Thinking Like a Central Banker

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Everyone looks at the world through lenses colored by his or her own experiences and background. Over my nine plus years at the Fed, I have been struck by misunderstandings of why the Fed acts as it does—misunderstandings from vantage points that are quite different from that of a Fed official. Those with Fed experience do know things that others do not. Some of what we know is confidential, but such information is in most cases disclosed with a lag. There are few permanent secrets. Still, there is a central-banker way of thinking that can be described and analyzed; doing so may help others to avoid mistakes in assessing Fed policy. That is my topic in these remarks.

Obviously, all I can do is to describe how one particular central banker with the initials W.P. thinks about what he does. And my perspective is that from a particular central bank, the Federal Reserve. My Fed colleagues might put things differently and might believe that I am off base with some of my comments. Nevertheless, I think the effort is worthwhile, for the degree of success of monetary policy is positively correlated with how completely the market understands the Fed. My disclaimer is that the views I express here are mine. These views not only do not necessarily reflect official positions of the Federal Reserve System but also may not reflect the views of anyone else at the Fed, past or present. I thank my colleagues at the Federal Reserve Bank of St. Louis for their comments, but I retain full responsibility for errors.

ASSESSING THE ECONOMY

An area where Fed practice and market practice are essentially identical is in assessing the state of the economy and the outlook. Private sector and Fed forecasters use similar methods and rely on the same statistical information. Obviously, there are professional differences of opinion and of approaches, but these do not create a divide between Fed and private forecasts. As I have often put it, economists inside and outside the Fed studied at the same universities under the same professors and read the same journal articles. There is substantial movement of economists into and out of the Federal Reserve System. Fed economists attend many university seminars, and academic economists attend Fed seminars. Disagreements about forecasts are similar inside and outside of the Fed.

There is a difference in the informal or anecdotal information available inside and outside the Fed. The Fed has a large network of business contacts and relies on them to augment the fore-

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casting effort. However, some private forecasters have access to data and information the Fed does not. Large financial firms in particular have access to data, such as credit card activity and prospective borrowing by major clients, that the Fed does not have. Retail firms have extremely current information on sales and orders. Of course, the Fed may obtain some of this information through its business contacts, but private companies often make much more systematic use of their own internal business information than the Fed does.

Forecasters continually provide updates based on the flow of current information, both statistical and informal. In this regard, Fed and market practice is essentially identical.

There is, however, a difference between the Fed and the market in the use of forecast information. Traders and portfolio managers base their trades on the current flow of information, which needs to be updated throughout the trading day. Fed policymakers, on the other hand, do not continuously adjust the stance of policy in the same way managers adjust portfolio holdings. For this reason, my own practice is not to worry much as to whether I have correctly absorbed the import of each day's, or each hour's, data. I know that some information will be irrelevant to my policy position because it will be superseded by new information by the time of the next FOMC meeting. For example, I do not need hour-by-hour information on security prices. When I get to the next FOMC meeting, I'll have the latest data, charts of how security prices have behaved since the previous meeting, and analyses of price behavior over a much longer period—indeed, for as far back in time as I find helpful. Given that the FOMC does not adjust policy continuously, updating my forecast with every data release would not be an efficient use of my time.

A consequence of the fact that FOMC meetings occur at six-week intervals, on average, is that when I give a speech and take questions I may not be completely up to date on the implications of the latest data. In my speeches and discussions of policy with various audiences, I try to concentrate on longer-run issues and general principles. I emphasize that I will be studying all the data and anecdotal information in the days leading up to an FOMC meeting. Thus, I ordinarily do not give detailed answers to questions on the precise implications of the latest data for the economic outlook. In many cases, I just haven't studied the implications thoroughly, although I certainly do so by the time the FOMC next meets.

DEALING WITH RISK

A private firm, especially a financial firm, must have robust policies to address risk. To an economist, risk is a two-sided concept. Outcomes may be above or below prior expectations. The possibility of an outcome far below expectation deserves special attention, for such an outcome may force a firm into bankruptcy. A financial firm models risk quantitatively, to the extent possible, and then examines with great care the extent to which formal models may miss key risks, perhaps because they were not observed during the sample period used to fit a model or because the economic environment may be changing. A central bank has a similar task. Quantification of risks to the economy should be taken as far as possible and then careful thought applied to risks beyond those that can be captured in models.

One important difference between a financial firm and the central bank is that a firm has a much wider array of strategies available to mitigate risk than does a central bank. A financial firm can make careful calculations of the extent of duration mismatch between assets and liabilities and can adjust its positions continuously to control the extent of mismatch. A financial firm can deal in many derivatives markets to control risk. A financial firm has wide latitude in choosing how much risk to accept.

A central bank pretty much has to accept policy risks to the economy arising from the economy's institutional structure and market environment. Market sentiment, bullish or bearish, can change quickly. Analytically, the central bank can explore implications of various possible scenarios and can engage in special information collection to try to understand as quickly as possible what is happening in the economy. Beyond that, what a central bank can do is to adopt from

time to time a somewhat asymmetric policy stance in an effort to control risk, especially by guarding against particularly costly possible outcomes. When inflation risk is the dominant concern, policy should lean on the restrictive side and policymakers should be more ready to tighten than to ease policy. Conversely, when deflation and/or recession risk predominates, policy should be asymmetric toward policy ease. However, there is always the danger of leaning in one direction too far or too long; policymakers must be prepared to reverse course and should try not to allow the stance of policy to drift too far from a baseline approach.

It is worth emphasizing that the central bank, as the dominant player in the money market, is in a different situation than is a competitive firm. The central bank's strategy in mitigating risk must work through the markets and by shaping accurate market expectations about future central bank behavior.

The list of possible risks facing private firms and central banks is a long one. A risk that is often incompletely understood by those outside management is reputational risk. The issue is much more than simple embarrassment. Trust is an essential capital asset for a financial firm, and for a central bank. A damaged reputation can send customers fleeing to competitors. For a central bank, a damaged reputation can lead market participants to question the bank's policy consistency, its motivations, and even its veracity. For these reasons, successful private sector firms and central banks both invest heavily in programs and procedures to ensure fair dealing and high ethical standards. With regard to reputational risk, the issues inside and outside the central bank are essentially identical. Financial firms and central banks understand each other very well on this dimension of managing risk.

ASSESSING ODDS ON FED POLICY ACTION

Market participants are constantly assessing the odds on Fed policy actions at upcoming FOMC meetings. These assessments register directly in market prices, especially in the federal funds futures and options markets and the similar markets in eurodollars. There is an important policy purpose for the Fed to study these market expectations. Understanding how the flow of new information affects market expectations can be useful to policymakers. For example, suppose I interpret a surprise change in employment to be an anomaly in the data but I observe a large market reaction to the data release. In that case, I would reexamine my interpretation, and if I still believe I am correct I might comment during the Q&A session after a speech that my own personal take on the data differs from the market view. My aim would be to prompt market participants to reexamine their interpretation of the data.

Consider another example of the importance of tracking market expectations. When I examine the federal funds futures market, a large discrepancy between market expectations and my "best guess" of the FOMC's future actions might suggest to me the possibility of a Fed communications failure. The ideal situation is one in which the market and the Fed have read available information the same way. I am only one participant in the FOMC process, but I try not to contribute to market misunderstanding of monetary policy. The market is collating information from all FOMC participants, paying especially close attention, of course, to the Chairman's views.

I also follow market data carefully as part of ongoing research on how market expectations are formed. This research, conducted with economists in the St. Louis Fed's Research Division, helps me to understand monetary policy at a deeper level. My perspective in this research is essentially the same as similar research conducted in universities and by active market participants.

OBJECTIVES

Private firms have the goal of profit maximization, whereas the central bank is pursuing the macroeconomic goals of price stability, employment stability at a high level, and financial market stability. The private sector and monetary policy goals are quite different, but that fact does not, in

my view, define an important difference in approach.

Policymakers think in terms of a loss function that depends on departures of outcomes from desired outcomes. Policy goals are quantifiable and, as with profits, come with short and long horizons. As already discussed, private firms and central banks must understand and control risks to the extent possible.

Private firm and central bank governing and disciplining processes are, of course, quite different. Nevertheless, analytical approaches to achieving goals are quite similar. I do not believe that differences of objectives and governing processes define an essential difference between the two types of organizations. Thus, in this respect those in the private sector and in the central bank understand and relate to each other easily.

PRICE MAKERS VERSUS PRICE TAKERS

What is a critically important difference between a central bank and a private financial firm is that the central bank, in the short run anyway, sets a policy interest rate and importantly influences longer-term interest rates through effects on market expectations. The central bank is a price maker in the interbank funds market. Private financial firms are essentially price takers in that market and in the government securities market.

A typical trader or portfolio manager can plan security purchases and sales with little or no regard to any effects on market prices or the behavior of other firms. Of course, this statement is not precisely true for very large portfolios, but the difference in market impact between a central bank and a large private portfolio is enormous.

The fact that a central bank is a price maker makes its strategy fundamentally different from that of a portfolio manager. To achieve policy goals, the central bank must think of its policy actions as following a predictable policy rule that the private sector can observe. A portfolio manager responds to the flow of new information partly as it affects probabilities of future central bank action.

I pointed out earlier that both market participants and policymakers try to understand the implications of the flow of information for policy actions. Now I want to emphasize the important point that policymakers have the task of designing systematic policy responses to new information. The design should advance achievement of policy goals, such as price stability. There are many dimensions to policy design. A simple example is that the Federal Reserve now adjusts its target for the federal funds rate in multiples of 25 basis points. That may seem a trivial example, but in the past the Fed sometimes adjusted its funds rate target by smaller amounts. Another example is disclosure of the policy decision promptly after the decision. That practice started only in 1994 and ever since the FOMC has almost constantly grappled with disclosure issues.

I could point to many other dimensions of defining a policy rule, or response function (Poole, 2005). My point is not to elaborate on the nature of the policy rule but instead to emphasize how different that responsibility is from that of a portfolio manager. Policymakers should shape their policy actions by conscious decisions about how to guide market thinking not just in the context of a particular policy action but also in the future for policy actions in general. Put another way, when economic conditions recur, policy responses to the same set of conditions should also recur. If that were not the case, then policy actions could be interpreted only as random, unpredictable responses to changes in economic conditions. It simply cannot be good policy for policy actions to be essentially random.

