Introduction

In his book *The Cash Nexus*, historian Niall Ferguson felt it necessary to argue against the view that it is entirely economic forces that have shaped the history and current state of societies around the world. While we would not take the extreme view that only economic factors are important in understanding history, it is certainly true that economic forces have had a huge impact on many aspects of society. Central banks are, and have been, a major economic force, influencing a wide range of other economic events and, as a consequence, the course of history. But a tantalizing and important question remains: Are central banks an inevitable historical outcome, or just one of many possible institutions that can (and will) arise in the course of economic development?

As we enter the twenty-first century, it seems natural to reevaluate the appropriate roles—if not, in fact, the need—for central banks. To foster this reevaluation, in the spring of 2001 the Federal Reserve Bank of Cleveland held a conference on "The Origins and Evolution of Central Banking." The purpose of the conference was to shed light on how central banks have come to be what they are, what their objectives ought to be, how central banks should operate to best achieve these objectives, and what kinds of challenges such institutions might face in the twenty-first century.

There have been few times in history when so many fundamental questions about the role of central banks have been on the table simultaneously. We have recently witnessed major revolutions in the technology of transacting, and undoubtedly we will witness many more. These fundamental changes raise many questions that central banks must confront. What role should central banks play in the payments system? Can central banks promote useful innovations in the technology for making payments, or does their presence in the payments system inhibit innovations that would occur otherwise? As payments system innovations have continued, the need for base money in transactions has declined and will continue to decline dramatically—at least within the United States. What

challenges does this pose for central banks? With a decline in the use of central bank liabilities in transactions, can central banks conduct monetary policy in traditional ways, or will their operating procedures need to be dramatically revised? Does a declining role for central bank liabilities in transactions pose a challenge to the maintenance of a stable price level?

Spurred in part by technological advances, the legal environment in which central banks operate has experienced rapid and dramatic change as well. Recent changes in banking legislation in the United States have made it possible for banks and nonbanks to play many new roles. This fact raises questions about the regulation of banks and of entities that provide payments services but do not operate under bank charters. What regulation is needed, and is the regulation of payments service providers optimally coupled with other central banking functions, such as the conduct of monetary policy? Should the "safety net" provided to banks be extended as they take on new functions and as nonbanks begin to perform many of the functions traditionally associated with banking? Some studies[1] suggest the provision of banking system safety nets, such as deposit insurance, actually increases the likelihood of a banking crisis, and that the existence of such safety nets raises the social costs of banking crises when they do occur. In the end, is the existence of a banking system safety net socially optimal?

These questions, of course, evoke other long-standing economic issues. To what extent do banks—or other payments service providers—need to be regulated at all? Why isn't market discipline sufficient for banks, as we often take it to be for other industries? Can coalitions of banks perform what amounts to "peer monitoring," thereby rendering government regulation unnecessary? And can organizations such as clearinghouses effectively provide liquidity as needed, as they have tried to do at various times in U.S. history before the advent of the Federal Reserve System?

The last question is an illustration of a historically important issue that has recently reemerged. Another example is the private provision of money. Hayek (1976) and others have argued that "the market" can provide currency as effectively—if not more so—than the government. The real bills doctrine, while not necessarily asserting Hayek's claim, certainly suggests that appropriately backed provision of currency and currency substitutes by private entities poses no threat to price stability or to the general functioning of the economy. This contrasts starkly with the sentiments of Friedman (1960) (and others), who argues that lending should be strictly segregated from currency issue.[2] In Friedman's view, the comingling of lending activity and the provision of payments instruments is a formula for creating "excessive economic volatility"—leading him to advocate that providers of payments instruments face 100 percent reserve requirements.[3] This, of course, is

1 For instance, Demirguc-Kunt and Detragiache (2000) or Boyd, Kwak, and Smith (2002).
2 See Sargent and Wallace (1982) for a modern interpretation of these issues.
3 Some revisions of this viewpoint can, however, be found in Friedman (1960).

