problem of complexity presents little trouble for consumers who are likely to know the local brand.

The threat of legal action may be the greatest barrier to entering the market for private banknotes.

ting a large initial investment, a better strategy might be to introduce private notes slowly, concentrating efforts in smaller cities or regions. After all, the more private notes are used in a given area, the more likely customers in that area are to adopt them. For example, if a small area had a high adoption rate then consumers in that area would be much more likely to use private notes because they can be assured that other people and businesses are willing to accept them. If adoption occurs at a low rate across the country, however, then private notes are unlikely to gain momentum in any area since they will be unable to become sufficiently common as a means of exchange in any locale.

Considering this fact, the best opportunity for the success of private notes might be to first introduce them in a medium-sized town where the local economy is mostly self-contained. If the town is too large, then it will be difficult to get enough businesses to accept the private notes. If the town is too small, then the economy will be reliant on trade from other regions in which private notes have not yet been adopted. Consequently, the optimal strategy might be to find a small number of medium-sized towns in which private notes could be first introduced. If private notes are adopted in these towns, their use could spill over to other nearby towns, big and small alike. Under this strategy, optimal use of marketing resources might not be to spend all \$200 million on an initial national advertising campaign, but to use smaller, focused campaigns over the course of several years. Spreading this expense over several years would also increase expected profits.

The threat of legal action may be the greatest barrier to entering the market for private banknotes. Despite the apparent legality of private issue, the threat of litigation may make note production prohibitively costly. The U.S. government has been particularly hostile to parties impinging on its note-issue monopoly. Bank managers may be afraid that the Fed, Treasury, or Department of Justice will attempt to prohibit or

ban the issue of private currency, tax away the profits of private issuers, or even bring criminal charges against them. If so, the bank's up-front investment, as well as all future profits, would be lost.

The government's hostility toward private currency producers is clearly illustrated in the case of the Liberty Dollar. Beginning in 1998, Liberty Services (formerly the National Organization to Repeal the Federal Reserve Act, or "NORFED"), run by economist Bernard von NotHaus, produced small discs made of gold and silver. The company termed its products "Liberty Dollars," with the disclaimer that they were not intended to be used as coins or legal currency. Despite this, von NotHaus was arrested in 2009 and charged with the manufacture and possession of coins of gold or silver that resemble U.S. currency.⁹⁰ He was convicted on both counts and currently faces fines of up to \$250,000, five years in prison, and the confiscation of up to seven million dollars' worth of Liberty Dollars.⁹¹ The Justice Department called Liberty Services' coin production "insidious" and claimed it presented "a clear and present danger to the economic stability of this country." The district attorney went so far as to call the production of coins "a unique form of domestic terrorism."⁹² Liberty Services also issued promissory notes redeemable for gold and silver, but these notes were not the subject of any legal action against von NotHaus or Liberty Services.

Given the overzealous nature with which these regulations are enforced, it is understandable that banks would be hesitant to enter the market for private currency. Von NotHaus was not charged for producing promissory notes, and it seems that note issuers who gain approval from the Federal Reserve, as local currency issuers have done, would likely be immune from prosecution.⁹³ Still, the von NotHaus trial sent a strong signal regarding the government's position on private currency production.

If a bank were to produce private banknotes, government litigation could possibly eliminate the bank's entire future in-

come stream from the project. As noted, it is likely that adoption will be slow initially, so most value created by the project would come from future revenue. Consequently, even a small probability of government interference could eliminate potential profits from the introduction of private banknotes. As in the extreme example of the von Not-Haus case, government legal action could even result in confiscation of the company's assets and criminal charges against the bank's managers. The Department of Justice might also choose to prosecute the producers of private banknotes under anti-counterfeiting statutes, which prohibit the production of cards or advertisements similar to U.S. currency.⁹⁴ Considering these outcomes, the potential for government action appears to be the greatest barrier to the introduction of private money.

Even if private banks are able to issue banknotes without interference from the federal government, there are further legal questions that would need to be resolved. First, would national banks issue notes through their current charters, or would they open state subsidiaries for their issuing activities? As previously discussed, because of the federal tax levied on outstanding national banknotes, it might be in the banks' best interest to issue notes through state-chartered subsidiaries. Alternatively, since national banks are already quite involved with the legislative and lobbying process relating to financial regulation, perhaps they would be able to convince Congress to repeal the national note-issue tax altogether.

Second, how would a clearinghouse for private banknotes operate? Would banks be allowed to use the Fed's check-clearing system, or would it be necessary to develop a new system from scratch? Perhaps some combination of these would be optimal, such as using the check-clearing system in the short-term, while building infrastructure for a more efficient note-clearing system. Third, would banknote liabilities be covered by FDIC deposit insurance? Although these obligations are not traditionally thought of

as deposits, the case could be made that they face the same uncertainty of redemption as bank deposits and should therefore receive the same guarantee. FDIC insurance would likely hasten the adoption of private notes, since their value would be "backed by the full faith and credit of the United States government." Such a guarantee, however, would erode the economic stability engendered by private currency since banks would be less accountable for the riskiness of their investing and note-issuing activities.

Another possible reason banks have not yet issued their own notes is that they may simply be unaware of the legality of private-note issue. In his 2001 study "Note Issue by Banks: A Step toward Free Banking in the United States," Kurt Schuler found that representatives of the finance industry were unaware that U.S. banks could legally issue private notes. He therefore concluded that "[i]gnorance, rather than a judgment by banks that note issue would not be profitable, seems responsible for the Federal Reserve's continuing monopoly on note issue."⁹⁵ Yet in the 10 years since that study was published, the Fed's de facto monopoly power remains unchallenged. Instead, it seems likely that despite the apparent legality of private note issue, banks have chosen to refrain from entering this potential market because of the uncertain profits and the potential for legal action.

Considering these challenges, banks wishing to take advantage of the market for private currency must proceed with caution. As discussed, large banks would likely begin operations in small regional test markets before going nationwide. This strategy would also allow them to test the legal implications before committing to significant levels of investment. In addition, banks would likely seek a summary opinion from the judiciary or a statement from Congress clarifying the laws governing private currency before any major investment is undertaken. A reduction or elimination of the annual tax on notes outstanding might also encourage banks to enter the market for private notes.

Considering the challenges involved, banks wishing to take advantage of the market for private currency must proceed with caution.

Commodity-based Currency

Another way banks could enter the market for private money would be to create a commodity-based currency (CBC) for international trade. A bank could issue banknotes redeemable for a valuable commodity like gold or silver. Such a currency would have the advantage of holding its value better than dollar-based banknotes and would be less susceptible to government manipulation. Given the current legal environment, it might be difficult to introduce a CBC within the United States, but such a currency would likely be attractive to the international markets for banknotes and currency.

An international CBC would have several advantages over banknotes based on a fiat currency. First, it would not be subject to the same legal constraints as domestic currency. Second, it could be introduced gradually rather than requiring widespread adoption. Third, the costs would be lower, since international transactions do not generally require that physical cash changes hands. Fourth, the international currency market is potentially much larger than the domestic market and therefore offers significantly higher profit potential.

Acceptability versus Value

The greatest benefit of commodity-based currency is its stable store of value. The fundamental quality of money is that it is commonly accepted as a medium of exchange. But in the choice between types of money, value stability may be the most important quality. There is a long and ongoing discussion regarding the tradeoff between degree of acceptability and stability of value.

Milton Friedman and Friedrich von Hayek famously debated the relative importance of these forces in the context of money adoption.⁹⁶ Friedman considered money's role as a medium of exchange its primary and most important quality. For example, despite the erosion of the value of the U.S. dollar, it remains the most common medium of exchange in

international trade, notwithstanding the existence of more stable currencies such as the Swiss franc. Friedman argued that the dollar is commonly used because so many people are already willing to accept it. This is the quality of money as a medium of exchange, a property sometimes described as "network effects." The larger the network of dollar users, the greater the advantage to any new user. Because the U.S. dollar is so commonly accepted, it is easier for a trader to transact in dollars rather than a more stable, but less common, currency like the Swiss franc.⁹⁷ Friedman therefore concluded that the exchange value (or network effects) of money greatly outweighs its importance as a store of value.

Hayek argued that although its acceptance as a medium of exchange is the defining characteristic of money, its role as a store of value is sometimes more important. In his book *The Denationalization of Money*, Hayek posited a private fiat currency which he called the Swiss ducat. The ducat could be issued in quantities sufficient to facilitate wide exchange, but the annual growth in the quantity of ducats would be sufficiently low to maintain a stable value. Hayek's example of the Swiss ducat is clearly based on the real example of the Swiss franc, which is administered in a similarly stable manner.

The Swiss franc provides a real-world example of Hayek's point that traders often value a currency for its stability rather than its widespread acceptance or network effects. The stable long-term value of the Swiss franc provides a substantial benefit to international traders. The volume of exchange in Swiss francs is small compared with that of U.S. dollars, but it is quite larger relative to the size of the country and has a disproportionate influence in international trade. Despite Switzerland having only the 19th-largest economy in terms of GDP, the Swiss franc is the 4th most commonly used currency in international trade and the 6th most widely held foreign reserve currency.⁹⁸ Swiss banks account for roughly 5 percent of all currency exchange—the 5th most of any country.⁹⁹ The example of the Swiss franc demonstrates

An international commodity-based currency would have several advantages over banknotes based on a fiat currency.

that there is a significant portion of international traders who value the store-of-value aspect of money over its network effects. In fact, any existing network or set of consistent trade partners might find it advantageous to switch their regular trades to a stable currency, like the Swiss franc, rather than using a currency that is more widely accepted but less consistent in value.

The stable value of the Swiss franc comes from the long-run perspective of the Swiss government, but a commodity-based currency might provide an even more stable source of value. If a more stable currency were available, how much market share would it take from the Swiss franc? What about from the dollar? Although Friedman used the dollar as an example of an unstable currency, its value has been relatively stable in recent decades relative to other major currencies. The U.S. dollar is a “vehicle” currency that is used as a channel for international trade between nations that do not use the dollar as their official currency.¹⁰⁰ The U.S. dollar is also considered a “safe-haven” currency in which investors choose to hold their funds in times of crisis.¹⁰¹

Would a CBC provide a more stable medium of exchange than the U.S. dollar or the Swiss franc? One classic argument against a gold-based currency is that it is subject to the whims of new gold discoveries that would decrease the value of the currency already in circulation by increasing the money supply. This argument, however, is both theoretically and historically unsound.