The market interprets every policy action and every policy statement in the context of past actions and statements. What is a surprise and what is expected depends on past practice. The implication of this obvious point is that every policy action needs to be based on an understanding of how the action will be regarded in the future. Policy actions set precedents, and policymakers must be careful about those precedents. Otherwise, what appears to be a policy success today could be the seed of a policy problem in the future.

Modern macroeconomics emphasizes the importance of policy predictability for good policy outcomes (Taylor, 1984). The difference in perspective from standard practice 30 years ago is profound and incompletely recognized by many journalists and commentators. Even in the early Greenspan years, many thought that monetary policy worked by creating surprises. That perspective was natural because policy surprises had visible effects on security prices.

Theoretical developments in macroeconomics in the 1970s emphasized that policy surprises were undesirable. Efficient planning in the private sector requires that expectations about government policies be accurate, or as accurate as the inherent uncertainty of the economic environment permits. Policymakers ought not to add to inherent economic uncertainty. It is desirable that, to the maximum possible extent, the economy be characterized by an expectational equilibrium in which the market behaves as policymakers expect and the central bank behaves as the market expects. There are certainly times, however, when policy surprises are unavoidable.

So, much of my own thinking is driven by an effort to help define a policy that will increase policy predictability over time. In my speeches and ensuing Q&A, I try to emphasize general policy principles rather than the current policy situation. What is important is not the policy action at the next FOMC meeting, which is typically what people want to know, but the policy regularity that will extend across many FOMC meetings, which is what people should want to know.

AVOIDING POLICY DISTURBANCES

An important corollary to the task of defining a policy rule is that the central bank ought not to be a source of random disturbances. All of us are well aware of the potential for saying things inadvertently that will create market misunderstanding of likely future Fed policy actions. Or, more precisely, what needs to be understood is how and why various possible economic conditions would justify particular appropriate policy responses. One way to avoid misinformation is to avoid providing any information. Put another way, if my mouth is not open, I cannot put my foot into it.

In my view, however, it is important to try to convey correct information. I do not believe that I would be doing my job if fear of providing misinformation led me to provide no information. For this reason, I have maintained an active speaking schedule.

I do follow some general practices designed to reduce missteps. I try to schedule speeches, and certainly press interviews, for times when the markets are closed. That allows the market to digest what I say overnight. Another practice is that I never predict the outcome of future FOMC meetings. Given that I am only one participant in those meetings and that the Chairman's opinion carries great weight, predicting the outcome would be foolish. That is obvious, but what is less obvious is that I do my best to avoid being committal even in my own mind about the policy implications of recent data. Clearly, I could draw conclusions from available data that would create a certain presumption about the policy decision or at least about my policy position. I am very cautious about drawing firm implications about policy from the data.

I emphasize that my policy position will depend on all the information available at the time of the FOMC meeting, on the staff analysis, and on the debate during the meeting. That description of my attitude is literally correct. I noted earlier that I often do not focus on the data arriving day by day because I know that new data will supersede existing data and that I will benefit from my own intensive preparation before each meeting. I rely on the expert staff analysis prepared for each FOMC meeting. Given the complexity and dynamic nature of the issues, I find it best not to form a settled policy position well in advance of the meeting.

Moreover, what policy purpose would be served by my discussing publicly every twist and turn of my analysis between FOMC meetings? Market effects from doing so would not serve a

constructive policy purpose—indeed, they would violate one of the important findings in macroeconomics that policy should not create random disturbances.

BASICS OF POLICY STRATEGY

I have emphasized the importance of the central banker perspective in conveying a policy strategy. I will conclude by sketching the appropriate strategy as I see it.

First, the central bank should be clear as to its goals. The most fundamental goal is maximum possible sustainable economic growth, which in my mind motivates the dual mandate in the law for the Federal Reserve to strive for price stability and high employment. Price stability, which is uniquely a central bank responsibility, contributes greatly to the goal of maximum sustainable growth. Price stability is not in conflict with high employment but contributes to it.

I personally believe, and have so stated on numerous occasions, that the inflation goal should be quantified. I know that many disagree on this point. In today's economy, I believe that a quantified inflation goal is not critically important but quantification might be of great importance in the future. I ask this question: If the Fed had had a specific inflation goal in 1965, would that commitment have helped to avoid the Great Inflation? I think the answer to the question is "yes." If that is the correct answer, then the United States might have avoided a very costly 15-year period of inflation, or the period might have been shorter.

A central bank cannot fix the level of employment or its rate of growth, or the average rate of unemployment. However, the central bank can contribute to employment stability. Avoiding, or at least cushioning, recessions is an important goal. This goal should not be viewed as in conflict with price stability. The most serious employment disaster in U.S. history was the Great Depression, which was a consequence of monetary policy mistakes that led to ongoing serious deflation. Similarly, the period of the Great Inflation saw four recessions in 14 years. Price stability is an essential precondition for overall economic stability.

We have tentative signs that the financial markets are beginning to recover from the recent upset, but financial fragility is obviously still an issue. If the upset were to deepen in a sustained way, it might have serious consequences for employment stability. As of today, we just do not know what the consequences may be. My best guess is that the inherent resilience of the U.S. economy along with future policy actions, should they be desirable, will keep the economy on a track of moderate average growth and gradually declining inflation over the next few years.

Similar bouts of financial market instability in the nineteenth century on up to the financial panic of 1907 led Congress to pass the Federal Reserve Act in 1912. A fundamental responsibility of the central bank is to contribute to orderly and efficient functioning of financial markets. The financial market upset of 2007 will join the history of upsets including those in 1970, 1984, 1987, and 1998. Each upset has different specifics but all of them have common characteristics, including especially a flight to safe assets.

I believe that part of the policy strategy ought to be to convey as clearly as possible to the market what the central bank is doing and why. A policy strategy that is a mystery to the markets will not serve the central bank well. Of course, the market will observe what the central bank does and infer many aspects of the strategy from those observations. Nevertheless, central bank strategy always relies in part on judgments about incoming information, such as whether a particular data release has anomalous features and should be discounted. The strategy of a central bank should be institutionalized and enduring. The strategy should not change just because the official roster changes. The strategy should evolve as economic knowledge improves and as economic conditions change.

I hope these remarks are useful. They do, in any event, explain something about how I have approached my responsibilities.

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The Microfinance Revolution: An Overview

Rajdeep Sengupta and Craig P. Aubuchon

The Nobel Prize committee awarded the 2006 Nobel Peace Prize to Muhammad Yunus and the Grameen Bank "for their efforts to create economic and social development from below." The microfinance revolution has come a long way since Yunus first provided financing to the poor in Bangladesh. The committee has recognized microfinance as "an important liberating force" and an "ever more important instrument in the struggle against poverty." Although several authors have provided comprehensive surveys of microfinance, our aim is somewhat more modest: This article is intended as a non-technical overview on the growth and development of microcredit and microfinance. (JEL I3, J41, N80)

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In 2006, the Grameen Bank and its founder Muhammad Yunus were awarded the Nobel Peace Prize for their efforts to reduce poverty in Bangladesh. By providing small loans to the extremely poor, the Grameen Bank offers these recipients the chance to become entrepreneurs and earn sufficiently high income to break themselves free from the cycle of poverty. Yunus's pioneering efforts have brought renewed attention to the field of microfinance as a tool to eliminate poverty; and, since 1976 when he first lent $27 to 42 stool makers, the Grameen Bank has grown to include more than 5.5 million members with greater than $5.2 billion in dispersed loans. As microfinance institutions continue to grow and expand, in both the developing and developed world, social activists and financial investors alike have begun to take notice. In this article we seek to explain the rise in microfinance since its inception in the early 1980s and the various mechanisms that make microfinance an effective tool in reducing poverty.[1] We also address the current problems facing microfinance and areas for future growth.

In its broadest sense, microcredit includes the act of providing loans of small amounts, often $100 or less, to the poor and other borrowers that have been ignored by commercial banks; under this definition, microcredit encompasses all lenders, including the formal participants (such as specialized credit cooperatives set up by the government for the provision of rural credit) and those of a more informal variety (such as the village moneylender or even loan sharks). Yunus (2007) argues that it is important to distinguish microcredit in all its previous forms from the specific form of credit adopted at the Grameen Bank, which he calls "Grameencredit." Yunus argues that the "most distinctive feature of *Grameencredit* is that it is not based on any collateral, or legally enforceable contracts. It is based on 'trust,' not on legal procedures and system." For the purposes of this article and unless mentioned otherwise, our use of the term microcredit

[1] Other, more technical surveys of microfinance include Ghatak and Guinnane (1999), Morduch (1999), and Armendáriz de Aghion and Morduch (2005).

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will, for the most part, follow Yunus's characterization of Grameencredit.

Although the terms microcredit and microfinance are often used interchangeably, it is important to recognize the distinction between the two. As mentioned before, microcredit refers to the act of providing the loan. Microfinance, on the other hand, is the act of providing these same borrowers with financial services, such as savings institutions and insurance policies. In short, microfinance encompasses the field of microcredit. Currently, it is estimated that anywhere from 1,000 to 2,500 microfinance institutions (MFIs) serve some 67.6 million clients in over 100 different countries.[2]

Many MFIs have a dual mandate to provide financial as well as social services, such as health care and educational services for the underprivileged. In this sense, they are not always perceived as profit-maximizing financial institutions. At the same time, the remarkable accomplishment of microfinance lies in the fact that some of the successful MFIs report high rates of repayment, sometimes above 95 percent. This rate demonstrates that lending to underprivileged borrowers—those without credit histories or the assets to post collateral—can be a financially sustainable venture.

Not surprisingly, philanthropy is not a requirement of microfinance—not all MFIs are non-profit organizations. While MFIs such as Banco Sol of Bolivia operate with the intent to return a profit, other MFIs like the Grameen Bank charge below-market rates to promote social equity.[3] As will be discussed below, this distinction is important: As the microfinance industry continues to grow and MFIs serve a wider client base, the commercial viability of an MFI is often viewed as crucial for its access to more mainstream sources of finance. (We will return to this and related queries in the "The Evidence of Microfinance" section of this paper.) The next section offers a brief history of the Grameen Bank and a discussion of its premier innovation of group lending contracts; the following sections describe the current state of microfinance and provide a review of some of the common perceptions on microfinance. The final section outlines the future of microfinance, particularly in the context of global capital markets.