an extreme version of other calls for "narrow banking," reflecting historical arguments that when private agents can create substitutes for base money, optimism or pessimism can cause the money stock to expand and contract, thereby creating multiplicities of equilibria. Many of these equilibria will display economic volatility that is a result of self-fulfilling prophecies.[4]

The history of banking and private currency provision is indeed marred by a long sequence of banking panics, some of which were accompanied by huge fluctuations in the value of privately issued currencies. The driving force behind the creation of the Federal Reserve System was the search for a way to prevent these events, or at least to mitigate their severity. But is it clear that modern economies need central banks to respond to extreme events, such as banking crises or stock market crashes? If so, how should central banks respond? Even today, thinking on this issue seems to have advanced little since Bagehot (1873), who argued that in a crisis, central banks should lend liberally on collateral that "would be good" under normal circumstances, but should charge a high rate of interest. How well does this advice apply today?

The set of questions confronting central banks—or the governments that create them—are even more complex in an international context. What kinds of exchange rate regimes contribute (or not) to banking and financial crises? Is the choice of an exchange rate regime just a way of determining whether a crisis manifests itself as a currency or a banking crisis, as Chang and Velasco (2000) suggest? When events such as the Asian financial crisis of 1997 occur, who should be the lender of last resort or the provider of the safety net? Should it be the national central bank, an international organization like the International Monetary Fund, or some combination of both?

Even if there is a need for central banks in their modern variations, does every country need one? The number of national currencies in the world is shrinking. Ecuador and El Salvador, for example, have formally adopted the dollar as their national currency, [5] and this kind of complete, or near complete, dollarization has been debated in many Latin American countries. In Europe, 13 national currencies already have been abandoned in favor of the euro, and more will certainly follow.

These observations raise some obvious questions: Which countries are good candidates for dollarization?[6] Which countries are good candidates for a new common currency, such as the euro? In monetary unions characterized by limited political unification, such as the European Monetary Union, how should monetary policy be formulated and implemented?

4 See Smith (1988) for a formalization of this idea.
5 Cohen (2001) classifies Ecuador and El Salvador as "near-dollarized": "Independent states that rely primarily on one or more foreign currencies but also issue a token local currency" (22).
6 See the May 2001 *Journal of Money, Credit, and Banking*—Federal Reserve Bank of Cleveland conference symposium issue for several different perspectives on dollarization.

Dollarization or currency unions raise questions as well for countries only peripherally involved in the adoption decision. For instance, what are the implications for the United States if many countries, or some large country like Mexico, unilaterally dollarize? Does this alter how United States monetary policy should be conducted? Does dollarization create channels through which volatility elsewhere can be transmitted to the U.S. economy? And, if the answer is yes, how should the Federal Reserve System respond to this possibility?[7]

Alternatively, one could ask how the formation of third-party monetary unions affects the policymaking of other nations. Will the European Monetary Union and the formation of the European Central Bank affect the way monetary policy will be—or ought to be—conducted in the United States or elsewhere? When one set of countries forms a common currency area, how should other countries respond? Does the formation of a common currency area make other areas more or less attractive?

All of these issues are inherently linked to questions about what central bank objectives should be and how they can or should be best achieved. There seems to be a consensus that the obvious objective of a central bank should be price stability: the maintenance of low and relatively stable rates of inflation. It may be surprising that such a consensus could have been achieved despite the academic literature, which so far has identified few major consequences for social welfare, even under sustained and relatively high rates of inflation. Nonetheless, such a consensus does seem to exist. Thus, it is natural to ask what kinds of challenges central banks face in maintaining price stability, and what mechanisms can best maintain stable price levels. Inflation targeting is now commonly advocated.[8] The maintenance of strong versions of fixed exchange rate regimes, such as currency boards or outright dollarization, is often suggested for places like Latin America.[9] Are these obvious, natural institutional choices, even if we agree the maintenance of price stability is an appropriate objective for a central bank?[10]