First, the production of gold is endogenous, meaning it both affects and is affected by the price of gold. When the price of gold rises, more gold is discovered. Although any single discovery of gold may be a random accident, more people will be prospecting for gold if the price is high, so more gold is likely to be found. There are real costs to exploring for gold, mining it, and bringing it to market. Any gold producer must weigh the marginal costs of additional prospecting against the expected marginal benefits. When the price of gold rises, gold producers

put more money into exploration and production. Additionally, a mine may hold several veins of gold, some of which are cheap to harvest and some more expensive. When the price of gold rises, the miner will find that harvesting from the more expensive parts of their mine becomes profitable, and the production and transportation costs become smaller relative to the potential revenue. Therefore, a rising price of gold causes more gold to be produced. Conversely, a fall in the price of gold means that gold production is less profitable, so less gold will be produced. In this way, the price of gold often determines gold production rather than being determined by it. Indeed, according to a study by Hugh Rockoff, most gold strikes during the 19th century were the result of increases in prospecting rather than accidental discoveries.¹⁰²

Second, even when a sizable goldmine is discovered, it is unlikely to lead to significant inflation. The greatest examples of gold discoveries during the era of the gold standard took place in California in the 1840s and Australia in the 1850s. Each of these discoveries resulted in a gold rush that drew people and resources into mining and poured large amounts of gold into the world market. But despite their significant size, these discoveries had little effect on the worldwide price of gold. The study “Money, Inflation, and Output Under Fiat and Commodity Standards,” by Arthur Rolnick and Warren Weber, examines prices in 15 industrialized nations in the 19th century and finds that the major gold discoveries caused price inflation of only 1.75 percent per year. This compares favorably to the average inflation rate of 9.17 percent per year in these same countries following their adoptions of fiat monetary standards.¹⁰³ Even in recent decades of low inflation in the United States, the period we call the Great Moderation, the Fed has pursued a target inflation rate of 2 percent, which it has often exceeded. Thus, even the least stable periods under the gold standard had lower inflation rates than the most stable period of central banking in the United States.

Even the least stable periods under the gold standard had lower inflation rates than the most stable period of central banking in the United States.

If a private commodity-based currency were more reliable and more accessible than the dollar, it is likely that its adoption would be very high.

The longest sustained inflation under a commodity standard occurred in 16th-century Spain after Columbus' discovery of the Americas. Spain imported large amounts of precious metals (especially silver) from its American colonies, which caused substantial increases in its domestic money supply. As a result, the price level in Spain from 1525 to 1600 more than tripled. In his paper, "The Price Revolution: A Monetary Interpretation," Douglas Fisher documents how arbitrage between nations caused this inflation to spread from Spain throughout the rest of Europe. "What is particularly striking about this event—recognizing that the point of impact of the inflow of specie from the Americas was, for the most part, Spain—is the roughly parallel rise of Spanish and other European price levels."¹⁰⁴

Although the length and breadth of inflation in this period may appear striking, the rates of inflation are actually quite moderate compared with those experienced under central banking. A tripling of the price level over 75 years implies a compound rate of inflation of 1.48 percent—a level far below the target rate of most central banks—and the annual rates during Spain's "Price Revolution" were actually slightly lower than this. In comparison, Spain's average rate of inflation over the past 45 years has been almost 8.0 percent.¹⁰⁵ Again, we see that the least stable periods under a gold standard provided lower rates of inflation than even the theoretically optimal case of central banking, and far lower than the actual historical rates of inflation.

A bank producing a CBC might also choose to issue redeemable banknotes. Many countries are "dollarized," meaning the dollar replaces or circulates alongside the local currency. This may be partly because of trade with the United States, but much of it is clearly due to the dollar's relatively stable value. After all, most transactions occur within a single country and have nothing to do with the United States. It seems quite logical that a CBC would be attractive for trades within dollarized countries, and could tap

into a large international market for paper currency (considering that 60 percent of U.S. dollars are currently used outside the United States). If the private CBC were both more reliable and more accessible than the dollar, then it is likely that the adoption of the new CBC would be very high.

A stable CBC might be more useful than the dollar in these countries. According to the essay "Dollarization," by Alberto Alesina and Robert J. Barro, the main advantage to dollarization is that it binds the government to a stable monetary policy of not overstimulating the economy or inflating away its debts.¹⁰⁶ A study of 21 Latin American countries from 1960 to 2003 found that dollarization significantly reduced inflation,¹⁰⁷ and OECD studies showed that "countries allowing citizens to legally hold foreign currency tend to have lower average rates of inflation."¹⁰⁸ A stable CBC might provide similarly beneficial results.

Several countries are officially dollarized. Ecuador and El Salvador both use the U.S. dollar as their official currency. Panama has its own official currency, the balboa, which is officially fixed to the U.S. dollar at a 1-to-1 ratio, and dollars circulate in the country as the primary means of exchange. Peru and Uruguay were highly dollarized through the middle of the first decade of the 21st century, but have since experienced some degree of de-dollarization due to recent financial reforms. These nations have become dollarized partly because of strong trading ties to the United States, but also because the citizens of these countries cannot trust their central banks to maintain a stable national currency. A stable CBC might be able to capture a sizable share of the currency markets in these nations.

Several other countries are partially dollarized. For example, a study "Exchange Rate Movements in a Dollarized Economy: The Case of Cambodia," by Sok Heng Lay, Makoto Kakinaka, and Koji Kotani, found that in Cambodia, "[t]he dollarization index [percentage of dollars in the money supply] has surged from around 55 percent in 1998 to

around 80 percent in 2007.”¹⁰⁹ The authors note that U.S. dollars tend to be used more by wealthy Cambodians because dollar denominations are rather large relative to local prices, while Cambodian riels are used primarily by the poor. Wealthy Cambodians also have more access to dollars through international trade. This makes the lower economic class most likely to be adversely affected by the government’s inflationary habits. These poorer Cambodians might be prime customers for a CBC, since they are in need of a stable currency. A 1999 study by the International Monetary Fund found 52 countries that were at least moderately dollarized.¹¹⁰ Although the term “dollarized” refers to the U.S. dollar, it can also be applied generally to any country in which a foreign currency is used as a medium of exchange. Several other currencies, such as the euro and Chinese yuan, play strong roles in regional trade for the same reason.¹¹¹ An international CBC might capture market share from these other currencies as well.

We can see that international commodity money would have great benefits for individuals and national economies. These benefits would be particularly significant for large companies participating in international trade. There are several major international banks that could produce such a currency with very little legal expense or threat of litigation. Commodity-based currency would also be very useful in less-developed countries. International commodity money thus appears to be a great potential opportunity for profit.

Establishing a Commodity-based Currency

A commodity-based currency is fundamentally simpler than fiat-based private banknotes because it is backed by a physical good rather than a government guarantee. Banknotes redeemable for gold or silver existed long before central banks issued paper fiat currency. Nevertheless, introducing a CBC today, when all of the world’s currencies are based on fiat standards, might still be difficult. As with private banknotes, the

difficulty lies in creating a critical mass of acceptance so that individual traders are willing to use the new money because they are confident that other traders will accept it in exchange. This problem may be smaller for a CBC since international trading groups are likely to have fewer transactions and partners. Unlike private notes, a CBC would not face the domestic legal challenges of any particular country.

The process of introducing a CBC would be different from the process of introducing private notes. First, customers will likely make their deposits in money, not the commodity, so the bank would need to convert at least some of whatever currency is deposited into the commodity. Second, the bank would need to physically store some of the commodity on location in case its customers choose to redeem their currency for the actual commodity. Third, the supply of CBC would likely be partly in the form of banknotes and partly held as deposits. For banknotes, the bank would face the same costs of production described earlier. For deposits, the bank would profit on the spread between the rates on loans and deposits.

Let us assume that a bank was to offer a new currency based on gold because the long-term value of gold has been very stable relative to most fiat currencies. Since no major CBC exists today, the bank would likely take deposits in other currencies. Per standard banking practice, part of the deposit would be lent out or invested, while the rest of the money would be used to buy gold to be held on reserve. Customers would expect to be able to redeem their deposits in gold (or possibly in another currency but the value at the time of redemption would be based on the value of gold during the period and not on the value of any other currency). In this way, customers could take advantage of the stability of the commodity and need not worry about national politics or international demand affecting any particular currency.

The amount of physical gold held by the bank could vary depending on how its

A commodity-based currency is fundamentally simpler than fiat-based private banknotes because it is backed by a physical good rather than a government guarantee.

Commodity-based currencies are potentially more profitable than domestic private banknotes.

customers expected to be paid. If customers expect to redeem their notes for actual gold bars, then obviously the bank would need to keep gold on hand. This would require physical storage of gold at some or all branch banks. For large quantities of gold, storage and security might be quite costly. Gold storage would require a larger storage area and better security features than a standard branch bank, but any bank with safety deposit boxes is already equipped with this capacity. A bank might reduce these costs by limiting redemption to only a few main locations. The bank might also require advance warning from any customer requesting physical delivery. Indeed, a two-day notice was once required by goldsmiths for the redemption of gold-denominated promissory notes. Such a practice would allow banks sufficient time to transport gold between facilities and require less gold to be kept on site at any individual bank.

Most CBC users would likely value the stability of the currency rather than the commodity itself. As such, most customers would be expected to hold their gold-denominated currency in the bank or to redeem it for some alternative currency rather than physical gold. In this case, the bank would not need to keep much physical gold on hand. Instead, the bank might choose to own large quantities of gold but have it stored in a private vault, such as the New York Federal Reserve Bank. Alternatively, they might simply buy and hold futures contracts on gold so that they receive the stable value of gold without taking ownership of the gold itself.¹¹²

Unlike private banknotes, introducing a CBC is less likely to require major legal battles. It could be the case that private notes redeemable for gold would still be subject to U.S. currency regulations, but this does not appear to be the case. Recalling the case of Liberty Dollar, von NotHaus and Liberty Services produced promissory notes redeemable for gold—but these notes were not the subject of litigation. Only the production of coins similar to U.S. coins was deemed illegal, although clearly the degree of similar-

ity is subject to interpretation. This example does not guarantee that there will be no legal action, but it appears to be less of a concern. Additionally, the international market for a CBC will likely be a much bigger target than the domestic market. International trade is conducted in all types of currencies and is not subject to domestic currency regulations. It seems that banks could immediately profit by entering this market.

An international CBC might be easier to introduce than private banknotes since it would be marketed to many small markets rather than a single large one. In the case of private banknotes, an individual is unlikely to use a banknote unless his trading partners are willing to accept it. In the U.S. economy that includes a vast array of businesses and individuals, including restaurants, gas stations, grocery stores, and any other business that might accept cash. If most of these establishments are unwilling to accept private banknotes, then consumers are unlikely to carry them.