A BRIEF HISTORY OF THE GRAMEEN BANK

The story of the Grameen Bank is a suitable point to begin a discussion of microcredit and microfinance. After obtaining a PhD in economics in 1969 and then teaching in the United States for a few years, Muhammad Yunus returned to Bangladesh in 1972. Following its independence from Pakistan in 1971 and two years of flooding, Bangladesh found itself in the grips of a terrible famine. By 1974, over 80 percent of the population was living in abject poverty (Yunus, 2003). Yunus, then a professor of economics at Chittagong University in southeast Bangladesh, became disillusioned with economics: "Nothing in the economic theories I taught reflected the life around me. How could I go on telling my students make believe stories in the name of economics?" (See Yunus, 2003, p. viii.) He ventured into the nearby village of Jobra to learn from the poor what causes their poverty. Yunus soon realized that it was their lack of access to credit that held them in poverty. Hence, the origins of "microfinance" emerged from this experience when Yunus lent $27 of his own money to 42 women involved in the manufacturing of bamboo stools.[4]

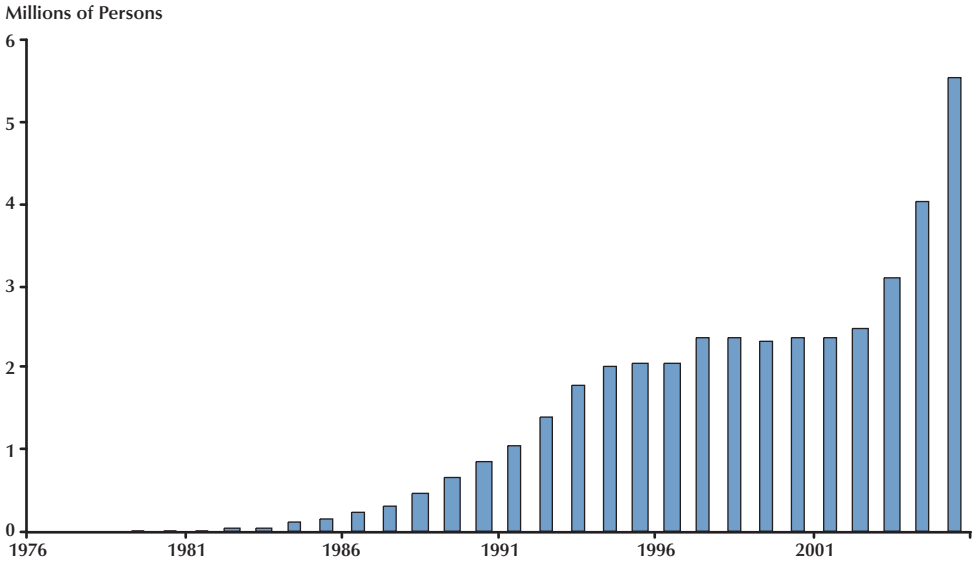
[2] Microfinance Information Exchange (MIX) lists financial profiles and data for 973 MFIs. The high estimate of 2,500 comes from a survey conducted by the Microcredit Summit Campaign in 2002.

[3] The social objectives of the Grameen Bank are summarized by the 16 decisions in their mission statement. The statement is available at http://grameen-info.org/bank/the16.html.

[4] Yunus (2003) describes his conversation with Sufiya, a stool maker. She had no money to buy the bamboo for her stools. Instead, she was forced to buy the raw materials and sell her stools through the same middleman. After extracting interest on the loan that Sufiya used to buy the bamboo that morning, the moneylender left her with a profit of only 2 cents for the day. Sufiya was poor not for lack of work or skills, but because she lacked the necessary credit to break free from a moneylender. With the help of a graduate student, Yunus surveyed Jobra and found 41 other women just like Sufiya. Disillusioned by the poverty around him and questioning what could be done, Yunus lent $27 dollars to these 42 women and asked that he be repaid whenever they could afford it.

Figure 1

Grameen Bank Membership



Through a series of trials and errors, Yunus settled on a working model and by 1983, under a special charter from the Bangladesh government, founded the Grameen Bank as a formal and independent financial institution. Grameen is derived from the Bengali word *gram*, which means village; *grameen* literally means "of the village," an appropriate name for a lending institution that requires the cooperation of the villagers. The Grameen Bank targets the poor, with the goal of lending primarily to women. Since its inception, the Grameen Bank has experienced high growth rates and now has more than 5.5 million members (see Figure 1), more than 95 percent of whom are women.[5]

Lending to poor villagers involves a significant credit risk because the poor are believed to be uncreditworthy: That is, they lack the skills or the expertise needed to put the borrowed funds to their best possible use. Consequently, mainstream banks have for the most part denied the poor access to credit. The Grameen Bank has challenged decades of thinking and received wisdom on lending to the poor. It has successfully demonstrated this in two ways: First, it has shown that poor households can benefit from greater access to credit and that the provision of credit can be an effective tool for poverty alleviation. Second, it has proven that institutions do not necessarily suffer heavy losses from lending to the poor. An obvious question, though, is how the Grameen Bank succeeded where so many others have failed. The answer, according to most economists, lies in its unique group lending contracts, which enabled the Grameen Bank to ensure repayment without requiring collateral from the poor.

The Group Lending Innovation

This Grameen Bank lending model can be described as follows: Borrowers organize themselves into a group of five and present themselves to the Bank. After agreeing to the Bank rules, the first two members of the group receive a loan. If the first two successfully repay their loans, then

[5] Grameen Bank, annual reports (various years). Data can be viewed at www.grameen-info.org/annualreport/commonElements/htmls/index.html.

four to six weeks later the next two are offered loans; after another four to six weeks, the last person is finally offered a loan. As long as all members in the group repay their loans, the promise of future credit is extended. If any member of the group defaults on a loan, then all members are denied access to future credit. Furthermore, eight groups of Grameen borrowers are organized into centers and repayment is collected during public meetings. While this ensures transparency, any borrower who defaults is visible to the entire village, which imposes a sense of shame. In rural Bangladesh, this societal pressure is a strong disincentive to default on the loan. Initial loans are small, generally less than $100, and require weekly repayments that amount to a rate of 10 percent per annum.[6] Weekly repayments give the borrowers and lenders the added benefit of discovering problems early.

Group lending—or the joint liability contract—is the most celebrated lending innovation by the Grameen Bank. Economies of scale motivated its first use, and Yunus later found that the benefits of group lending were manifold. Under a joint liability contract, the members within the group (who are typically neighbors in the village) can help mitigate the problems that an outside lender would face. Outside lenders such as banks and government-sponsored agencies face what economists call agency costs. For example, they cannot ensure that the borrowed money be put to its most productive use (moral hazard), cannot verify success or failure of the proposed business (costly state verification/auditing), and cannot enforce repayment. It is not difficult to see how peers within the group can help reduce these costs, particularly in a situation where the promise of future credit depends on the timely repayment of all members in the group. Joint liability lending thus transfers these agency costs from the bank onto the community of borrowers, who can provide the same services more efficiently.

But perhaps the more difficult agency problem faced by lenders is that of adverse selection—ascertaining the potential credit risk of the borrower. Market failure occurs because safe borrowers (who are more likely to repay) have to subsidize risky borrowers (who are more likely to default). Because the bank cannot tell a safe borrower from a risky one, it has to charge the same rate to all borrowers. The rate depends on the mix of safe and risky borrowers in the population. When the proportion of risky borrowers is sufficiently large, the subsidy required (for the lender to break even on all borrowers) is so high that the lender has to charge all borrowers a significantly high rate. If the rates are sufficiently high, safe borrowers are unlikely to apply for a loan, thereby adversely affecting the composition of the borrower pool. In extreme cases, this could lead to market failure—a situation in which lenders do not offer loans because only the risky types remain in the market!

Economic theory helps show how joint liability contracts mitigate adverse selection (Ghatak and Guinnane, 1999). Under group lending, borrowers choose their own groups. A direct way in which this might help is when a prospective customer directly informs the bank about the reliability of potential joiners. Perhaps a more surprising result is that the lender can mitigate the adverse selection problem even when customers do not directly inform the bank but form themselves into like groups (peer selection). That is, given a joint liability clause, safe customers will more likely group together with other safe customers, leaving the risky types to form groups by themselves. This "assortative matching" mitigates the adverse selection problem because now the risky borrowers are the ones who must bail out other risky borrowers, while the safe borrowers have to shoulder a lesser subsidy. Consequently, all borrowers can be charged a lower rate, reducing the likelihood of a market failure.

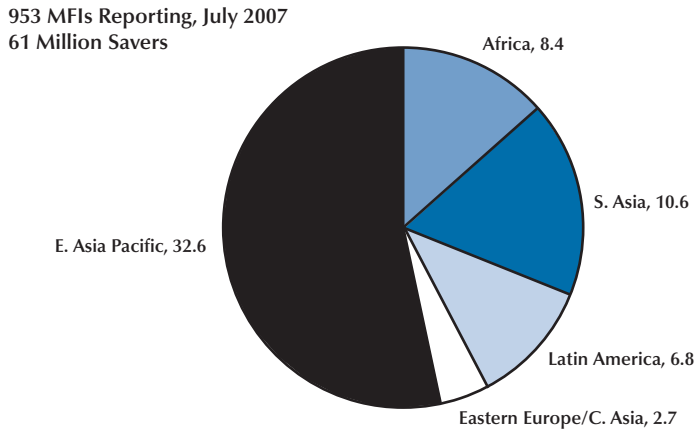
CURRENT STATE OF MICROFINANCE

Since the inception of the Grameen Bank, microfinance has spread to cover five continents and numerous countries. The Grameen Bank has

[6] See www.grameen-info.org/bank/GBGlance.htm. Other sources put the annual rates charged by MFIs at around 30 to 60 percent.

Figure 2

Savings by Region



SOURCE: Microfinance Information Exchange Network; www.mixmarket.org.

been duplicated in Bolivia, Chile, China, Ethiopia, Honduras, India, Malaysia, Mali, the Philippines, Sri Lanka, Tanzania, Thailand, the United States, and Vietnam; the microfinance information exchange market (MIX) lists financial information for 973 MFIs in 105 different countries. Some MFIs have also begun to seek out public and international financing, further increasing their amount of working capital and expanding the scope of their operations. As MFIs have become more efficient and increased their client base, they have begun to expand their services through different product offerings such as micro-savings, flexible loan repayment, and insurance. We discuss these three different product offerings below.