Moreover, ever-evolving environmental factors may threaten the maintenance of low inflation rates even among those institutions that have thus far proven capable of delivering on that objective. One is the need for seigniorage revenue, and the other is the (possibly misguided) view that central banks face an exploitable Phillip's curve trade-off. But less traditional problems also exist. For instance, in the United States, the use of central bank liabilities in domestic transactions is declining; this trend is expected to continue, and perhaps to accelerate.[11] Furthermore, traditional sources of demand for central bank liabilities, such as reserve requirements, have less and less significance in advanced economies such

[7] See Altig (2002) or Altig or Nosal (forthcoming) for informal discussions of these issues.
[8] See, for instance, Leiderman and Svensson (1995) or Bernanke et al. (1999).
[9] See, for instance, Calvo (2001).
[10] See Bencivenga, Huybens, and Smith (2000) for an argument that inflation targeting and fixed exchange rate regimes create more scope for the indeterminacy of equilibrium and for endogenously arising volatility than does a regime of flexible exchange rates with a low and relatively constant rate of money growth.
[11] See Schreft and Smith (2000) for a discussion.

as the United States. Does the decline in the demand for central bank liabilities threaten price stability? How does it affect the feasibility of various methods of conducting monetary policy?

Similarly, the potential for private agents to create currency substitutes—which is now legally and technologically feasible in the United States, for example—raises all of the questions we have already touched on: about the central bank's ability to guarantee price stability, about the feasibility of different policy operating procedures, and about the central bank's ability to maintain a uniform currency. Relatively little modern research has been done on the determination of the price level or rates of interest when private agents can issue liabilities that compete with currency. When many private entities can create currency substitutes, the following questions immediately arise: Will we observe several currencies that coexist but circulate against each other, or against outside money, at discounts or premiums that potentially fluctuate? If so, what are the economic consequences? Will privately issued currencies create a "race to the bottom" (the Gresham's law implication that poorly backed currencies will drive out better backed and more stable private currencies)? Or will the outcome be a Hayekian "race to the top" (in which the market disciplines the issuers of private currencies and guarantees that only adequately backed currencies will circulate)?[12] And how does the answer to these questions affect what the central bank can and should do when private agents compete with it in the provision of currency?

Clearly, we have laid out a dauntingly large, diverse, and difficult set of questions. No single conference or volume could reasonably be expected to address all of them. The chapters in this volume largely focus on two questions: The need for central banks, and the maintenance of price stability by central banking institutions as we know them today.

DO WE NEED CENTRAL BANKS?

Three papers in this volume—by Gary Gorton and Lixin Huang, Art Rolnick, Bruce Smith, and Warren Weber, and Alberto Trejos—explore the extent to which central banks are necessary to improve the functioning of an economy's banking and payments system.

Gorton and Huang explore whether large private banks or coalitions of small banks can effectively eliminate the need for government regulation of banking and the need for an outside entity—like a central bank—to provide liquidity in the event of a banking crisis. The authors proceed from the observation that central banks emerged as a response to systemic banking crises, but that some banking systems—such as that in the United States—seem to have been particularly prone to such problems. Others—the Canadian banking system, for instance—seem to

[12] See Schreft (1997) for a presentation of alternative points of view on this topic.

have been relatively immune. Gorton and Huang relate these differences in susceptibility to panics to the industrial organization of the banking system.

The analysis of Gorton and Huang's paper is based on the idea, familiar from Diamond and Dybvig (1983), that banking panics can emerge as part of the mechanism by which market participants effectively discipline and monitor banks. In particular, threats of large-scale withdrawals of deposits can be a means of deterring the moral hazard problems confronted in banking.[13] In Gorton and Huang's framework, however, the formation of bank coalitions, such as clearinghouses, also can serve as a device for resolving moral hazard. In addition, these coalitions can create liquidity in the event of a panic, in effect becoming their own lender of last resort.