In contrast, international trade is composed mostly of large transactions between known parties. Rather than dealing with many random businesses, an international trader generally has a small set of trading partners with whom he regularly deals. Transactions are often large in value and involve planning and preparation, including the specification of the currency to be used in the exchange.¹¹³ This level of planning indicates that traders would value a stable currency in which to transact.

These factors make CBCs potentially more profitable than domestic private banknotes. The market for a CBC is larger, while the costs of entering the market, money production, and potential litigation are all lower. The next section estimates the potential profit to private banks on the introduction of a CBC.

Potential Profit

The potential profit from establishing a CBC can be calculated in a manner similar to that of the domestic market for private notes.

We consider the potential world market for a CBC in two parts. First, we estimate the potential deposits from international traders who might use a stable CBC. Second, we estimate the potential quantity of notes that might replace U.S. dollars in dollarized countries. We then use these quantities to estimate the potential profit from creating a CBC.

As before, we begin by estimating the size of the market in international trade and the potential penetration of the new currency. Let us consider a new commodity-based currency as a substitute for U.S. dollars in international exchange. What volume of international transactions in U.S. dollars would be captured by a CBC? Let us assume that some portion of U.S. dollar deposits held outside the United States is used for trade, while the rest is held as a store of value. The same is true of the Swiss franc. The Bank of International Settlements reports that there are \$9.655 trillion worth of deposits in U.S. dollars held outside the United States, and \$392.8 billion in deposits of Swiss francs (measured in terms of 2010 USD) outside of Switzerland.¹¹⁴ That is a total of \$10.0487 trillion in U.S. dollar and Swiss franc foreign deposits (if we include foreign deposits in all currencies, the number would be \$16.6371 trillion). To this figure we can add the potential market for cash dollars of a CBC. In the previous section we assumed that 60 percent of the total 1 trillion of U.S. dollars in circulation are currently outside the United States. Although a CBC would be unlikely to replace all U.S. dollars, it might capture some of the market from other currencies, such as the euro and yuan. Adding this potential market to the previous estimate of foreign deposits values the potential market for a CBC at \$10.6487 trillion.

Using this quantity estimate, we can calculate the potential profit from a CBC. Let us assume that a CBC issued by private banks can capture just 1 percent of the potential market. Although some portion of the currency is expected to be backed by physical gold reserves, the costs of storage are negligible because a single gold bar is valued at

roughly \$760,000 and yet can be stored for only a few dollars.¹¹⁵ Going forward, we follow the profit model described in the previous section with all rates, such as return on assets, annual marketing and administrative expenses, and cost of production equal to those of the base case. We assume a reserve ratio of 10 percent, money supply growth of 2 percent per year for 10 years, and 0 percent growth thereafter, and that money is adopted in an S-curve. We assume a total upfront investment of \$5 billion. Using these figures, we find an NPV of \$67.3 billion and an IRR of 42.3 percent. These calculations are presented in Appendix B.

The large potential market for a CBC causes the NPV estimate of \$67.3 billion for a CBC to be much higher than the best-case profit estimate for private banknotes. The assumptions involved, however, are less certain. The assumption of 1 percent market penetration is used simply for example. The reader is encouraged to repeat these calculations using assumptions and estimates he deems most appropriate. There certainly appears to be a large potential market for a stable international currency, as evidenced by the use of the U.S. dollar and Swiss franc in international trade. Establishing a CBC would require only a small initial investment but may yield large potential profits.

Conclusion

For almost a century, the Federal Reserve and central banks around the world have inflated away the values of their currencies without achieving noticeable improvements in economic stability or performance. Their inflationary policies act as hidden taxes on consumers, create deadweight economic losses, and misallocate scarce resources. By contrast, the American experiences of 19th century free banking and national banking were periods of strong economic growth and consistently stable prices. If private banks were to resume the production of currency, they could help stabilize the values of

There certainly appears to be a large potential market for a stable international currency.

The provision of banknotes by U.S. commercial banks could provide the first step toward true competition in currency.

currencies in the United States and abroad.

The provision of banknotes by U.S. commercial banks could provide the first step toward true competition in currency. Banks could issue private notes redeemable for U.S. Federal Reserve notes. Competing banks would have the incentives to maintain the value of their banknotes by limiting the extent of their note issuance and to provide banknotes with features that best satisfy consumer preference. This type of semi-private system is already employed in Hong Kong, Scotland, and Northern Ireland, and private banknotes are heavily favored over government-issued notes in these regions. The issuance of private banknotes appears to be technically legal in the United States, although the government's avid prosecution of currency-related crimes might lead one to question whether private note issue would be allowed in practice.

U.S. banks could potentially earn billions of dollars in annual profits by issuing private banknotes. The greatest obstacles to the introduction of private notes appear to be the threat of legal action and the challenge of marketing this new product to American consumers. Costs of potential litigation appear to be small relative to potential profits from note issue, but the downside risk of losing all future profits is considerable. Targeted marketing campaigns would likely be the most cost-effective promotional strategy, and might lead to the highest rates of adoption. If these challenges are carefully negotiated, U.S. banks may then capitalize on this potential opportunity for substantial profit.

To encourage their adoption, Congress should clarify the legal status of private banknotes and eliminate the taxes on nationally chartered banks. Nationally chartered banks are required to pay a semiannual tax of 0.5 percent (1 percent annually) on the value of their notes outstanding, while no federal tax applies to note issue by state-chartered banks (although taxes may ap-

ply at the state level). Repealing the federal tax would put state and national banks on equal footing and avoid wasteful losses from regulatory arbitrage. Additionally, Congress could declare it legal for banks to issue promissory banknotes redeemable for Federal Reserve notes, and also establish that private banknotes are neither counterfeit nor similar reproductions of Federal Reserve notes.

The creation of a commodity-based currency would be a boon to firms and consumers in the United States and abroad. Considering the widespread usage of the U.S. dollar in foreign transactions, and the disproportionately large reserve holdings and number of international transactions in Swiss francs and Hong Kong dollars, there appears to be a large potential market for a stable international currency. Private banks may be able to serve this market by providing a currency whose value is based on gold or a similar commodity. Before the era of fiat currencies, gold-backed currencies helped enable international trade with minimal disturbances in the long-term price level. Creating an international CBC would avoid the legal obstacles facing a domestic private currency. Although the U.S. government has limited authority over international transactions, a policy of nonintervention should be encouraged. A CBC might not be as immediately adopted by domestic consumers, but allowing it in the United States would be an important step toward its use in international transactions.

Congress needs to guarantee the feasibility of private money for the benefit of consumers in the United States and around the world by clarifying the legal status of private banknotes; eliminating the tax on nationally chartered banks; and prohibiting the Fed, Treasury, and Justice Department from taking action against private money producers. After such actions are taken, private banks will find it in their own interests to enter the market for private currency.

Appendix A: Estimating the Profits on Private Banknotes

This appendix describes the model used to estimate the potential profits from private-note issue. The model is based on Bell's "Profits on National Bank Notes" and other similar works. It is used to estimate annual profits over the first 10 years of private-note issue.¹¹⁶ We then estimate a terminal value based on year-10 profits and use these estimates to calculate the NPV of the potential project.

The first step of the analysis is to estimate annual revenues. We assume that the bank will be able to capture some percentage of the domestic market for U.S. dollar bills. Let N_t represent the total quantity of notes outstanding worldwide in year t , and let η represent the portion of bills currently outside the United States. If N grows at some annual rate g for each year t , then let the domestic circulation of dollars be calculated as $N_{D_t} = N_0(1-\eta)(1+g)^t$. The bank will be able to capture some portion ϕ_t of the domestic circulation. The value of ϕ_t in each year is based on an S-curve adoption calculated from the estimated adoption ϕ_{10} in year 10, as shown in Figure 7. Thus, the bank's potential market in year t is calculated in equation A.1:

$$(A.1) N_{B_t} = \phi_t N_{D_t} = \phi_t N_0 (1-\eta) (1+g)^t.$$

The potential market N_{B_t} acts as a revenue base for the bank. For each private note the bank issues, it gains \$1 to invest. Some of the bank's new investments will be loans to customers. The bank must maintain some portion ρ of liquid reserves for its notes outstanding. The total funds net of reserves can be invested by the bank at some rate of return r_p , and any interest on reserves is paid at a rate of r_i . The annual revenue of the bank in year t is calculated in equation A.2:

$$(A.2) R_t = [(1-\rho)r_p + \rho r_i] N_{B_t}.$$

Earnings in each year can be calculated by subtracting annual expenses from the annual revenue R_t . These expenses include marketing, M_t ; administration, A_t ; note production, P_t ; and any interest, I_t , paid on notes outstanding. Marketing and note production expenses are calculated as percentages m and p of new notes entered into circulation, such that $M_t = m(N_{B_t} - N_{B_{(t-1)}})$ and $P_t = p(N_{B_t} - N_{B_{(t-1)}})$. Administration and interest expenses are assumed to be proportional to notes outstanding, such that $A_t = aN_{B_t}$ and $I_t = iN_{B_t}$. Subtracting annual expenses from annual revenues yields annual earnings before taxes EBT_t as shown in equation A.3:

$$(A.3) EBT_t = R_t - (M_t + A_t + P_t + I_t) \\ = R_t - (m + p) (N_{B_t} - N_{B_{(t-1)}}) - (a + i) N_{B_t}.$$

The tax T_{B_t} on banknotes in circulation and the corporate income tax T_C are then taken out. The tax on banknotes is a percentage b of notes outstanding $T_{B_t} = b(N_{B_t})$. The corporate taxes are a percentage T_C of EBT_t less the note tax such that $T_{C_t} = T_C(EBT_t - T_{B_t})$. This yields the annual after-tax profit, as calculated in equation A.4. Annual profits can be used as the cash flow in each year for calculating NPV:

$$(A.4) \Pi_t = EBT_t - T_{B_t} - T_{C_t} \\ = (EBT_t - bN_{B_t})(1 - T_C).$$

The potential NPV of the private-issue of banknotes is equal to the sum of the present values of cash flows in each year less any necessary investment at time $t = 0$. Cash flows will be discounted by a discount rate that is assumed to be equal to the bank's rate of return on investment $r = r_p$. A terminal value is added in year 10 to account for all cash flows after that year. In most NPV calculations, terminal value is calculated as a perpetuity of the final year's cash flow. In this case, however, long-term costs might be different from final year costs. We assume that notes in circulation will deteriorate and wear out at some rate, δ , in each year, and will need to be replaced at that rate at production cost p .