At the time of their inception, many MFIs included a compulsory savings component that limited a borrower's access to deposited funds. This promoted long-term savings, but ignored the fact that many poor save for the short term to smooth consumption during seasonal lows of production. Figure 2 provides a look at the distribution of voluntary MFI savings by region. As MFIs have become better versed in the microfinance market, they have applied their innovations in lending to the collection of deposits. One of the leading examples is SafeSave, located in Dhaka, Bangladesh, which uses the idea that frequent small deposits will guard against the temptation of spending excess income. To keep the transaction costs of daily deposits low, SafeSave hires poor workers from within the collection areas (typically urban slums) to meet with clients on a daily basis. By coming to the client, SafeSave makes it convenient for households to save; by hiring individuals from the given area, training costs and wages are also kept low. With this efficient model for both the bank and individuals, SafeSave has accumulated over 7,000 clients in six years.[7] Not surprisingly, microfinance deposits (like microfinance loans) break from traditional commercial banking experiences. The example of Bank Rakyat Indonesia (BRI) suggests that the poor often value higher liquidity over higher interest rates on deposit products. In 1986, after a year of field experiments, they offered two deposit products: The TABANAS product offered a 12 percent interest rate but restricted withdrawals to twice monthly, whereas the SIMPEDES product offered an interest rate of zero but allowed unlimited withdrawals. The SIMPEDES program saw the largest gain in popularity and to this day

[7] See www.savesafe.org.

still offers a lower interest rate but maintains more accounts than the TABANAS program.[8]

The original Grameen Bank was one of the first MFIs that incorporated a compulsory savings requirement into their lending structure. Every client was required to make a deposit worth 5 percent of their given loan, which was placed into a group fund with strict withdrawal rules (generally no withdrawals before three years). In 2001, the Grameen Bank reviewed both its lending and savings policy and reinvented itself as Grameen II. At the heart of this change were more savings options and more flexible loans, which act as a form of insurance. New to Grameen II is a pension fund, which allows clients with loans greater than 8,000 taka ($138) to contribute at least 50 taka ($0.86) per month. The client receives 12 percent per year in compound interest, earning a 187 percent return after the mandatory 10-year wait. This scheme allows Grameen II to earn more money in the present and expand services, while delaying payment in the near future.

Grameen II serves as a good example of a second innovation in microfinance: flexible loan repayment. Group lending still exists and is an integral part of the process, but Grameen II introduced a flexi-loan that allows borrowers multiple options to repay their loan on an individual basis. Yunus (2002) stated that "group solidarity is used for forward-looking joint actions for building things for the future, rather than for the unpleasant task of putting unfriendly pressure on a friend." The flexi-loan is based on the assumption that the poor will always pay back a loan and thus allows the poor to reschedule their loan during difficult periods without defaulting. If the borrower repays as promised, then the flexi-loan operates exactly like the basic loan, using dynamic incentives[9] to increase the size of the loan after each period. If the borrower cannot make her payments, she is allowed to renegotiate her loan contract rather than default. She can either extend the life of the loan or pay only the principle for an extended period of time. As a penalty, the dynamic incentives of her loan are reset; she cannot access larger (additional) amounts of credit until the original loan is repaid. Because her default now poses no threat to the group promise of future credit, each member is accountable only up to their individual liabilities.

The third offering is the addition of insurance to microfinance loans. The most basic insurance is debt relief for the death of a borrower, offered by many MFIs, including Grameen. Other MFIs have begun experimenting with health insurance and natural disaster insurance. As with lending, agency problems present a dilemma for microinsurance. To this end, some groups such as FINCA Uganda require life insurance of all borrowers, including "risky" and "healthy" alike and thus avoid the adverse selection problem. Other ideas include providing rain insurance to guard against catastrophes. This relies on the assumption that crop yields (and much of the developing economy) are tied to seasonal rain cycles. This innovation eliminates the problem of moral hazard associated with a crop loan. By tying performance to rain cycles, a farmer has no incentive to take crop insurance and then fail to adequately produce a crop during a season of adequate rainfall.

A more recent phenomenon in microfinance is the emergence of foreign investment in MFIs. As more and more MFIs establish positive returns, microfinance is being seen by many professional investors as a profitable investment opportunity. One of the most important developments for the MFIs was the June 2007 release of Standard & Poor's (S&P) report on the rating methodology for MFIs. By applying a common methodology, S&P will be able to send a stronger signal to potential investors about the quality of MFI investments. The process of debt offerings and securitization in the microfinance sector will be covered in greater detail below.

MICROFINANCE AROUND THE WORLD

As Yunus and the Grameen Bank began to prove that microfinance is a viable method to

[8] The SIMPEDES program does also use a lottery system to give rewards, often worth 0.7 percent of deposits. More details are available at the BRI web page: www.bri.co.id/english/mikrobanking/aboutmikrobanking.aspx.

[9] Dynamic incentives threaten to exclude defaulted borrowers from future loans.

Table 1

Characteristics of Select Microfinance Institutions

	Grameen Bank, Bangladesh	Banco Sol, Bolivia	Compartamos, Mexico	Enterprise Development Group, Washington, D.C.
Established	1983	1992	1990	1993
Membership	6,948,685	103,786	616,528	250
Average loan balance (US$)	$69	$1,571	$440	$22,285**
Percent female	96.70%	46.40%	98.40%	30.00%
Group lending contracts?	Yes	Yes	Yes	No
Collateral required?	No	No	No	No
Portfolio at risk >30 days ratio	1.92%	2.91%	1.13%	N/A
Return on equity	1.95%*	22.81%	57.35%	N/A
Operational self-sufficiency	102.24%*	120.09%	181.22%	53%**

NOTE: *12/31/2005; **2004.

SOURCE: Data for this table come from the Microfinance Information Exchange (MIX) Network, which is a web-based platform: www.mixmarket.org. Information was provided for the Enterprise Development Group because it is the only U.S.-based MFI that reports data on the MIX network. Some of the information for EDG was taken from their 2003/2004 annual report, available at www.entdevgroup.org. Comparable information is not available for the Southern Good Faith Fund, as the scope of their mission has changed and expanded to more training-based programs. A more comprehensive summary chart exists in Morduch (1999).

alleviate poverty, their methodology and program began to spread around the world. It is difficult to know exactly how many MFIs there currently are, but Microfinance Information Exchange (MIX) estimates range from 1,000 to 2,500 serving some 67.6 million clients. Of these 67 million, more than half of them come from the bottom 50 percent of people living below the poverty line. That is, some 41.6 million of the poorest people in the world have been reached by MFIs. MFIs have expanded their operations into five different continents and penetrated both rural and urban markets. They have achieved success with a variety of credit products and collection mechanisms. Table 1 provides a comparison of several groups from around the world.

Banco Solidario (Bolivia)

Banco Solidario originally existed as the Fundacion para Promocion y el Desarrollo de la Microempresa (PRODEM), a non-governmental organization (NGO) in the mid-to-late 1980s and provided small capital loans to groups of three or more people dedicated to entrepreneurial activities. By 1992, PRODEM serviced 17,000 clients and disbursed funds totaling $4 million dollars. Constrained by the legal and financial regulations governing an NGO, the board of directors decided to expand their services and PRODEM became the commercial bank, Banco Solidario, later that year. Currently, Banco Sol has 48 branches in seven cities with over 110,000 clients and a loan portfolio of more than $172 million. As of March 31, 2007, Banco Sol reported a past-due loans level of only 1.78 percent. An important distinction between Grameen and Banco Sol is the latter's emphasis on returning a profit with poverty alleviation stated only as a secondary goal.

Banco Sol offers credit, savings, and a variety of insurance products. Their initial loan offering was based on Grameen-style joint-liability lending, offering a maximum of $3,000 per client to groups of three or four individuals with at least one year of experience in their proposed occupation. Using dynamic incentives, the size of the loan is gradually increased based on good repayment history. Annual interest rates average

between 12 and 24 percent and can be anywhere from 1 to 60 months in length (120 months for a housing loan).[10] With these higher interest rates, Banco Sol does not rely on subsidies and, at the end of 2006, posted returns on equity of 22.8 percent.

Compartamos (Mexico)

Compartamos is the largest MFI in Mexico, servicing some 630,000 clients with an active loan portfolio of $285 million. Located in Mexico City, Compartamos is active in 26 Mexican states throughout the country and services primarily rural borrowers. Compartamos was founded in 1990 and began by offering joint-liability loans to female borrowers for income-generating activities. Compartamos has only recently expanded their services to allow men to borrow through their solidarity group and their individual credit program; still, around 98 percent of their borrowers are female. In 1998, Compartamos formed a strategic alliance with Accion International and transformed into a regulated financial institution, called a Sociedad Financiera de Objeto Limitado (SFOL). In 2002, Compartamos took a unique step for a MFI and became one of the first MFIs to issue public debt, listing themselves on the Mexican Stock Exchange. As an SFOL, Compartamos was limited to only offering credit for working capital. In order to offer more services, such as savings and insurance programs, Compartamos became a commercial bank in 2006.

Compartamos was one of the first MFIs to raise additional capital funds through the sale of domestic bond issuances. In 2002, Compartamos was the first MFI in Mexico and one of the first in Latin America to offer a bond sale. Because this was Standard and Poor's first attempt at rating a microfinance bond, they adapted their current methodology and rated the bond using their Mexican scale and assumed local buyers. S&P was impressed with the diversified portfolio of debt and offered Compartamos an MXA+ (Mexican AA) rating. Reddy and Rhyne (2006) report that their most recent bond was rated an MXAA through the use of credit enhancements, allowing them to place the bond with institutional investors. Their fifth issue to date was three times oversubscribed with 70 percent of the bond purchased by institutional investors. By accessing the commercial market, Compartamos has been able to lower the cost of obtaining funds and, in turn, offer better services to their borrowers, such as absorbing the costs of providing life insurance for all clients. Their efforts to improve operational efficiency have also created a self-sufficient MFI that has existed without subsidies for over a decade.