The setup is relatively straightforward. Banks are imperfectly diversified and better informed than depositors about the return on their assets. Moral hazard problems arise in banking because banks may liquidate funds to their own advantage when they know the return on their assets is going to be low. To confront the resulting agency problem, depositors require banks to hold reserves. When reserve levels are high, banks are less likely to liquidate projects early in response to low returns. But to force banks to hold high levels of reserves, there must be some probability that withdrawal demand will be high. Thus, some potential for "panics" is required to induce banks to hold the necessary level of reserves.

In this context, Gorton and Huang consider three alternative structures for the banking system. One is a system of small unit banks, meant to approximate the situation that prevailed in the United States before the Federal Reserve System was created. Under unit banking, banks hold inefficiently high levels of reserves to reduce the potential for panics and to control the moral hazard problem. An alternative organizational structure allows unit banks to form bank coalitions. When banks enter a coalition, they agree to an asset-sharing rule in the event of a panic, and they agree to hold a certain level of reserves. The coalition becomes active only in the event of a panic. Because asset-sharing rules can create an "externality" in the event of a panic, banks have incentives to monitor each other. This, along with the potential for sharing reserves, mitigates the moral hazard and permits banks to economize on reserve holdings. Hence, the resulting allocation under the coalition structure is more efficient than that attained by a system of strictly independent unit banks.

Gorton and Huang also consider the possibility of a single large bank, which internalizes the externality that exists under a coalition of unit banks. Moreover, because a large bank is better diversified than many small banks, depositors are not disadvantaged by their lack of knowledge about the idiosyncratic component of returns on bank assets. Hence, the agency problem between banks and depositors is mitigated, again resulting in an efficiency gain. Indeed, in Gorton and Huang's

[13] See Calomiris and Kahn (1991) for an early formalization of this idea in the context of banking. The idea that the threat of funds withdrawals can discipline management in settings with agency conflicts was articulated earlier by Jensen and Meckling (1976) and Mayers and Smith (1981).

model, removing depositor concern about the idiosyncratic component of the return on bank assets eliminates the informational asymmetry in the economy altogether, thereby eliminating the disciplinary role of bank panics.

The Gorton–Huang analysis suggests that it is by no means clear that the creation of a central bank can improve upon the allocation of resources that can be achieved by an appropriately organized banking system. Furthermore, as the authors note, clearinghouses issued 2.5 percent of the money supply (in the form of clearinghouse loan certificates) in the U.S. banking panic of 1893 and 4.5 percent in the panic of 1907. The authors thus pose an interesting challenge to the purported need for a central bank to confront the problem of liquidity provision during bank panics.

There are, however, some natural questions raised by Gorton and Huang's analysis. For instance, was it difficult as a practical matter for depositors to infer information about the return on bank assets? In a world without deposit insurance, and without regulation of rates of interest on deposits, might depositor funds have been priced (that is, rates of interest on deposits been set) in a way that revealed information about bank asset returns? When bank shares were publicly traded, couldn't equity values have revealed similar information?

Perhaps more importantly, the Gorton–Huang analysis abstracts from monopoly distortions that might be expected to emerge in the case of a single large bank or multiple banks with the potential to collude through coalitions. John Boyd raises this point in his discussion and effectively asks whether the welfare losses from creating bank monopolies might not outweigh other welfare gains that result from moving away from strict unit banking. Boyd's point has broader generality in view of another common argument: that giving banks monopoly profits provides them with incentives to avoid taking excessively risky positions, which might lead to the loss of their "charter value." Granting banks monopoly power, whether by explicit design or mere acquiescence to monopolistic banking structures, may create welfare losses that more than offset the potential gains from reduced risk taking.