Terminal value is therefore calculated as $V_T = \Pi_T / (r - g_T)$, where $\Pi_T = (EBT_{10} - (\delta p + b)N_{B_T}) (1 - T_C)$, and g_T is the terminal growth rate of cash flows after year 10. The present value of all cash flows is calculated in equation A.5:

$$(A.5) PV_0 = [\sum_{1,10} \Pi_k / (1+r)^k] + V_T / (1+r)^{10}$$

Although such a project may require up-front investments in equipment or infrastructure, the primary up-front costs considered here are legal, L_0 ; marketing, M_0 ; and any other costs, K_0 . Since these costs are technically initial expenses rather than investments, they can be discounted by the corporate tax rate (since expenses will not be taxed and will essentially create a rebate or tax shield). Subtracting these from the pres-

ent value of all future cash flows, the NPV is calculated in equation A.6:

$$(A.6) NPV = PV_0 - (L_0 + M_0 + K_0)(1 - T_C)$$

These formulas are used to calculate NPV under three scenarios: a best case, a base case, and a worst case. Variables listed in Table A.2 take a different value in each scenario. Spreadsheets for each scenario are presented in Tables A.3 to A.5. The resulting NPVs are approximately \$29.1 billion in the best case, \$6.0 billion in the base case, and \$66.2 million in the worst case. The internal rate of return (IRR) is also calculated for each scenario. These results are 68.9 percent in the best case, 37.3 percent in the base case, and 5.2 percent in the worst case.

Table A.1
Parameters Used in All NPV Estimates

Symbol	Description	Value
N_0	U.S. currency base in year 0	1,000,000,000,000
g	Annual growth in U.S. currency base in years 1 to 10	2.0%
η	Percentage of dollar bills outside of the United States	60.0%
ρ	Reserve ratio	10.0%
p	Note production cost per note	4.5%
a	Administrative cost per note	0.05%
δ	Terminal note replacement rate	5.0%
m	Annual marketing expense as percentage of new notes issued	5.0%
T_C	Corporate tax rate as percentage of earnings (EBT)	35.0%

Table A.2
Variables Used in Best, Base, and Worst Case NPV Estimates

Symbol	Description	Best case	Base case	Worst case
ϕ_{10}	Portion of base captured by private notes by year 10	10.0%	5.0%	1.0%
r	Rate of return on investment	5.0%	5.0%	4.2%
i	Interest paid on notes as percentage of notes outstanding	0.0%	0.5%	0.5%
r_i	Interest paid by Fed on bank reserves	0.25%	0.0%	0.0%
b	Banknote tax as percentage of notes outstanding	0.0%	0.5%	1.0%
g_T	Annual growth rate of cash flows after year 10	2.0%	0.0%	-2.0%
L_0	Legal expenses at time $t=0$ in millions	\$50.00	\$50.00	\$100.00
M_0	Marketing expenses in time $t=0$ in millions	\$100.00	\$200.00	\$300.00
K_0	Other expenses in time $t=0$ in millions	\$100.00	\$200.00	\$200.00

Table A.3
Base Case Profits from Private Note Issue (Dollars in Millions)

2.0% = Money growth rate 5.0% = Rate of return 0.5% = Interest paid on notes 5.0% = Discount rate
5.0% = Market penetration 5.0% = Marketing expense 35.0% = Corporate tax rate 0.0% = Terminal growth rate
60.0% = US dollars abroad 0.05% = Admin expense 4.5% = Production cost 5.0% = Terminal replacement rate
0.0% = Interest on reserves 10.0% = Reserve ratio 0.5% = Tax on notes outstanding

Year	0	1	2	3	4	5	6	7	8	9	10	Terminal
Quantity of Notes Outstanding												
US dollar outstanding	1,000,000.0	1,020,000.0	1,040,400.0	1,061,208.0	1,082,432.2	1,104,080.8	1,126,162.4	1,148,685.7	1,171,659.4	1,195,092.6		
Dollars inside US	400,000.0	408,000.0	416,160.0	424,483.2	432,972.9	441,632.3	450,465.0	459,474.3	468,663.8	478,037.0		
Market penetration rate (%)	0.1	0.4	0.8	1.4	2.5	3.6	4.3	4.6	4.9	5.0		
Private notes outstanding	500.0	1,530.0	3,121.2	5,836.6	10,824.3	16,009.2	19,144.8	21,250.7	22,847.4	23,901.9	23,901.9	
Revenue												
Revenue from loaned funds	22.5	68.9	140.5	262.6	487.1	720.4	861.5	956.3	1,028.1	1,075.6	1,075.6	
Revenue from reserves	-	-	-	-	-	-	-	-	-	-	-	-
Total revenue	22.5	68.9	140.5	262.6	487.1	720.4	861.5	956.3	1,028.1	1,075.6	1,075.6	
Expenses												
Annual marketing expense	(25.0)	(51.5)	(79.6)	(135.8)	(249.4)	(259.2)	(156.8)	(105.3)	(79.8)	(52.7)	(52.7)	-
Administrative expense	(0.3)	(0.8)	(1.6)	(2.9)	(5.4)	(8.0)	(9.6)	(10.6)	(11.4)	(12.0)	(12.0)	(12.0)
Note production costs	(22.5)	(46.4)	(71.6)	(122.2)	(224.4)	(233.3)	(141.1)	(94.8)	(71.9)	(47.5)	(47.5)	(53.8)
Interest expense	(2.5)	(7.7)	(15.6)	(29.2)	(54.1)	(80.0)	(95.7)	(106.3)	(114.2)	(119.5)	(119.5)	(119.5)
Earnings before taxes	(27.8)	(37.4)	(27.9)	(27.4)	(46.3)	139.8	458.3	639.3	750.8	843.9	843.9	890.3
Corporate income tax	9.7	13.1	9.8	9.6	16.2	(48.9)	(160.4)	(223.8)	(262.8)	(295.4)	(311.6)	(311.6)
Notes outstanding tax	(2.5)	(7.7)	(15.6)	(29.2)	(54.1)	(80.0)	(95.7)	(106.3)	(114.2)	(119.5)	(119.5)	(119.5)
Cash flow	(20.5)	(32.0)	(33.7)	(47.0)	(84.2)	10.8	202.2	309.3	373.8	429.1	429.1	9,184.3
Present value of cash flow	(19.6)	(29.0)	(29.1)	(38.7)	(66.0)	8.1	143.7	209.4	240.9	263.4	263.4	5,638.4
Sum of PVs	6,321.5											
Legal expense	(50.0)											
Marketing expense	(200.0)											
Other expense	(200.0)											
Tax shield	157.5											
NPV (\$)	6,029.0											
IRR (%)	37.3											

Table A.4
Best Case Profits from Private Note Issue (Dollars in Millions)

2.0% = Money growth rate
 10.0% = Market penetration
 60.0% = US dollars abroad
 0.25% = Interest on reserves
 5.0% = Rate of return
 5.0% = Marketing expense
 0.05% = Admin expense
 10.0% = Reserve ratio
 0.0% = Interest paid on notes
 35.0% = Corporate tax rate
 4.5% = Production cost
 0.0% = Tax on notes outstanding
 5.0% = Discount rate
 2.0% = Terminal growth rate
 5.0% = Terminal replacement rate

Year	1	2	3	4	5	6	7	8	9	10	Terminal
Quantity of Notes Outstanding											
US dollar outstanding	1,000,000.0	1,020,000.0	1,040,400.0	1,061,208.0	1,082,432.2	1,104,080.8	1,126,162.4	1,148,685.7	1,171,659.4	1,195,092.6	
Dollars inside US	400,000.0	408,000.0	416,160.0	424,483.2	432,972.9	441,632.3	450,465.0	459,474.3	468,663.8	478,037.0	
Market penetration rate (%)	0.3	0.8	1.5	2.8	5.0	7.3	8.5	9.3	9.8	10.0	
Private notes outstanding	1,000.0	3,060.0	6,242.4	11,673.3	21,648.6	32,018.3	38,289.5	42,501.4	45,694.7	47,803.7	47,803.7
Revenue											
Revenue from loaned funds	45.0	137.7	280.9	525.3	974.2	1,440.8	1,723.0	1,912.6	2,056.3	2,151.2	2,151.2
Revenue from reserves	0.3	0.8	1.6	2.9	5.4	8.0	9.6	10.6	11.4	12.0	12.0
Total revenue	45.3	138.5	282.5	528.2	979.6	1,448.8	1,732.6	1,923.2	2,067.7	2,163.1	2,163.1
Expenses											
Annual marketing expense	(50.0)	(103.0)	(159.1)	(271.5)	(498.8)	(518.5)	(313.6)	(210.6)	(159.7)	(105.4)	(47.8)
Administrative expense	(0.5)	(1.5)	(3.1)	(5.8)	(10.8)	(16.0)	(19.1)	(21.3)	(22.8)	(23.9)	(23.9)
Note production costs	(45.0)	(92.7)	(143.2)	(244.4)	(448.9)	(466.6)	(282.2)	(189.5)	(143.7)	(94.9)	(107.6)
Interest expense	-	-	-	-	-	-	-	-	-	-	-
Earnings before taxes	(50.3)	(58.8)	(23.0)	6.4	21.1	447.7	1,117.7	1,501.8	1,741.5	1,938.9	1,983.9
Corporate income tax	17.6	20.6	8.0	(2.3)	(7.4)	(156.7)	(391.2)	(525.6)	(609.5)	(678.6)	(694.3)
Notes outstanding tax	-	-	-	-	-	-	-	-	-	-	-
Cash flow	(32.7)	(38.2)	(14.9)	4.2	13.7	291.0	726.5	976.2	1,132.0	1,260.3	42,983.5
Present value of cash flow	(31.1)	(34.6)	(12.9)	3.4	10.8	217.2	516.3	660.7	729.7	773.7	26,388.1
Sum of PVs		29,221.2									
Legal expense		(50.0)									
Marketing expense		(100.0)									
Other expense		(100.0)									
Tax shield		87.5									
NPV (\$)											29,058.7
IRR (%)											68.9

**Table A.5
Worst Case Profits from Private Note Issue (Dollars in Millions)**

2.0%= Money growth rate 4.2% = Rate of return 0.5%= Interest paid on notes 4.2%= Discount rate
1.0%= Market penetration 5.0% = Marketing expense 35.0%= Corporate tax rate -2.0%= Terminal growth rate
60.0%= US dollars abroad 0.05%= Admin expense 4.5%= Production cost 5.0%= Terminal replacement rate
0.0%= Interest on reserves 10.0% = Reserve ratio 1.0%= Tax on notes outstanding