Good Faith Fund (United States)

The Good Faith Fund was modeled after the Grameen Bank and was one of the first MFIs to be established in America. In 1986, while governor of Arkansas, Bill Clinton invited Muhammad Yunus to visit and discuss microfinance. The initial program was started as the Grameen Fund, but the name was later changed to better reflect the fund's commitment to providing loans to micro-entrepreneurs. Loans weren't securitized with collateral; rather, they were guaranteed on "good faith" (Yunus, 2003, p.180).

As the Good Faith Fund grew, practitioners and academics alike began to question the effectiveness of a pure Grameen-style program in the United States. Much like the original Grameen Bank, the Good Faith Fund has relied on innovation and change to apply microlending to the rural economy of Arkansas. Taub (1998) argues that the Good Faith Fund is a successful poverty alleviation program, but that it is a poor economic development program. In Taub's words, "the Good Faith Fund has never been able to deliver a meaningful volume of customers, provide substantial loan services to the really poor, or achieve anything close to institutional self-sufficiency." He argues that important social differences arise because rural Arkansas is inherently different from rural Bangladesh and that these social differences cause the group lending model to fail.

Group lending failed for several reasons, but foremost was the inability of potential borrowers to form a group. In Bangladesh, where poverty

[10] Banco Sol, accessed July 27, 2007; www.bancosol.com.bo/en/intro.html.

rates and population density are much higher than the those in the United States, potential borrowers can more readily find other entrepreneurs. However, a close network of social ties among the poor does not exist in rural Arkansas. In response to this problem, Good Faith Fund personnel established a mandatory six-week training program for individual new members and then created groups from the training programs. These newly formed groups of relative strangers lacked the social cohesion to enforce contract payments, unlike group members in rural Bangladesh, who often live in the same village and have family/community histories together. Consequently, group lending was slowly phased out of the Good Faith Fund. Today, the Good Faith Fund focuses mainly on career training through their Business Development Center and Asset Builders program. They have also found a niche in loaning larger amounts of money to small- and medium-sized enterprises that are underserved by the commercial banking center. These loans provide the same service, but at $100,000 or more, they can hardly be considered "micro" credit.

THE EVIDENCE ON MICROFINANCE

In this section, we review some of the important questions on microfinance. Our assessment is based on numerous studies, technical surveys, and newspaper reports on microfinance. The attempt here is to be illustrative rather than provide a comprehensive review of microfinance.

Is Microfinance a Desirable Alternative to Informal, Exploitative Sources of Finance?

The spread of microfinance and the success of MFIs in various countries around the world prompts a question: Who served the poor before the microcredit revolution? It is well known that conventional banks, which act as creditors to most entrepreneurial activity in the modern world, have largely avoided lending to the poor. Instead, credit to the poor has been provided mostly by local moneylenders, often at usurious rates. Consequently, moneylenders are typically perceived as being exploitative, taking advantage of poor villagers who have no other recourse to loans. Therefore, it is not surprising that microfinance has been welcomed by most as an alternative to the abusive practices of village moneylenders. However, this common perception requires a more careful study: Why don't mainstream banks lend to the poor? In the banks' absence, do local moneylenders have monopoly power? More importantly, are these high interest rates charged by moneylenders welfare reducing?

We begin by listing the difficulties that arise in lending to the poor. First, early studies believed that poor people often lack the resources needed to invest their borrowings to the most productive use. In short, the poor borrow mostly to finance consumption needs (Bhaduri, 1977; Aleem, 1990). Second, even if loans could be earmarked for investment purposes, commercial banks would find it difficult to lend: Lack of credit histories and documented records on small entrepreneurs or farmers make it difficult for the bank to assess the creditworthiness of the borrower. Finally, there is the inability of the poor to post collateral on the loans. This reduces the bank's recourse to a saleable asset once the borrower defaults on the loan. Therefore, it is not difficult to see why commercial banks have avoided lending to the poor.

On the other hand, it is believed that local moneylenders could mitigate the problems faced by outside banks in lending to the poor. Local moneylenders are arguably better informed of borrower quality and have more effective means of monitoring and enforcing contracts than outside banks. In short, because of their social ties, information, and location advantage, these moneylenders are in a unique position to lend to the poor. Some observers argue that usurious interest rates in these markets can be explained by this "monopoly" that the local moneylenders enjoy. Several researchers have studied the market structure of rural credit markets in developing countries. Some argue that rural credit markets are more competitive than previously imagined because there is free entry for local moneylenders if not outside banks. While there is no broad consensus yet, most observers believe that despite

free entry in these markets, moneylenders often enjoy some form of local monopoly power (in the manner of monopolistic competition), at least in the short run.

However, there are other reasons why moneylenders charge high interest rates. First, moneylenders have to compensate for the high transaction costs of issuing and servicing a small loan. Second, some observers believe that these funds have high "opportunity costs"—that is, moneylenders can earn high returns by investing in their own farms. Finally, and this is despite their local informational advantage, moneylenders face some of the same problems as commercial banks in identifying risky borrowers and securing collateral, particularly in poor rural areas. A simple numerical example helps illustrate this result[11]: Consider two lenders with the same cost of funds. Suppose now that the first lender operates in a prime market where borrowers faithfully repay all of their loans at 10 percent, giving him an expected 10 percent return. However, the second lender operates in a poor rural market where borrowers arguably have a higher rate of default, say 50 percent.[12] Consequently, her expected net return is thus [(1 + interest rate) ∗ (1 – probability of default) – 1]. Therefore, for the second moneylender to earn the same 10 percent return, she must charge an interest rate equal to 120 percent: (1 + 120%) ∗ (1 – 50%) – 1 = 10%. This is not to say that some moneylenders don't engage in price setting, but it does give a simple example in which a moneylender can be competitive but still charge extremely high interest rates.

Do moneylenders reduce welfare because they charge high interest rates? To the extent that borrowers willingly accept these loan contracts, the answer is no.[13] These loan contracts do generate a positive surplus ex ante. That is, only those borrowers who expect to generate a rate of return from their investment that is higher than that charged by the moneylender will enter into these contracts. Clearly, this situation can be improved upon by offering lower rates: This would allow more borrowers—i.e., those who expect to generate a lower rate of return on their investment—to enter into loan contracts. However, this does not mean that a high interest rate per se reduces welfare. On the contrary, getting rid of moneylenders or preventing them from offering loans at these high rates can be welfare reducing; in their absence, entrepreneurs with the highest returns on their projects have no recourse to loans.

In contrast, MFIs can often offer lower interest rates than local moneylenders because of their higher efficiency in screening and monitoring borrowers, which results from both their economy of scale (serving more borrowers) and their use of joint liability lending mechanisms. This lowers the MFI's cost of lending relative to that of the local moneylender. To the extent that MFIs can provide loans at a lower rate than moneylenders, enabling more and more borrowers to enter the credit market, is an argument for both the efficiency (because of the reduced cost of funds) and welfare enhancement (because of an increase in the borrower pool) of microfinance.

How High are the Repayment Rates for MFIs?

This is widely regarded as the greatest achievement of microfinance. Many MFIs report high rates of repayment, often greater than 90 percent. These claims have driven considerable academic interest in why and how microfinance works. Furthermore, these repayment rates are widely cited in popular media (*Business Week*, July 9 and 16, 2007; *Wall Street Journal*, September 23, 2007) and have been one of the reasons for the recent interest generated by microfinance in financial markets worldwide. Although the theories of joint liability contracts, progressive lending,[14] frequent repayments, and flexible collateral adequately explain these high rates of repayment, Morduch (1999) raises the important issue of

[11] This example in Armendáriz de Aghion and Morduch (2005) is drawn from the early work of Bottomley (1975).

[12] Of course, Yunus believes that this wrong assumption is the root of all the problems that the poor have in obtaining credit.

[13] Bhaduri (1973) points to some degree of coercion in rural credit markets, particularly in situations where landlords double as moneylenders.

[14] Progressive lending is a type of dynamic incentive in which access to larger amounts of credit becomes available after each successfully repaid loan.

validation. Because many of these repayment rates are self reported, it is important to understand the methodology used to calculate these repayment rates.

Morduch studies the repayment rates for the Grameen Bank for the 10-year period of 1985 to 1996. During this period, Grameen's average loan portfolio grew from $10 million to $271 million and membership expanded more than 12-fold to include 2.06 million members in 1996. For this decade, Grameen reports an average overdue rate of only 1.6 percent.[15] Morduch's contention is that the Grameen Bank does not follow conventional accounting practices and calculates the overdue rates as the value of loans overdue (for more than one year) divided by the *current portfolio*, instead of dividing by the *size of the portfolio when the overdue loans were issued*. Because the size of the loan portfolio expanded 27-fold during this 10-year period, the loan portfolio is significantly larger at the end of any one year than at the beginning. Morduch finds the adjusted average default rate to be 7.8 percent for the same 10-year period. He makes the point that "the rate is still impressive relative to the performance of government development banks, but it is high enough to start creating financial difficulties" (Morduch, 1999, p. 1590).

As for these financial difficulties, Morduch then focuses on reported profits, taking special care to examine the provision of loan losses. He finds that the bank is slow to write off bad loans, dropping only a modest 3.5 percent of its portfolio every year, again overstating the amount of profit. He calculates that instead of posting a total of $1.5 million in profits, the bank would have instead lost a total of $18 million. The implications to Morduch's findings are as follows: In the early 1990s, to operate without subsidies, the Grameen Bank would have had to raise interest rates on its general product from 20 percent to 50 percent, and this would have raised the average interest rate on all products to 32 percent. Morduch is careful to point out that it is unknown whether or not borrowers would defect, because for most borrowers the alternative is either no loan or an even higher interest rate on loans from a moneylender.

Although there is an apparent disagreement between Morduch's adjusted rates of repayment and the Grameen Bank's self reported rates, this alone does not mean that Grameen is a financial failure. In one case, the modest write-offs of bad loans offer proof of Yunus's organizational commitment to the poor and the belief that, given time, they will repay a loan. The since-implemented Grameen II Bank builds on this concept and allows borrowers to restructure a loan into smaller payments or to take a scheduled amount of time off, rather than default. Yunus describes the difference: "[The] overarching objective of the conventional banks is to maximize profit. The Grameen Bank's objective is to bring financial services to the poor, particularly women and the poorest and to help them fight poverty, stay profitable and financially sound. It is a composite objective, coming out of social and economic visions." Given that the Grameen Bank's focus is largely on social objectives and not profit maximization, some have argued that it is not obligated to adopt standard accounting procedures. What is important is that Grameen is among the few transparent microfinance organizations and researchers have been able to review and evaluate their financial statements.