Boyd's discussion of Gorton and Huang raises another important consideration. In practice, large banks are not necessarily better diversified than small banks. Until we understand why this might be the case, we may want to exercise caution in considering arguments that proceed from the idea that a small number of large banks is necessarily preferable to a large number of small banks.

Rolnick, Smith, and Weber's contribution to this volume considers another problem—currency uniformity—which has, at some points in history, led to the creation of a central bank. In antebellum United States, the bulk of the money supply consisted of notes issued by private banks.[14] Almost all of these banks

[14] Temin (1969), for instance, estimates that privately issued notes constituted nearly 90 percent of the money supply in the late 1820s.

operated under state charters or state-created free banking laws. The state banknotes often circulated against each other, and against government-issued coins, at market-determined exchange rates. In other words, discounts and, in some cases, premiums were observed on the notes of different banks. These discounts and premiums could and did vary over time and across locations. The result was that a variety of "dollars" with different market values were being issued by different entities—the currency was not uniform.

The lack of currency uniformity was viewed as an important economic problem throughout the history of the antebellum United States, at least by the federal government, and various attempts were made to produce a superior monetary payments system. Indeed, the Second Bank of the United States—the sole federally chartered bank in the country—was created with the explicit objective of creating a uniform currency. In 1832, Andrew Jackson vetoed the renewal of the Second Bank's charter, citing among his reasons the Bank's failure to produce a uniform currency. Rolnick, Smith, and Weber identify reasons why the Second Bank of the United States was unsuccessful in creating a uniform currency. But central to their paper is a private arrangement for creating a uniform currency that prevailed in New England from the mid-1820s until nearly the Civil War, the Suffolk Banking System.

The Suffolk Banking System was a private arrangement, operated by the Suffolk Bank of Boston, for clearing notes issued by various banks.[15] New England banks could join the Suffolk system and, if they did, the Suffolk Bank would clear their notes at par (face value). Moreover, the costs of note clearing were largely born by note issuers, a condition that Rolnick, Smith, and Weber identify as an important feature in creating an environment in which banknotes would circulate at par.[16] In fact, the Suffolk system succeeded in creating a uniform currency throughout New England. Indeed, Bruce Champ's discussion alludes to yet other private arrangements that came close to achieving currency uniformity within restricted geographical regions. As with the Gorton–Huang essay, Rolnick, Smith, and Weber challenge the need for central banks to guarantee currency uniformity or the existence of an efficient payments system.

Open questions do, of course, remain. In his remarks, Neil Wallace asks whether it is necessarily optimal for all privately issued notes to circulate at par.[17] In addition, the Suffolk system gave the Suffolk Bank monopoly power in certain areas, raising the same issues that John Boyd emphasizes in his comments on Gorton and Huang. Indeed, consistent with Boyd's criticism of market arrangements that work by giving some banks monopoly power, other work by Rolnick,

[15] See Rolnick, Smith, and Weber (1998) for a concise overview of the Suffolk Banking System and its activities.
[16] The costs of note clearing and presentation were born by the issuers of notes under the National Banking System in the United States as well.
[17] See also Smith and Weber (1999), who show that the resource allocation achieved through a private arrangement like the Suffolk system need not have dominated that achieved with private note issue, and with notes sometimes circulating at discounts.

Smith, and Weber (1998) suggests that most of the welfare gains generated by the Suffolk system accrued to the owners of the Suffolk Bank.

It may be premature to conclude that market arrangements can completely supplant central banks. At the very least, however, Rolnick, Smith, and Weber suggest that private market arrangements for issuing currency can work well in providing a uniform currency, calling into question the necessity of central banks regarding this particular function.