Year	1	2	3	4	5	6	7	8	9	10	Terminal
Quantity of Notes Outstanding											
US dollar outstanding	1,000,000.0	1,020,000.0	1,040,400.0	1,061,208.0	1,082,432.2	1,104,080.8	1,126,162.4	1,148,685.7	1,171,659.4	1,195,092.6	
Dollars inside US	400,000.0	408,000.0	416,160.0	424,483.2	432,972.9	441,632.3	450,465.0	459,474.3	468,663.8	478,037.0	
Market penetration rate (%)	0.0	0.1	0.2	0.3	0.5	0.7	0.9	0.9	1.0	1.0	
Private notes outstanding	100.0	306.0	624.2	1,167.3	2,164.9	3,201.8	3,829.0	4,250.1	4,569.5	4,780.4	4,780.4
Revenue											
Revenue from loaned funds	3.8	11.6	23.6	44.1	81.8	121.0	144.7	160.7	172.7	180.7	180.7
Revenue from reserves	-	-	-	-	-	-	-	-	-	-	-
Total revenue	3.8	11.6	23.6	44.1	81.8	121.0	144.7	160.7	172.7	180.7	180.7
Expenses											
Annual marketing expense	(5.0)	(10.3)	(15.9)	(27.2)	(49.9)	(51.8)	(31.4)	(21.1)	(16.0)	(10.5)	-
Administrative expense	(0.1)	(0.2)	(0.3)	(0.6)	(1.1)	(1.6)	(1.9)	(2.1)	(2.3)	(2.4)	(2.4)
Note production costs	(4.5)	(9.3)	(14.3)	(24.4)	(44.9)	(46.7)	(28.2)	(19.0)	(14.4)	(9.5)	(10.8)
Interest expense	(0.5)	(1.5)	(3.1)	(5.8)	(10.8)	(16.0)	(19.1)	(21.3)	(22.8)	(23.9)	(23.9)
Earnings before taxes	(6.3)	(9.7)	(10.1)	(13.9)	(24.8)	4.9	64.1	97.3	117.3	134.4	143.7
Corporate income tax	2.2	3.4	3.5	4.9	8.7	(1.7)	(22.4)	(34.0)	(41.0)	(47.0)	(50.3)
Notes outstanding tax	(1.0)	(3.1)	(6.2)	(11.7)	(21.6)	(32.0)	(38.3)	(42.5)	(45.7)	(47.8)	(47.8)
Cash flow	(5.1)	(9.4)	(12.8)	(20.7)	(37.8)	(28.8)	3.4	20.7	30.5	39.5	735.0
Present value of cash flow	(4.9)	(8.6)	(11.3)	(17.6)	(30.8)	(22.5)	2.5	14.9	21.1	26.2	487.1
Sum of PVs		456.2									
Legal expense		(100.0)									
Marketing expense		(300.0)									
Other expense		(200.0)									
Tax shield		210.0									
NPV (\$)											66.2
IRR (%)											5.2

Appendix B: Estimating the Profit on Commodity-based Currency

To estimate the potential NPV of a commodity-based currency, we adapt the model used in the previous NPV calculations for private banknotes. This section will not re-explain the entire model, only the adjustments.

First, we estimate the percentage of international deposits currently held in U.S. dollars and Swiss francs that might be captured by a CBC. Data from the Bank of International Settlements puts these numbers at \$9.655 trillion in foreign deposits of U.S. dollars and \$392.8 billion worth of Swiss francs (measured in 2010 USD). That gives a total of $N_D = \$10.0487$ trillion. Next we estimate the potential market for CBC banknotes, N_N , based on the circulation of U.S. dollars outside the United States. Since the percentage η of dollars outside the United States

is estimated to be 60 percent of the total \$1 trillion in circulation, the value of dollars outside the United States is $N_N = 0.6(\$1,000 \text{ billion}) = \600 billion. The sum of markets for international deposits and banknotes is $N_0 = N_D + N_N$ and is used as the potential currency base that might be captured by a CBC. Given our estimates for the markets for currency and deposits, $N_0 = \$10.6487$ trillion. We assume that a CBC may capture 1 percent of this potential market. We assume that no interest is paid on banknotes or reserves and that note production costs apply only to banknotes, not to reserves.

We then estimate the potential NPV from creating a CBC using the profit model from private banknotes, assuming base-case values with the exception of initial marketing, legal, and other expenses. For these costs we assume a total up-front expense of $E_0 = L_0 + M_0 + K_0 = \5 billion. The resulting NPV for creating a CBC is approximately \$67.3 billion, with an IRR of 42.3 percent, as shown in Table B.1.

**Table B.1
Estimated Profits from Commodity-based Currency (Dollars in Millions)**

5.0% = Money growth rate 5.0% = Rate of return 0.0% = Interest paid on notes 5.0% = Discount rate
 1.0% = Market penetration 5.0% = Marketing expense 35.0% = Corporate tax rate 0.0% = Terminal growth rate
 10.0% = Reserve ratio 0.05% = Admin expense 4.5% = Production cost 5.0% = Terminal replacement rate

Year	1	2	3	4	5	6	7	8	9	10	Terminal
Quantity of Notes Outstanding											
Market for currency reserves	10,048,700	10,551,135	11,078,692	11,632,626	12,214,258	12,824,971	13,466,219	14,139,530	14,846,507	15,588,832	15,588,832
Market for banknotes	600,000	630,000	661,500	694,575	729,304	765,769	804,057	844,260	886,473	930,797	930,797
Market penetration rate (%)	0.0	0.1	0.2	0.3	0.5	0.7	0.9	0.9	1.0	1.0	1.0
Total CBC market	2,662.2	8,385.9	17,610.3	33,899.8	64,717.8	98,532.9	121,297.3	138,600.1	153,396.6	165,196.3	165,196.3
Revenue											
Revenue from loaned funds	119.8	377.4	792.5	1,525.5	2,912.3	4,434.0	5,458.4	6,237.0	6,902.8	7,433.8	7,433.8
Expenses											
Annual marketing expense	(133.1)	(286.2)	(461.2)	(814.5)	(1,540.9)	(1,690.8)	(1,138.2)	(865.1)	(739.8)	(590.0)	-
Administrative expense	(1.3)	(4.2)	(8.8)	(16.9)	(32.4)	(49.3)	(60.6)	(69.3)	(76.7)	(82.6)	(82.6)
Note production costs	(6.8)	(1.0)	(2.1)	(4.1)	(7.8)	(11.9)	(14.6)	(16.7)	(18.5)	(19.9)	(20.9)
Interest expense	-	-	-	-	-	-	-	-	-	-	-
Earnings before taxes	(21.4)	86.0	320.3	690.0	1,331.2	2,682.1	4,244.9	5,285.8	6,067.8	6,741.3	7,330.3
Corporate income tax	7.5	(30.1)	(112.1)	(241.5)	(465.9)	(938.7)	(1,485.7)	(1,850.0)	(2,123.7)	(2,359.5)	(2,565.6)
Cash flow	(13.9)	55.9	208.2	448.5	865.3	1,743.3	2,759.2	3,435.8	3,944.1	4,381.8	95,293.8
Present value of cash flow	(13.2)	50.7	179.9	369.0	678.0	1,300.9	1,960.9	2,325.5	2,542.4	2,690.1	58,502.1
Present value of cash flow	(44.0)	(39.4)	13.9	71.7	138.8	576.4	1,189.8	1,520.9	1,710.7	1,851.9	41,747.2
Sum of PVs											
Initial investment											
Tax shield											
NPV (\$)											
IRR (%)											

Notes

1. For example, Bradford DeLong explains, “That exchange rates were stable under the pre-World War I gold standard is indisputable. Devaluations were few among the industrial powers, and rare. Exchange rate risk was rarely a factor in economic decisions.” However, DeLong disputes that such a system could be replicated today. J. Bradford DeLong, “VIII. The Pre-World War I Gold Standard,” *Slouching Towards Utopia?: The Economic History of the Twentieth Century*, http://econ161.berkeley.edu/tceh/slouch_gold8.html.
2. This essay uses the term “price stability” as shorthand for the appropriate relative price level when the money supply is allowed to grow at its natural rate. In systems of decentralized money creation, the quantity of money in the economy is determined by supply and demand, so the aggregate price level might be rising or falling depending on resources, preferences, and productivity, as described in George A. Selgin, *Less Than Zero: The Case for a Falling Price Level in a Growing Economy* (London: Institute of Economic Affairs, 1997).
3. As discussed later, government banknotes in Hong Kong compose only 3.7 percent of the supply of paper currency. Regarding Scotland and Northern Ireland, “[t]oday Scottish banknotes make up about 95 percent of Scotland’s circulating paper money, and do so despite not being legal tender.” William D. Lastrapes and George Selgin, “Banknotes and Economic Growth” (working paper, 2007): 27, http://www.terry.uga.edu/~selgin/files/banknotes_growth.pdf.
4. Generally, default implies bankruptcy, but this is not always the case. Default means that a firm (or government) is unable to fulfill a specific obligation, while bankruptcy is a legal term indicating that the present value of the firm’s debt exceeds its expected future income, and it is therefore unable to continue as a going concern. Put differently, default pertains to a specific obligation at a specific time, whereas bankruptcy pertains to a set of expected future outcomes. A firm may default on a specific obligation without entering a state of bankruptcy.
5. For examples of the law of adverse clearings, see Lawrence H. White, *Competition and Currency* (New York: New York University Press, 1989); and George A. Selgin, *The Theory of Free Banking: Money Supply under Competitive Note Issue* (Lanham, MD: Rowman & Littlefield, 1988).
6. “The over-expansive bank in a free banking system will sooner or later be disciplined by a loss of its reserves. . . . In order to re-establish its initial equilibrium position following a period of over-issue, the expansive bank must reverse course. It must pursue a relatively restrictive policy for a period. During this period of underissue, it will enjoy positive clearings against the other banks and so may replenish its own reserves.” Lawrence H. White, *Free Banking in Britain: Theory, Experience and Debate 1800–1845*, 2nd ed. (London: Institute of Economic Affairs, 1995), p. 15.
7. Aurthur J. Rolnick, Bruce D. Smith, and Warren E. Weber, “Lessons from a Laissez-Faire Payments System: The Suffolk Banking System (1825–58),” *Federal Reserve Bank of Minneapolis Quarterly Review* 22, no. 3 (Summer 1998): 11–21.
8. Gary Gordon and Donald J. Mullineaux, “The Joint Production of Confidence: Endogenous Regulation and Nineteenth Century Commercial-Bank Clearinghouses,” *Journal of Money, Credit and Banking* 19, no. 4 (November 1977): 457–68.
9. For examples, see Spurgeon Bell, “Profit on National Bank Notes,” *American Economic Review* 2, no. 1 (March 1912): 38–60; C. A. E. Goodhart, “Profit on National Bank Notes, 1900–1913,” *Journal of Political Economy* 73, no. 5 (October 1965): 516–22; John A. James, “The Conundrum of the Low Issue of National Bank Notes,” *Journal of Political Economy* 84, no. 2 (April 1976): 359–68; and Howard Bodenhorn and Michael Hauptert, “Was There a Note Issue Conundrum in the Free Banking Era?” *Journal of Money, Credit and Banking* 27, no. 3 (August 1995): 702–12.
10. Private banks can also inhibit the central bank’s influence over the money supply through interest rates. Suppose the Federal Reserve was able to reduce the interest rate available to U.S. banks, but banks still refused to lend at the lower rate. The banks might choose simply to hold larger reserves rather and then lend them out. This is, in fact, what happened in the recession of 2007–2008. Banks reduced the Fed’s control by refusing to make new loans. The banks’ choice not to lend was due in part to the Fed’s new policy of paying interest on reserves and uncertain economic conditions, which caused fears of loan defaults.
11. In his book *The Theory of Free Banking: Money Supply under Competitive Note Issue*, George Selgin described the change in a bank’s reserves in response to changes in the demand and velocity of money. He considered two components of bank reserves, the “average net reserves” necessary to cover the bank’s normal average redemptions and “precautionary reserves” needed in case the bank’s redemptions are unusually high (p. 64). The bank will increase its reserve ratio in response to an increase in turnover of its notes since “[p]recautionary reserves rises or falls along with changes in the total volume of gross bank