An important consideration here is that MFIs are known to charge considerably higher rates compared with similar loans from conventional banks. In their celebrated work, Stiglitz and Weiss (1981) showed that the high interest rate that a lender charges may itself adversely affect repayment rates by either discouraging creditworthy borrowers (adverse selection) or tempting the borrowers to opt for riskier projects (moral hazard). Consequently, the coexistence of high repayment rates (around 95 percent) and higher interest rates (a 30 to 60 percent interest rate is common) in microfinance has "puzzled" economists.

One explanation offered by some economists is that MFIs face an inelastic demand for loans.

[15] In comparison, nonperforming loans averaged between 1 and 1.5 percent for all U.S. commercial banks for the decade of 1995 to 2005. (Source: Federal Financial Institutions Examination Council.) Braverman and Gausch (1986) found that government credit programs in Africa, the Middle East, Latin America, South Asia, and Southeast Asia all had default rates between 40 and 95 percent.

However, in a recent empirical study on the SafeSave program in Dhaka slums, Dehejia, Montgomery, and Morduch (2005) show that the elasticity of demand for microcredit may be significantly negative even though certain groups of borrowers (particularly the wealthier ones) do not reduce their demand when faced with higher interest rates. However, Emran, Morshed, and Stiglitz (2006) offer a more promising explanation for this puzzle. Departing from the traditional focus on credit markets in studies of microfinance, the authors examine the implications of missing or imperfect labor markets for poor women in developing countries (the typical customers of MFIs in Bangladesh). Emran, Morshed, and Stiglitz (2006, p. 4) demonstrate "the critical role played by the structure of the labor market in making the small-scale household-based investment projects 'credit worthy' in the face of very high interest rates, especially for the poor households with little or no collaterizable assets."

Is There More to Microfinance than Group Lending or Joint Liability Contracts?

The success of microfinance in generating high repayment rates led many economists to investigate the reasons behind this success. The mid-to-late 1990s witnessed a large increase in the number of journal articles on group lending contracts, as economists sought to explain how microfinance "succeeded" where traditional forms of lending had failed. Joint liability contracts were seen as the break from traditional lending mechanisms and economic theory was used to readily explain how these contracts helped to improve repayment rates. The growth of the literature on group lending contracts in the mid-1990s offers the impression that all MFIs operate as such, but the reality is that MFIs use a variety of lending techniques, such as dynamic and progressive loans, frequent repayment schedules, and nontraditional collateral to ensure high repayment rates among poor, underserved borrowers. These mechanisms were either introduced independently or in conjunction with joint liability programs such as Grameen's and in many cases operate alongside group contracts. Practitioners and theorists alike have now realized that these mechanisms can operate with individual contracts and in certain cases (e.g., in areas of low population density) offer better repayment results than group lending schemes.

The mechanism of progressive lending guards against the borrower's strategic default at the end of a loan cycle, because by definition she has little or no collateral to be seized in the event of default. Instead, MFIs have offered small initial loans, with the promise of future credit for timely repayment. The offer of future credit serves as a powerful incentive for a micro-entrepreneur trying to grow her business. In this scenario, a borrower will default only if her current income is greater than her future expected profits. With a small initial loan for a beginning entrepreneurial venture, this is unlikely. To further increase the likelihood of repayment, MFIs use dynamic lending, in which the size of the loan is gradually increased with each successive loan repayment. Now, the expected future profits are almost certainly greater than current earned income because the size of the loan continues to grow.

Another mechanism used by MFIs is that of frequent repayments, which often begin even the week after the loan is disbursed. By requiring small repayments before the business venture has reach maturity, MFIs are essentially requiring that borrowers have a second source of income and, hence, borrow against their current consumption. This allows MFIs to screen against high-risk borrowers from the beginning because borrowers will be able to repay the loan even if their venture fails. Indeed, weekly repayments give the borrowers and lenders the added benefit of discovering problems early. Armendáriz de Aghion and Morduch (2005) also suggest that frequent repayments provide better customer service, contrary to the belief that more repayments raise the transaction costs for the borrower by requiring more travel to and from payment centers. Instead, frequent repayments help borrowers with savings constraints such as seasonality of income, family members dropping by to borrow funds, or discretionary spending by one or more of the family members. When coupled with dynamic incen-

tives, frequent loan repayments begin to resemble savings deposits that will be paid with interest (the graduated size of the next loan). This allows families to break free of certain savings constraints (such as those noted above) because the loan is paid each week, before the money can be spent on anything else.

The final mechanism is the requirement of nontraditional collateral, which was introduced by banks such as Bank Rakyat Indonesia (BRI). This feature breaks from the commercial practice that collateral submitted must have a resale value equal to the loan. In a group lending contract, joint liability often serves as collateral, but BRI operates on the "notional value" of an item and allows collateral to be any item that is important to the household, regardless of market value. This may include the family's sole domestic animal, such as a cow, or it may be land that is not secured by title. Neither item could be sold for much of a profit without significant transaction costs to the bank, but both items would be even more difficult and costly for the family to do without.

Armendáriz de Aghion and Morduch (2000) offer evidence of the success of individual loans that use progressive/dynamic incentives, frequent repayments, and nontraditional collateral to guarantee a loan. Using data from Eastern Europe and Russia, they demonstrate that individual loans can generate repayment rates greater than 90 percent (and above 95 percent in Russia). In industrialized settings, borrowers are more likely to face more competition, making it more costly to form a borrowing group. In this scenario, loan products will go to different entrepreneurs, with different expected payoffs—hence, necessitating different loan amounts. A group contract can be inefficient because it imposes a ceiling on the loan size equal to that given to the smallest member of any potential group. They conclude by suggesting that in areas that are relatively industrialized, individual loan models may perform better than traditional group lending models.

Is Microfinance an Important Tool for Poverty Alleviation?

Microfinance started as a method to fight poverty, and although microfinance still fulfills this goal, several institutions have sought to make a distinction between the "marginally poor" and the "very poor." The broadest definition distinguishing these two groups comes from the Consultative Group to Assist the Poorest (CGAP), which defines the poor as individuals living below the poverty line and the poorest as the bottom half of the poor. The World Bank estimates that in 2001, some 1.1 billion people had consumption levels below $1 and another 2.7 billion lived on less than $2 per day.[16] As microfinance continues to grow, questions have started to focus on who is the optimal client. Should microfinance target the marginally poor or the extremely poor?

Morduch (1999) tries to answer this question by considering two representative microfinance clients, one from each poverty group described above. The first client belongs to a subsidized microfinance program and her income is only 50 percent of the poverty line. The second client belongs to a financially sustainable program that accordingly charges higher interest rates. To ensure repayment of the loan at the higher rate, the second borrower is chosen to be marginally poor, that is, with an income of 90 percent of the poverty line. Using the widely used "squared poverty gap" (Foster, Greer, and Thorbecke, 1984) measure of poverty, Morduch suggests that a dollar increase in income for the very poor borrower has a five times greater impact than the same dollar for the marginally poor borrower.

This simple example would suggest that, in terms of poverty alleviation, MFIs should focus on the poorest borrowers first, but this is not always the case. As MFIs seek to become financially independent, they find themselves serving only the marginally poor. This is an important distinction between Grameen and Banco Sol of Bolivia: The latter's emphasis is on returning a profit, and alleviating poverty is seen only as a secondary goal. Not surprisingly, Banco Sol charges higher interest rates,[17] does not rely on

[16] World Bank, "Poverty Analysis"; data can be viewed at http://web.worldbank.org.

[17] Annual interest rates average between 12 and 24 percent and can be anywhere from 1 to 60 months in length (120 months for a housing loan). The data are from Banco Sol, accessed 7/27/07; www.bancosol.com.bo/en/intro.html.

subsidies, and at the end of 2006 posted returns on equity of 22.8 percent.[18]

This apparent dichotomy between financial independence and poverty alleviation also gets to the heart of a different problem. At what point does a successful MFI begin to look like a regular bank? If the MFI successfully serves poor clients, then those clients should be able to use their loans to lift themselves out of poverty. Because of the nature of progressive and dynamic loans, successful borrowers earn access to larger loans, helping them break free of poverty even faster.

The Grameen Bank has found a way to make this dichotomy work for them and now uses their economy of scale to create a financially independent bank without raising interest rates. In 1995, the Grameen Bank decided not to request any more funds from donors and instead began to fund the bank from collected deposits. With more than two decades of successful borrowers behind them, Grameen has had a chance to build up savings deposits slowly, to the point that it is now self-sustainable, based on the amount of funds provided by members. In a rough sense, it is now the more-successful poor that are subsidizing new clients. This is a significant step, especially considering that, from the decade of 1985 to 1996, Armendáriz de Aghion and Morduch (2005) calculate that Grameen accepted $175 million in subsidies, including both direct donations and "soft" donations such as soft loans, implicit subsidies through equity holdings, and delayed loan loss provision.

Is Microfinance Sustainable or Even Profitable?

With all of the positive publicity surrounding microfinance, it may be surprising to learn that not all MFIs are sustainable or able to return a profit. Despite their rapid growth and sound operations based on strong theoretical platforms (such as using group loans, dynamic incentives, and frequent repayments), less than half of all MFIs return a profit and most still require the help of donors and subsidies. A lack of financial sustainability doesn't necessarily indicate a failing MFI, but rather raises questions about the mission and direction of that particular MFI. Even with subsidies, many MFIs remain the most cost-effective method to alleviate poverty; and, as we argued previously, subsidies can help change the profile of the targeted client from the poor to the extremely poor.