Alberto Trejos also contemplates the need for central banks (or lack thereof), although in a much different context. Trejos' contribution, in particular, is about "dollarization." Rooted in the modern context of almost universal governmental monopoly control of fiat money creation, discussions of dollarization proceed on the assumption that some large countries will issue currency—presumably, through a central bank. But dollarization is at least partly the international extension of the quest for a uniform currency. The impulse for a national central bank that Rolnick, Smith, and Weber take up echoes in the arguments for a single or small number of dominant central banks discussed by Trejos and other proponents of dollarization. But then, so may the private-market challenge posed by the Suffolk experiment. It seems useful to separate the question of the optimality of a uniform currency (or effectively uniform, in the case of different currencies that always trade at parity) from the question of whether the sources of money should be the institutions of government. The dollarization debate typically deals with the former question, letting stand an implicit affirmative answer to the latter. In this, Trejos' analysis is no exception.

Because of its international context, dollarization introduces elements that are absent when the questions are posed within the confines of individual sovereign nations. In particular, even if we conclude that a uniform currency is desirable, and even if we further conclude that currencies should be government liabilities, dollarization raises the question of whether every country needs a central bank. In effect, dollarization adds the optimal number of central banks to the list of unknowns.

As Trejos notes, de facto dollarization is well under way in many parts of Latin America. In Costa Rica, for instance, 61 percent of bank credit is dollar denominated. In Peru, the analogous number is 82 percent. There have been strong trends toward unofficial dollarization. In Peru, only 50 percent of bank credit was dollar denominated in 1990. Observations such as this lead Trejos to describe a vision of the future in which there will be many small countries with no national currency and no meaningful central bank. The potential benefit, according to Trejos, would

be a reduction of the currency premium associated with international borrowing for the countries involved in dollarizing. Ross Levine, in his discussion, also notes the potential for reduced inflation and a resulting increase in long-term rates of real economic growth.[18]

This vision seems to stand in stark contrast to the one proposed in Randall Kroszner's paper. Kroszner envisions a world in which rapid advances in information technology make possible a system of "sophisticated barter" in which media of exchange take the form of multiple private mutual-fund-like assets. The few dominant central banks predicted by Trejos' framework vanish, replaced by (potentially many) providers of asset bundles bearing little resemblance to government-created fiat currency. Where dollarization feeds on the presumed benefits of eliminating exchange rate variation, such variation is intrinsic to sophisticated barter.

Trejos and Kroszner pose interesting yet opposing views on whether having a small number of central banks in the world will produce "good" economic outcomes. Kroszner focuses on the possibility that currency competition and, in particular, the ability of economic actors to use the currencies of other countries in transactions imposes discipline on national central banks. Indeed, Kroszner argues that currency competition has imposed significant discipline on national central banks and that this was an important factor in the large reductions observed in many national inflation rates during the 1990s. If there were a small number of national central banks, as Trejos envisions, would currency competition cease to discipline the remaining central banks? More specifically, would widespread dollarization tempt the United States, for example, to raise resources from the rest of the world by levying the inflation tax on those who use dollars in other countries? Wouldn't such use of the inflation tax be particularly tempting as the use of base money in the domestic economy declines? Or are a few dominant central banks sufficient to ensure contestability, and hence the discipline that Kroszner proposes?

WHY HAS THE INFLATION RATE FALLEN?

Kroszner bridges the two general issues considered in this volume, as he also focuses on both the attainment of price stability and the necessity of government-created central banks and government-dominated monetary and payments systems. On the former, Kroszner begins with an account of what almost everyone acknowledges: The performance of central banks over the past 20 or so years has been vastly superior to the 20 or so years before. But why and how did this improvement come to pass? On this point, there is remarkably little consensus. One need look no

[18] Fischer (1993), Barro (1995), Bullard and Keating (1995), and Khan and Senhadji (2000) all provide empirical evidence that inflation is detrimental to long-run growth, at least if the rate of inflation is sufficiently high. King and Levine (1993a,b), Levine and Zervos (1998), Benhabib and Spiegel (2000), and Levine, Loyaza, and Beck (2000) all argue that the degree of financial development is strongly linked to real growth performance. Boyd, Levine, and Smith (2001) show that inflation can be highly detrimental to the performance of the financial system.