clearings” (p. 66). Further, “it follows that reserve needs are affected by changes in the demand for inside money even when these changes affect all banks simultaneously and uniformly” (p. 67).

12. Lawrence R. Cordell and Kathleen Keuster King, “A Market Evaluation of Risk-based Capital Standards for the U.S. Financial System,” *Journal of Banking & Finance* 19, no. 3–4 (June 1995): 531–62; Robert F. Engle, “Risk and Volatility: Econometric Models and Financial Practice,” *American Economic Review* 94, no. 3 (June 2004): 405–20; Andrea Resti and Andrea Sironi, “The Risk-weights in the New Basel Capital Accord: Lessons from Bond Spreads Based on a Simple Structural Model” *Journal of Financial Intermediation* 16, no 1 (January 2007): 64–90.

13. As discussed later, government banknotes compose only 3.7 percent of the supply of paper currency in Hong Kong. “Today Scottish banknotes make up about 95 percent of Scotland’s circulating paper money, and do so despite not being legal tender,” William D. Lastrapes and George Selgin, “Banknotes and Economic Growth” (working paper, 2007): 27, http://www.terry.uga.edu/~selgin/files/banknotes_growth.pdf.

14. Stanley Fischer, in “Central Bank Independence Revisited,” *American Economic Review* 85, no. 2 (May 1995): 201–6 states, “[t]he case for central-bank independence (CBI), while not a new one, has been strengthened by a growing body of empirical evidence, by recent developments in economic theory, and by the temper of the times. The case is a strong one, which is becoming part of the Washington orthodoxy.”

15. Milton Friedman, “The Lag Effect of Monetary Policy,” *Journal of Political Economy* 64, no. 5 (October 1961): 447–66.

16. As the Fed itself describes, “Even the most up-to-date data on key variables like employment, growth, productivity, and so on, reflect conditions in the past, not conditions today; that’s why the process of monetary policymaking has been compared to driving while looking only in the rearview mirror.” Federal Reserve Bank of San Francisco, “About the Fed,” <http://www.frbsf.org/publications/federalreserve/monetary/formulate.html>.

17. Thomas F. Cooley and Gary D. Hansen, “The Inflation Tax in a Real Business Cycle Model,” *American Economic Review* 79, no. 4 (September 1989): 733–48.

18. Thomas F. Cooley and Gary D. Hansen, “The Welfare Costs of Moderate Inflation,” *Journal of Money, Credit and Banking* 23, no. 3 (August 1991):

483–503. See also Patricia Reagan and René M. Stulz, “Contracting Costs, Inflation, and Relative Price Variability,” *Journal of Money, Credit and Banking* 25, no. 3 (August 1993): 585–601.

19. Armen A. Alchain and Reuben A. Kressel, “Redistribution of Wealth through Inflation,” *Science* 130, no. 3375 (September 1959): 535–39. See also: Matthias Doepke and Martin Schneider, “Inflation and the Redistribution of National Wealth,” *Journal of Political Economy* 114, no. 6 (December 2006): 1069–97.

20. Steven Horwitz, “The Costs of Inflation Revisited,” *The Review of Austrian Economics* 16, no. 1 (2003): 77–95.

21. This must be true since bond prices and interest rates move inversely.

22. Of course, the recent debt ceiling debate and problems in Greece have caused many to reconsider the potential for U.S. Treasury default.

23. Eldar Shafir, Peter Diamond, and Amos Tversky, “Money Illusion,” *Quarterly Journal of Economics* 112, no. 2 (May 1997): 341–374; and Ernst Fehr and Jean-Robert Tyran, “Does Money Illusion Matter?” *American Economic Review* 19, no. 5 (December 2001): 1239–62.

24. The value of each currency is calculated from the World Bank’s GDP deflator (indicator NY.GDP.DEFL.KD.ZG) for each currency. This measure is given as an annual rate of inflation, and is defined as “[i]nflation as measured by the annual growth rate of the GDP implicit deflator shows the rate of price change in the economy as a whole. The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency.” To create an index for each currency, we assume a value of 100 percent for the year 1970. For each subsequent year we divide by $1+i$, where i is the GDP deflator.

25. Edgar A. Gossoub and Robert R. Reed, “Economic Development and the Welfare Cost of Inflation,” (working paper, 2010): 18, <http://www.cba.ua.edu/~rreed/EconomicDevelopmentWelfarecostsAugust2009.pdf>.

26. George Selgin, William D. Lastrapes, and Lawrence H. White, “Has the Fed Been a Failure?” *Journal of Macroeconomics* (2012), <http://dx.doi.org/10.1016/j.jmacro.2012.02.003>. The paper concludes, “[A]vailable research does not support the view that the Federal Reserve System has lived up to its original promise. Early in its career, it presided over both the most severe inflation and the most severe (demand-induced) deflations in post-Civil War U.S. history. Since then, it has tended to err on the side of inflation, allowing

the purchasing power of the U.S. dollar to deteriorate considerably. That deterioration has not been compensated for, to any substantial degree, by enhanced stability of real output. Although some early studies suggested otherwise, recent work suggests that there has been no substantial overall improvement in the volatility of real output since the end of World War II compared to before World War I. Although a genuine improvement did occur during the sub-period known as the ‘Great Moderation,’ that improvement, besides having been temporary, appears to have been due mainly to factors other than improved monetary policy. Finally, the Fed cannot be credited with having reduced the frequency of banking panics or with having wielded its last-resort lending powers responsibly. In short, the Federal Reserve System, as presently constituted, is no more worthy of being regarded as the last word in monetary management than the National Currency system it replaced almost a century ago.”

27. These sources include Andrew Atkeson and Patrick J. Kehoe, “Deflation and Depression: Is There an Empirical Link?” *American Economic Review* 94, no. 2 (May 2004): 99–103; John W. Keating and John V. Nye, “Permanent and Transitory Shocks in Real Output Estimates from Nineteenth-Century and Postwar Economics,” *Journal of Money, Credit, and Banking* 30, no. 2 (May 1998): 231–51; Christina D. Romer, “Is the Stabilization of the Postwar Economy a Figment of the Data?” *American Economic Review* 76, no. 3 (June 1986a): 314–34; Christina D. Romer, “Spurious Volatility in Historical Unemployment Data,” *Journal of Political Economy* 94, no. 1 (February 1986b): 1–37; and Christina D. Romer, “Changes in Business Cycles: Evidence and Explanations,” *Journal of Economic Perspectives* 13, no. 2 (Spring 1999): 23–44.

28. “The modern view of central banks as sources of monetary stability is in essence a historical myth.” George Selgin, “Central Banks as Sources of Financial Instability,” *The Independent Review* 14, no. 4 (Spring 2010): 486.

29. Remarks by Ben S. Bernanke before the National Economists Club, Washington, D.C., November 21, 2002, <http://www.federalreserve.gov/boarddocs/speeches/2002/20021121/default.htm>.

30. In 2008, the Federal Reserve provided loans of up to \$12.9 billion to Bear Stearns and up to \$85 billion to American International Group (AIG) before eventually deciding to purchase toxic financial assets from these firms. To facilitate these asset purchases, the New York Federal Reserve Bank created three limited liability corporations which took the names Maiden Lane, Maiden Lane II, and Maiden Lane III (after the street on which the NYFRB is located). Maiden

Lane was created to facilitate the purchase of Bear Stearns by JPMorgan Chase by purchasing \$30 billion in assets from Bear Stearns. Maiden Lane II and III were created to purchase almost \$50 billion in assets, mostly mortgage-backed securities and credit default swaps, from AIG. In addition, the Federal Reserve purchased \$1.25 trillion in agency mortgage-backed securities between 2008 and 2010. Further details of these transactions are available at http://www.federalreserve.gov/newsevents/reform_bearstearns.htm, http://www.federalreserve.gov/newsevents/reform_aig.htm, and http://www.federalreserve.gov/newsevents/reform_mbs.htm.

31. George Selgin and Lawrence H. White, “How Would the Invisible Handle Money?” *Journal of Economic Literature* 32, no. 4 (December 1994): 1718–49.

32. The Coinage act of 1792 authorized the creation of a national mint and requisitioned the mint to produce coins of gold, silver, and copper. The base unit of coinage was the U.S. dollar. Coins were minted in nine denominations, from eagles valued at 10 dollars down to half-cents worth one two-hundredth of a dollar.

33. Data on the number of state-chartered banks is taken from Warren E. Weber, “Early State Banks in the United States: How Many Were There and Where did They Exist?” Federal Reserve Bank of Minneapolis *Quarterly Review* 30, no. 2 (September 2006): 28–40. Data on the quantity of notes issued is taken from John E. Gurley and E. S. Shaw, “The Growth of Debt and Money in the United States, 1800–1950: A Suggested Interpretation,” *Review of Economics and Statistics* 39, no. 3 (August 1957): 250–62.

34. John Wilson Million, “Debate on the National Bank Act of 1863,” *Journal of Political Economy* 2, no. 2 (March 1894): 264.