For an MFI to be sustainable can mean one of two things: The organization can be operationally sustainable or it can be financially sustainable. An MFI that is operationally sustainable raises enough revenue to cover the cost of operating the business—paying loan supervisors, opening branch offices, etc. Subsidies might still be used to issue loans or cover defaulted loans. An institution that is financially sustainable does not require any subsidized inputs or outside funds to operate. Instead, it raises money through its lending operations. The *MicroBanking Bulletin* (2003) surveyed 124 MFIs with a stated commitment to becoming financially sustainable. In their survey, the *Bulletin* found that only 66 operations were sustainable, a rate just slightly above 50 percent. As Armendáriz de Aghion and Morduch (2005, p. 232) note, all 124 programs asked for help in managing their accounting standards and, hence, "in terms of financial management, [these 124 programs] are thus skimmed from the cream of the crop." Similar sustainability data do not exist for the other 2,000+ MFIs; but, without similarly strong commitments to financial sustainability, the percentage of sustainable operations is likely to be much lower than 50 percent.

Subsidized credit is financed in a variety of forms, some of which have been discussed briefly with the Grameen Bank example. MFIs also secure funds from donors, many of whom want to alleviate poverty but have not seen strong returns in the nongovernmental organization (NGO) or government sector. For many, donations and subsidies are intended as a method to get MFIs started. But without any accountability or empirical research, it is difficult for donors to decide at what point an MFI should forgo its dependence on outside funds. Lacking in this debate is a clear under-

[18] MIX Market financial data are from BancoSol, accessed 8/2/07; www.mixmarket.org/en/demand/demand.show.profile.asp?token=&ett=280.

standing of how subsidies affect the supply and demand of loans. Without subsidies, interest rates may rise; and, as standard demand theory suggests, fewer loans will be requested. Moreover, rising interest rates without subsidies may exclude poorer projects, thus raising average returns. But, they may also increase the moral hazard problem; at higher interest rates, only risky borrowers apply for a loan, thus increasing the default rate and lowering returns. Finally, it is unclear what affect subsidized lenders have on the overall credit supply. Do they segment the credit market while serving the very poor or do they squeeze out other lenders, reducing overall efficiency for the market?

In some instances, government institutions collaborate with local MFIs; but, more often than not, government organizations and MFIs are at odds with one another, despite the fact that both share the stated goal of reducing poverty. A prime example of the failure of government subsidized initiatives in the market for microcredit is the Integrated Rural Development Program (IRDP), which allocated credit based on social targets in rural India, giving 30 percent of credit to socially excluded groups and 30 percent to women. Armendáriz de Aghion and Morduch (2005) report that between 1979 and 1989 IRDP offered over $6 billion in subsidized credit but generated loan repayment rates below 60 percent, with only 11 percent of borrowers taking out a second loan. During the same decade, the Grameen Bank also accepted subsidies in a variety of forms, but did not change their lending model to include social targets. During this time, the Grameen Bank saw its membership grow to half a million members, with repayment rates above 90 percent. The experience of the Grameen Bank and IRDP during the late 1970s and early 1980s is important because of the similarities between regions. Both Bangladesh and India are densely populated, rural, agrarian economies with high rates of poverty. Therefore, it is likely that the Grameen Bank's comparative success during this period is indicative of a more efficient lending model rather than variances in their lending environment.

In sum, even if many MFIs are not financially sustainable, the microfinance movement may still be the best per-dollar investment for alleviating poverty. Further research is needed to show whether financial sustainability is even a desired objective, and future work could help understand how different subsidy mechanisms can best balance financial sustainability with the desired social objectives.

Could Competition Among MFIs Lead to Better Results?

At first glance, standard economic theory suggests that competition should improve the performance of MFIs and lead to better service and lower interest rates. With such a large poor population and high rates of growth, there is also a large market to support more MFIs. Historically, though, competition has failed to increase services and often decreases the rate of repayment. When clients have access to alternative sources of credit, MFIs lose the leverage they gain from dynamic incentives and progressive loans (i.e., future loans are contingent on repayment).

During the late 1990s, Bolivia and Banco Sol experienced a microfinance crisis. As the success of Banco Sol increased and commercial banks began to see the profitability in an MFI model, competition increased. General economic theory suggests that competition is inherently good, but for the early MFIs, competition reduced efficiency by weakening the incentives: As credit options increased for borrowers, the incentives inherent in a dynamic or progressive loan became weaker. This proved difficult for Banco Sol, whose model relies on group lending and dynamic incentives. The competition mainly came from Acceso FFP, a Chilean finance company that paid its employees on an incentive system. Within three years, Acceso had 90,000 loans, and Banco Sol lost 11 percent of its clients. Regulated MFIs in Bolivia saw their loan overdue rates increase from 2.4 percent to 8.4 percent in just over two years. Because of the increased competition, Banco Sol saw its return on equity fall by 20 percentage points to only 9 percent in 1999 (Armendáriz de Aghion and Morduch, 2005, p. 127).

In their study of 2,875 households from 192 villages in Thailand, Ahlin and Townsend (2007,

p. F43) reach a similar conclusion. They note that, with increased access to credit, borrowers do not respond to dynamic incentives. Moreover, strong social ties, such as the clustering of relatives in a village, can also lower repayment rates in the same manner of competition. In their words, "this result has not been seen in the previous empirical research, nor focused on in the theoretical models."

In the early years of competition in the microfinance sector, MFIs struggled to maintain a credible threat of denying future credit on default. In recent times, however, new regulation has helped to promote competition in Bolivia as lenders started to share more information on borrowers. By law, Banco Sol and other regulated financial intermediaries are now required to report the name and national identification number of delinquent borrowers to the Superintendent of Banks and Financial Institutions. This information is available to all financial intermediaries through both formal and informal agreements. This agreement helped to strengthen the threat of dynamic incentives, and, as a result, competition among lenders has led to an increase in their client base.

Does Microfinance Have Any Social Impact in Terms of Female Empowerment and Education?

Any review of microfinance is incomplete without a discussion of its impact on women. The Microcredit Summit Campaign Report (2000) lists over a thousand programs in which 75 percent of the clients were women. Yunus (2003) recounts the initial difficulties overcoming the social mores in rural Bangladesh and lending to women in this predominantly Islamic nation. However, his efforts were rewarded and 95 percent of the Grameen Bank's current clients are women.

This focus on women follows largely from Yunus's conviction that lending to women has a stronger impact on the welfare of the household than lending to men. This has been confirmed by a large volume of research on microfinance. In countries where microfinance is predominant, country-level data reveal signs of a social transformation in terms of lower fertility rates and higher literacy rates for women. Pitt and Khandker (1998) show that loans to women have a positive impact on outcomes such as children's education, contraceptive use, and the value of women's non-land assets. Khandker (2005) finds that borrowing by a woman has a greater impact on per capita household expenditure on both food and non-food items than borrowing by a man. Among other things, this also improves nutrition, health care, and educational opportunities for children in these households. Smith (2002) validates this assertion using empirical data from Ecuador and Honduras to compare microfinance institutions that also offer health services with institutions that offer only credit. He notes that, "in both countries, health bank participation significantly raises subsequent health care over credit-only participation." In particular, he found that participation in MFIs that offer health services reduces the tendency to switch to bottle feeding as incomes rise. He notes that breast-feeding children under age two is a key health-enhancing behavior.

A pro-female bias in lending works well for the MFIs. Practitioners believe that women tend to be more risk averse in their choice of investment projects, more fearful of social sanctions, and less mobile (and therefore easier to monitor) than men—making it easier for MFIs to ensure a higher rate of repayment. Various studies from both Asia and Latin America have shown that the repayment rates are significantly higher for female borrowers compared with their male counterparts.

However, critics have argued that microfinance has done little to change the status of women within the household. A much-cited paper by Goetz and Gupta (1996) points to evidence that it is mostly the men of the household and not the women borrowers who actually exercise control over the borrowings. Moreover, microfinance does little to transform the status of women in terms of occupational choice, mobility, and social status within the family. Therefore, microfinance hardly "empowers" women in any meaningful sense. Although this may truly be

the case, there is no denying the fact that microfinance has provided heretofore unrealized working opportunities for women with limited skills in traditional activities.

Can the Microfinance Experiment Be Successfully Replicated Anywhere in the World?

Although the microfinance revolution has recorded success in most developing countries of the world, it has achieved little success in some of the more developed nations. The most notable example here is the Good Faith Fund in Arkansas, where microfinance has failed to deliver the same rapid growth and poverty alleviation as it has in the developing world. This seems reasonable given the relatively smaller percentage of those living in poverty and the much larger safety net afforded the poor through welfare and unemployment programs. As Yunus (2003, p. 189) states, "In the developed world, my greatest nemesis is the tenacity of the social welfare system…[M]any calculate the amount of welfare money and insurance coverage they would lose by becoming self-employed and conclude the risk is not worth the effort." Yunus correctly addresses a motivating factor for the relatively weak success of microfinance in the United States, but studies have found other reasons why microfinance has failed to deliver: e.g., a lack of entrepreneur opportunities for the poor, lack of group structure, and the multitude of options facing the U.S. poor.

Why Did Microfinance Initiatives Fail in the United States? In their study of U.S. microfinance, Edgcomb, Klein, and Clark (1996) find that micro-enterprise accounts for only 8 to 20 percent of all jobs—because of the availability of wage jobs and public assistance. When compared with the 60 to 80 percent of jobs supplied by micro-enterprise in the developing world, the pool of potential microfinance beneficiaries in the United States is substantially smaller. Schreiner and Woller (2003) make the point that the characteristics of the poor are different in the two regions. In the developing world, jobs are relatively scarce and hence the unemployed are more likely on average to include individuals that are highly skilled or better motivated to become entrepreneurs. In contrast, in the United States, where poverty is much less prevalent, most individuals with the aforementioned characteristics can find jobs. Furthermore, the amount of small business regulation in the United States poses problems; a micro-entrepreneur must know their proposed business but must also understand local and federal tax laws and regulations. To compete with much larger national markets, small business owners must further understand and excel at marketing their products in both local and larger markets. The lack of highly skilled or better-motivated workers among the poor in the United States, combined with the higher entry costs for successful micro-enterprise, makes successful microfinance initiatives more difficult. Schreiner (1999) finds that, in absolute terms, only one person in a hundred was able to move from unemployment to self-employment through micro-enterprise.