35. Data on U.S. GDP and CPI are taken from the Measuring Worth historical database at <http://www.measuringworth.com/>. The original source for GDP data is Louis Johnston and Samuel H. Williamson, “What Was the U.S. GDP Then? Annual Observations in Table and Graphical Format 1790 to the Present,” *MeasuringWorth* (2011) <http://www.measuringworth.com/usgdp/>. The original source for CPI data is Lawrence H. Officer, “The Annual Consumer Price Index for the United States, 1774–2010,” *MeasuringWorth* (2012), <http://www.measuringworth.com/usdpi/>.

36. For information on “wildcat” banking, see Arthur J. Rolnick and Warren E. Weber, “Causes of Free Bank Failures: A Detailed Examination,” *Journal of Monetary Economics* 14, no. 3 (November 1984): 267–91. See also Hugh Rockoff, “The Free

Banking Era: A Reexamination,” *Journal of Money, Credit and Banking* 6, no. 2 (May 1974): 141–67. For information on inflation and economic stability, see Selgin et al., “Has the Fed Been a Failure?”; Romer, “Is the Stabilization of the Postwar Economy a Figment of the Data?”; Romer, “Spurious Volatility in Historical Unemployment Data.”; and Romer, “Changes in Business Cycles: Evidence and Explanations.”

37. Richard H. Timberlake, *Monetary Policy in the United States: An Intellectual and Institutional History* (Chicago: University of Chicago Press, 1978), p. 83.

38. *Ibid.*, Table 7.1, p. 90.

39. For more information, see Charles W. Calomiris and Charles M. Kahn, “The Efficiency of Self-Regulated Payment Systems: Learning from the Suffolk System,” National Bureau of Economic Research working paper no. 5542 (January 1996), <http://www.nber.org/papers/w5442>.

40. Andrew T. Young and John A. Dove, “Policing the Chain Gang: Panel Cointegration Analysis of the Stability of the Suffolk System, 1825–1858,” (working paper, 2010): 6–7, <http://ssrn.com/abstract=1710042>.

41. Wesley C. Mitchell, “Greenbacks and the Cost of the Civil War,” *Journal of Political Economy* 5, no. 2 (March 1897): 117–56.

42. *Ibid.*, 126.

43. Timberlake, Table 7.1, p. 90.

44. Million, p. 256.

45. See Allen N. Berger, Richard J. Herring, and Giorio P. Szegö, “The Role of Capital in Financial Institutions,” *Journal of Banking and Finance* 19, no. 3–4 (June 1995): 401. See also Milton Friedman and Anna Jacobson Schwartz, *A Monetary History of the United States, 1867–1960* (Princeton: Princeton University Press, 1963), p. 20.

46. Million, p. 295.

47. Section 2 of the order reads, “[a]ll persons are hereby required to deliver on or before May 1, 1933, to a Federal Reserve bank or a branch or agency thereof or to any member bank of the Federal Reserve System all gold coin, gold bullion, and gold certificates now owned by them or coming into their ownership on or before April 28, 1933, except the following: (a) Such amount of gold as may be required for legitimate and customary use in industry, profession or art within a reasonable time, including gold prior to refining and stocks of gold in reasonable amounts for the usual trade requirements of owners mining

and refining such gold. (b) Gold coin and gold certificates in an amount not exceeding in the aggregate \$100 belonging to any one person; and gold coins having recognized special value to collectors of rare and unusual coins. (c) Gold coin and bullion earmarked or held in trust for a recognized foreign government or foreign central bank or the Bank for International Settlements. (d) Gold coin and bullion licensed for the other proper transactions (not involving hoarding) including gold coin and gold bullion imported for the re-export or held pending action on applications for export license.”

48. “The Fed has invested more than \$2 trillion in a range of unprecedented programs, first to restore the financial system and then to encourage economic expansion.” “Federal Reserve (The Fed),” *New York Times*, September 21, 2011, http://topics.nytimes.com/top/reference/timestopics/organizations/f/federal_reserve_system/index.html. “The Federal Reserve, already arguably the most powerful agency in the U.S. government, will get sweeping new authority to regulate any company whose failure could endanger the U.S. economy and markets under the Obama administration’s regulatory overhaul plan.” Patricia Hill, “Federal Reserve to Gain Power under Plan,” *Washington Times*, June 16, 2009, <http://www.washingtontimes.com/news/2009/jun/16/plan-gives-fed-sweeping-power-over-companies/>.

49. Kurt Schuler, “Note Issue by Private Banks: A Step toward Free Banking in the United States?” *Cato Journal* 20, no. 3 (Winter 2001): 454.

50. “Today Scottish banknotes make up about 95 percent of Scotland’s circulating paper money, and do so despite not being legal tender.” William D. Lastrapes and George Selgin, “Banknotes and Economic Growth,” (working paper, 2007), p. 27, http://www.terry.uga.edu/~selgin/files/banknotes_growth.pdf.

51. An article in the *Financial Times* describes “At present, the Scottish and Irish banks provide cover for their issued bank notes during the week with other assets, on which they can obtain a return. The Treasury estimates they are realizing a collective advantage worth £80m a year over non-issuing institutions, which are obliged to hold Bank of England notes on which they receive no interest.” Andrew Bolger, “Banking: Big Players in the European Game,” *Financial Times*, October 11, 2005, <http://www.ft.com/intl/cms/s/1/95049c02-3a66-11da-b0d3-00000e2511c8.html#axzz1aPdyqt6M>.

52. “The key feature of this is to protect note holders’ interests in the event of the failure of a note issuing bank, by requiring full backing of the note issue at all times by UK public sector lia-

- bilities and ring-fencing those assets for the interests of note holders.” U.K. Payment Council, *The Future of Cash in the UK*, (2010), p. 6, http://www.paymentscouncil.org.uk/files/payments_council/future_of_cash2.pdf.
53. “Under Threat,” *The Economist*, February 7, 2008, <http://www.economist.com/node/10659219>; “Salmond Voices Bank Notes Fears,” *BBC News*, February 4, 2008, http://news.bbc.co.uk/2/hi/uk_news/scotland/7224987.stm.
54. The Hong Kong Monetary Authority lists its “Key Functions” as monetary stability, banking stability, maintaining its status as an international financial center, and managing its exchange fund. Hong Kong Monetary Authority, “Monetary Stability,” <http://www.hkma.gov.hk/eng/key-functions/monetary-stability.shtml>.
55. For more information, see the Basic Law of the Hong Kong Special Administrative Region of the People’s Republic of China, <http://www.basiclaw.gov.hk/en/index/>.
56. Data on private banknotes are taken from the financial statements of the issuing banks. Data on government banknotes are available from the Hong Kong Monetary Authority annual reports.
57. James Gwartney, Robert Lawson, and Joshua Hall, *Economic Freedom of the World: 2010 Annual Report* (Vancouver: Fraser Institute, 2010).
58. According to 2010 World Bank GDP indicator NY.GDP.MKTP.CD.
59. GDP measured according to 2010 World Bank GDP indicator NY.GDP.MKTP.CD. International reserves measured according to 2010 Currency Composition of Official Foreign Exchange Reserves (COFER) from the International Monetary Fund.
60. See Bank of International Settlement, “Report on Global Exchange Market Activity in 2010,” Monetary and Economic Department (2010), Table B.7, p. 17.
61. For further information, a list of local currencies in the United States is listed on *Wikipedia* at http://en.wikipedia.org/wiki/List_of_community_currencies_in_the_United_States. A worldwide list is available at http://en.wikipedia.org/wiki/Local_currency.
62. Quotations are from the websites for Berkshares and Ithaca Hours, respectively. See <http://www.berkshares.org/> and <http://www.ithacahours.org/>.
63. See the BerkShares website, <http://www.berkshares.org/>.
64. See the Ithaca Hours website, <http://www.ithacahours.org/>.
65. Should the reader find these estimates unrealistic, he can feel free to use the same method to calculate higher or lower potential profits using numbers of his choice.
66. Interest income to the Fed is described as, “[t]he Federal Reserve issues non-interest-bearing obligations (currency) and uses the proceeds to acquire interest-bearing assets.” Michael J. Lambert and Kristin D. Stanton, “Opportunities and Challenges of the U.S. Dollar as an Increasingly Global Currency: A Federal Reserve Perspective,” *Federal Reserve Bulletin* (September 2001): 567–75.
67. The total value of Federal Reserve notes in circulation was \$1.035 trillion as of December 31, 2011. The value of currency in circulation is available at Board of Governors of the Federal Reserve System, “Currency and Coin Services,” http://www.federalreserve.gov/paymentsystems/coin_currircvalue.htm.
68. Linda S. Goldberg, “Is the International Role of the Dollar Changing?” *Federal Reserve Bank of New York, Current Issues* 16, no. 1 (January 2010): 1–7. http://papers.ssrn.com/soL3/papers.cfm?abstract_id=1550192.
69. Matt Peckham, “Bye-Bye Avatar: Modern Warfare 3 Takes \$1 Billion Record,” *PC World*, December 12, 2011, http://www.pcworld.com/article/246024/byebye_avatar_modern_warfare_3_takes_1_billion_record.html.
70. As of December 29, 2011, banks with more than \$71.0 million in liabilities are required to hold 10 percent of those liabilities on reserve. Current reserve requirements are available on the Federal Reserve website at <http://www.federalreserve.gov/monetarypolicy/reservereq.htm>.
71. Bell, “Profit on National Bank Notes,” p. 44.
72. According to Yahoo!Finance (<http://finance.yahoo.com/>), Bank of America earned revenues of \$134.2 billion in 2010 on total assets of \$2,264.9 billion, JPMorgan Chase earned \$102.7 billion on \$2,117.6 billion, Citigroup earned \$60.6 billion on \$1,913.9 billion, and Wells Fargo earned \$93.2 billion on \$1,258.1 billion. Note that these ratios of revenue over assets differ from the commonly quoted ratio “Return on Assets” in which “return” is net of costs.
73. This may be true since “small banks are more profit efficient than large banks,” and “[s]mall banks in non-metropolitan areas [non-

MSA] are consistently more profit efficient than small banks in MSAs.” Aigbe Akhigbe and James E. McNulty, “The Profit Efficiency of Small U.S. Commercial Banks,” *Journal of Banking & Finance* 27, no. 2 (February 2003): 307.

74. According to a press release, “The Federal Reserve Board on Monday announced that it will begin to pay interest on depository institutions’ required and excess reserve balances. . . . The interest rate paid on required reserve balances will be the average targeted federal funds rate established by the Federal Open Market Committee over each reserve maintenance period less 10 basis points.” Federal Reserve, press release, October 6, 2008, <http://www.federalreserve.gov/news-events/press/monetary/20081006a.htm>.

75. The Bureau of Engraving and Printing lists the actual production costs of Federal Reserve Notes at \$44.85 per thousand notes. *Performance and Accountability Report* (Washington: Bureau of Engraving and Printing, 2010), p. 25, http://moneyfactory.gov/images/2010_BEP_CFO.pdf.

76. The Bureau of Engraving and Printing lists the currency spoilage rates for the years 2006 to 2010 as 4.3 percent, 4.4 percent, 4.2 percent, 4.6 percent, and 10.9 percent, respectively. The high 2010 rate was due to the replacement of the redesigned \$100 note. Excluding the 2010 outlier, the average of the four preceding years is 4.4 percent. *Performance and Accountability Report* (Washington: Bureau of Engraving and Printing, 2010), p. 26, http://moneyfactory.gov/images/2010_BEP_CFO.pdf.

77. Although the assumption of marketing expenses as 5 percent of sales may be low for some industries, it appears to be quite substantial for the commercial banking industry. For example, Bank of America spent almost \$2 billion on marketing in 2010 on revenues of over \$111 billion, a rate of less than 2 percent. Indeed, an assumed rate of 5 percent creates annual marketing expenses of \$500 million in some years according to our net present value (NPV) estimates.

78. For example, the Money Reader app from LookTel is available for only \$1.99. See Tiffany Kaiser, “Money Reader App Helps Blind iPhone Users Recognize U.S. Currency,” *Daily Tech*, March 10, 2011, <http://www.dailytech.com/Money+Reader+App+Helps+Blind+iPhone+Users+Recognize+US+Currency+/article21096.htm>.

79. Despite its name, Happy State Bank and Trust Company is a member of the FDIC.

80. “A large fraction of these notes had looked like currency and had been treated as such—to a limited extent as hand-to-hand currency and to

a large extent as bank reserves. . . . Most of them were also interest-bearing and all of them were only legal tender for payments due to and from the government.” Timberlake, p. 85.

81. See 12 U.S.C. §541, which reads, “In lieu of all existing taxes, every association shall pay to the Treasurer of the United States, in the months of January and July, a duty of one-half of 1 per centum each half year upon the average amount of its notes in circulation.”

82. *Annual Report: Budget Review* (Board of Governors of the Federal Reserve System, 2010), p. 9, http://www.federalreserve.gov/boarddocs/rptcongress/budgetrev10/ar_br10.pdf.

83. This estimate assumes that administrative costs are equal to the expenses of the Federal Reserve’s Board of Governors. It does not include the expenses for the Fed’s 12 regional Reserve Banks since these banks also engage in activities not related to money production, such as bank regulation and supervision and, in the case of the New York branch, open market operations.

84. Kevin Foster, Erik Meijer, Scott Schuh, and Michael A. Zabek, “The 2009 Survey of Consumer Payment Choice,” Federal Reserve Bank of Boston, *Public Policy Discussion Papers* (2009), p. 16.

85. See *Noncash Payment Trends in the United States: 2006–2009*, Federal Reserve System 18, http://199.169.211.83/files/communications/pdf/press/2010_payments_study.pdf.

86. See Geoffrey R. Gerdes and Kathy C. Wang, “Recent Payment Trends in the United States,” *Federal Reserve Bulletin* (October 2008): A75–A106, pp. 85–87.

87. Scott Sumner, “A Critique of the “Credit Economy” Hypothesis,” *The Money Illusion*, September 25, 2011, <http://www.themoneyillusion.com/?p=11077>.

88. “Currency in Circulation: Value,” The Federal Reserve, http://www.federalreserve.gov/payment_systems/coin_currircvalue.htm; and “Currency in Circulation: Volume,” The Federal Reserve, http://www.federalreserve.gov/payment_systems/coin_currircvolume.htm.

89. See Strategic Cash Group, *The Future for Cash in the UK* (London: Payments Council, March, 2010), p. 14.

90. According to the U.S. Mint’s website, “under 18 U.S.C. §486 it is a Federal crime to utter or pass, or attempt to utter or pass, any coins of gold or silver intended for use as current money, except as

authorized by law. According to the National Organization for the Repeal of the Federal Reserve Act and the International Revenue Code (NORFED) website, 'Liberty merchants' are encouraged to accept NORFED 'Liberty Dollar' medallions and offer them as change in sales transactions of merchandise or services. Further, NORFED tells 'Liberty associates' that they can earn money by obtaining NORFED 'Liberty Dollar' medallions at a discount and then can 'spend [them] into circulation.' Therefore, NORFED's 'Liberty Dollar' medallions are specifically intended to be used as current money in order to limit reliance on, and to compete with the circulating coinage of the United States. Consequently, prosecutors with the United States Department of Justice have concluded that the use of NORFED's 'Liberty Dollar' medallions violates 18 U.S.C. §486." See U.S. Mint, "NORFED's 'Liberty Dollars'," <http://www.usmint.gov/consumer/?action=archives#NORFED>.

91. As reported by the Associated Press, "Federal prosecutors on Monday tried to take a hoard of silver 'Liberty Dollars' worth about \$7 million that authorities say was invented by an Indiana man to compete with U.S. currency." Tom Breen, "Feds Seek \$7M in Privately Made 'Liberty Dollars'," *Associated Press*, April 4, 2011.

92. These quotations are available from several sources, including the *New York Sun*, which quotes, "[a] unique form of domestic terrorism' is the way the U.S. Attorney for the Western District of North Carolina, Anne M. Tompkins, is describing attempts 'to undermine the legitimate currency of this country.'" The Justice Department press release quotes her as saying, "[w]hile these forms of anti-government activities do not involve violence, they are every bit as insidious and represent a clear and present danger to the economic stability of this country." For more information, see "A 'Unique' Form of 'Terrorism'," *New York Sun*, March 20, 2011, <http://www.nysun.com/editorials/a-unique-form-of-terrorism/87269/>.

93. For example, the statute on "Tokens or paper used as money" (18 U.S.C. §491) applies only to those "not lawfully authorized" to produce paper money. Since the producers of local currencies have gained such authorization, it seems reasonable to presume that other private banks would be able to do so as well.

94. For more information, see the statute on "Imitating obligations or securities; advertisements," 18 U.S.C. §475.

95. Schuler, p. 461.

96. This debate is discussed by William Luther, who states, "[A]ccording to Friedman, Hayek erred in believing that the mere admission of

competing private currencies will spontaneously generate a more stable monetary system. In Friedman's view, network effects, to use the modern term, discourage an alternative system from emerging in general and prevent Hayek's system from functioning as desired in particular." William J. Luther, "Friedman Versus Hayek on Private Outside Monies: New Evidence for the Debate," (working paper, 2011), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1831347.

97. Rinaldo and Söderlind document the Swiss franc as a "safe haven" currency. They find that when U.S. stocks decline in value, the value of the Swiss franc rises relative to the U.S. dollar. Angelo Rinaldo and Paul Söderlind, "Safe Haven Currencies," *Review of Finance* 14, no. 3 (2010): 385-407.

98. International reserves, measured according to 2010 Currency Composition of Official Foreign Exchange Reserves (COFER) from the International Monetary Fund.

99. See Bank of International Settlement, "Report on Global Exchange Market Activity in 2010," Monetary and Economic Department (2010), Table B.7, p. 17.

100. Linda S. Goldberg and Cédric Tille, "Vehicle Currency Use in International Trade," Federal Reserve Bank of New York Staff Report no. 200, (January 2005), http://www.newyorkfed.org/research/staff_reports/sr200.html.

101. Robert N. McCauley and Patrick McGuire, "Dollar Appreciation in 2008: Safe Haven, Carry Trades, Dollar Shortage, and Overhedging," *BIS Quarterly Review* (December 2009): 85-92, http://www.bis.org/publ/qtrpdf/r_qt0912i.pdf.

102. Hugh Rockoff, "Some Evidence on the Real Price of Gold, Its Costs of Production, and Commodity Prices," in *A Retrospective on the Classical Gold Standard, 1821-1931*, ed. Michael D. Bordo and Anna J. Schwartz (Chicago: University of Chicago Press, 1984), 613-50.

103. Arthur J. Rolnick and Warren E. Weber, "Money, Inflation, and Output under Fiat and Commodity Standards," *Journal of Political Economy* 105, no. 6 (December 1997): 1308-21.

104. Douglas Fisher, "The Price Revolution: A Monetary Interpretation," *Journal of Economic History* 49, no. 4 (December 1989): 883-902.

105. Calculated from the World Bank's GDP deflator (indicator NY.GDP.DEFL.KD.ZG).

106. Alberto Alesina and Robert J. Barro, "Dollarization," *American Economic Review* 91, no. 2 (May

2001): 381–85.

107. “Data from the World Bank World Development Indicators for 21 Latin American countries from 1960 to 2003 are analyzed. . . . Data suggests that dollarization significantly reduces inflation.” Sophia Castillo, “Dollarization and Macroeconomic Stability in Latin America,” *Oshkosh Scholar* I (Oshkosh, WI: The University of Wisconsin, 2006), p. 51, <http://minds.wisconsin.edu/handle/1793/6679>.

108. Elham Mafi-Kreft, “The Relationship Between Currency Competition and Inflation,” *Kyklos* 56, no. 4 (November 2003): 475–90.

109. Sok Heng Lay, Makoto Kakinaka, and Koji Kotani, “Exchange Rate Movements in a Dollarized Economy: The Case of Cambodia,” *Economics and Management Series*, International University of Japan (November 2010), p. 6.

110. Tomás J. Baliño, Adam Bennett, and Eduardo Borensztein, *Monetary Policy in Dollarized Economies* (Washington: International Monetary Fund, 1999).

111. Rebecca Hellerstein and William Ryan, “Cash Dollars Abroad,” Federal Reserve Bank of New York, Staff Report 400 (2011), p. 9.

112. Buying gold futures would involve a future transaction in some other currency, so the bank would likely need to hedge its risk in the other currency as well.

113. For a discussion of international trade networks, see James E. Rauch, “Business and Social Networks,” *Journal of Economic Literature* 39, no. 4 (December 2001): 1177–1203.

114. “Statistical Annex,” *BIS Quarterly Review* (Basel: Bank of International Settlements, September 2011), Table 5.A, p. A24, http://www.bis.org/publ/qtrpdf/r_qa1109.pdf.

115. The price of gold as of September 2011 is roughly \$1,900 per ounce. Since a single gold bar weighs 400 ounces, each bar is worth roughly \$760,000.

116. Bell, “Profit on National Bank Notes.”

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