Taub (1998) offers a slightly different explanation: He found that the markets for the borrowers differed between regions. In Bangladesh, most small entrepreneurs engage in goods-producing activities that, when combined with their small local markets, offers an almost immediate stream of revenue. This feature allows the Grameen Bank and others to require weekly repayments, which is often cited as a primary reason for their high repayment rates. In the United States, most entrepreneurs engage in service-producing activities because it is difficult to compete against the economies of scale in goods production and distribution within the U.S. market. These service businesses provide a relatively unreliable source of income, particularly in the early stages. This risk, combined with the safety net afforded to the poor through welfare, discourages many potential entrepreneurs from starting a new venture. In support of this point, Taub found that the likely borrower comes from a family with at least one source of steady income, so that their new venture is unlikely to substantially hurt their family resources.

In the late 1980s, the Good Faith Fund demonstrated the difficulty of forming a cohesive group

structure to enforce joint liability loans. Schreiner and Woller (2003) offer four basic failures of group formation in the United States. First, they suggest that the impersonal nature of U.S. market interactions reduces the need for social reputations and hence the group loses the ability to punish delinquent borrowers. Second, the U.S. poor are diverse and hence it is difficult to find other poor potential entrepreneurs to guarantee a group loan. In U.S. markets, there is also a limit to the potential number of small-business ideas. In developing countries, a group of borrowers may all enter the basket-making market with success because of the much larger local economy. The group guarantees the loan but also offers advice to help succeed in the market. In the United States, the demand for micro-businesses is much smaller and diverse groups of people must start diverse business ventures. There is little value to the group outside of a loan guarantee because group members don't share the same risk to their businesses. Third, defaults are often not enforced in group settings, as found by Hung (2003). Finally, groups often break down in the United States because the poor have access to other forms of credit. This credit may be more attractive because it doesn't require the transaction costs of dealing with a group.

For the United States, pure Grameen-style group lending schemes have failed to deliver substantial results, but that is not to say they have not benefited the poor. Rather, microfinance operations in the United States have often switched to individual lending operations that require borrowers to attend mandatory small business training programs or offer loans to attend specialized schooling for particular professions. A fundamental difference is that microfinance in the United States helps place the poor into existing wage-earning jobs rather than create new jobs. The additional training substantially raises costs to the point that many U.S. MFIs are not self-sustaining, instead relying on grants and subsidies. Edgcomb, Klein, and Clark (1996) found that the average cost to make and service a loan was $1.47 per dollar lent, with a range of costs from $0.67 to $2.95. Without charging usurious interest rates, it can be difficult to earn such a similarly high return, particularly with the smaller microfinance market. Taub (1998) reports that from 1989 to 1992, the Good Faith Fund averaged only 18 new loan customers per year.[19] In the following years, the average number of new loan customers rose into the mid 20s, before a change in management and change in focus substantially reduced those numbers. With small loans, averaging just $1,600 per year for the first four years, it became impossible for the Good Faith Fund to even come close to matching the combined staff salaries of $450,000.

Due in part to these high-cost structures, Bhatt, Tang, and Painter (2002) found direct evidence that nearly a third of MFIs started in California in 1996 had ceased to exist by 1998. Instead of focusing on becoming self-sufficient, Schreiner (2002, p. 82) argues for more quantitative evaluation of MFIs. He claims that "the dirty secret in micro-enterprise is that few evaluations are really tests…[E]valuations were funded and conducted by people who already believed that micro-enterprise was worthwhile." Schreiner thus concludes that a main goal in helping alleviate poverty should be to evaluate the efficiency of MFIs and, if need be, reallocate resources to other training programs that specialize in poverty alleviation, not economic development.

THE FUTURE OF MICROFINANCE

The number of MFIs has been growing steadily, and the top 100 MFIs are increasing their client base at a rate of 26 percent per year.[20] To fund this spectacular growth, MFIs have turned to a variety of sources, many of which rely on funding from local sources to guard against foreign currency risk. MFIs are currently moving into the international market and confronting challenges such as developing standard rating methods; guarding against foreign currency risk and country risk; and meeting the large volume

[19] At the time of Taub's study, population density in Bangladesh was 814 per square kilometer, while the population densities of Arkansas counties served by the Good Faith Fund were only 36, 9, 8, 9.1, and 10.33 per square kilometer (Jefferson, Lincoln, Desha, Chicot, and Ashley counties, respectively).

[20] MIX Market analysis of top 100 MFIs; www.mixmarket.org.

requirements for an international offering. But, according to Reddy (2007) of Accion International, "Many believe that savings mobilized from local depositors will ultimately be the largest source of capital for microfinance. Foreign capital provides 22 percent of funding for the 'Top 100' MFIs, but savings is the first source of capital, representing 41 percent of all assets in 2005."[21] Many MFIs have a mandatory or suggested savings rate; and, for larger loans, MFIs will often require borrowers to deposit 5 percent of the loan back into a savings account. Some, but not all, have restrictions on when and how that money can be accessed.

Although not the main source of funding, foreign capital still represents a significant portion of current funding for the top 100 MFIs. As Elizabeth Littlefield of CGAP found, U.S. investment in foreign microfinance in 2006 was $4 billion, which is more than double the 2004 total of $1.6 billion. This funding comes from two main sources: international financial institutions and microfinance investment vehicles. To access this foreign investment, MFIs are beginning to use new vehicles of debt-structured finance, including collateralized debt obligations (CDOs) and securitization.

To date, one of the most well-known international debt issues was structured by Blue Orchard Finance in 2004. This deal, worth $40 million, linked 90 investors with nine MFIs in Latin America, Eastern Europe, and Southeast Asia. The main innovation of the Blue Orchard deal was the introduction of a tiering system (of five tranches) that allowed for different risk appetites among investors. Microfinance is also beginning to raise money in the equity market, through organizations such as Accion Investments, which has invested $12.4 million in five institutions (Reddy and Rhyne, 2006).

In 2006, the first securitized microfinance receivables went on the market from the Bangladesh Rural Advancement Committee (BRAC). BRAC is an NGO that lends money to the extremely poor, focusing mainly on offering women credit to develop their own income-generating activities. The transaction was structured by RSA Capital, CitiGroup, the Netherlands Financing Company, and KfW Bank of Germany and has securitized $180 million in receivables over a period of six years.

According to CitiGroup, 65 percent of the loans are to the extremely poor, who borrow from $50 to $100. BRAC offers three loans, based primarily on the land holdings of the borrower. For those with less than one acre of land, borrowers can obtain from $50 to $500 at a flat 15 percent rate, payable over one year through 46 weekly installments. The marginally poor, those who own more than one acre of land and are involved in agricultural enterprise, can qualify for loans between $166 and $833 with a flat 15 percent interest rate. This product must be repaid in equal monthly installments, with a 12- or 18-month horizon. Finally, BRAC offers larger loans to entrepreneurs to start their own business. These loans are monthly products (12, 18, or 24 months) with a 15 percent interest rate.[22] BRAC employs a dynamic lending scheme, wherein timely repayments guarantee future access to credit. This mechanism is similar to a joint lending liability, except in this case borrowers are liable to their future selves.

International Financing Review Asia honored the BRAC deal with the title of best securitization in Asia Pacific for 2006 because "one of the most impressive aspects of the transaction is the way that it deals with the sheer complexity of a dynamic pool that will contain about 3.3 million short tenor loans for which the average outstanding principal is around US$95."[23] The security was given an AAA rating from the local Bangladesh markets, with CitiGroup and Netherlands Financing Company each purchasing one-third of the certificates. The remaining one-third was split among CitiGroup Bangladesh and two local Bangladeshi banks.

This deal differs from the collateralized debt obligations that Blue Orchard Loans for

[21] Data taken from MIX Market analysis of the top 100 MFIs; www.mixmarket.org.

[22] See BRAC's economic development and microfinance information at www.brac.net/microfinance.htm.

[23] CitiGroup: "Innovative BRAC Microcredit Securitization honored in Bangladesh," accessed 1/16/07; www.citigroup.com/citigroup/press/2007/070116b.htm.

Development issued in April 2006, in which funding for 21 MFIs from 12 countries was packaged into a $99.1 million commercial investment. The main difference between a CDO and securitization is that a CDO relies on the ability of the MFI to repay the loan, unlike a securitized loan that relies on the underlying borrowers to repay. A CDO is another vehicle to bring mainstream investors to microfinance, but is still limited by the ability to rate the creditworthiness of differing MFIs. To help with this issue, S&P released a rating methodology for microfinance in June 2007. By applying a common methodology, S&P will be able to send a stronger signal to potential investors about the quality of MFI investments. It is unclear yet whether the 2007 subprime mortgage meltdown in the United States will have an effect on investors' risk appetites for more collateralized securities and whether microfinance securities will be viewed as "subprime" loans.

Walter and Krauss (2006) argue that the opposite should be true—namely, that microfinance can reduce portfolio volatility—and their empirical tests show that microfinance institutions have a low correlation to general market movements. They suggest that this phenomenon is brought on by the continuous and diverse funding through international donor agencies and because micro-entrepreneurs may be less integrated into the formal economy. When markets enter a downturn, micro-entrepreneurs may experience a countercyclical effect, as consumers shift their consumption downward to cheaper goods.

Outside of international credit markets, microfinance has continued to receive grassroots support and popular media coverage. Organizations such as Kiva.org serve as intermediaries and connect individual donors with micro-entrepreneurs. Kiva.org allows individuals to choose a business, originate their own micro-loan, and in return receive electronic journal updates and payments from their borrower. Most loans are small, between $50 and $100 and have repayment terms from six months to a year, but the lender does not receive any interest on their loan. Rather, journal updates and progress reports serve as interest, letting lenders know that their money has been put to good use. At the end of the year, providers can start the cycle anew or withdraw. To date, 128,547 individuals have lent over $12 million with a self-reported repayment rate greater than 99 percent. Popular media outlets such as the *Wall Street Journal* (September 23, 2007, August 21, 2007, October 21, 2006), *New York Times* (March 27, 2007, December 10, 2006), National Public Radio (September 7, 2007, June 19, 2007, April 6, 2007), and others have given Kiva.org frequent and broad exposure, making the microfinance movement as accessible to lenders as the Grameen Bank made microcredit accessible to borrowers.

CONCLUSION

With the recognition of the Nobel Peace Prize in 2006, Muhammad Yunus's vision of extending credit to the poor has reached a global level. Microfinance is not a panacea for poverty alleviation; but, with committed practitioners, a wealth of theoretical work, and a surging demand for both international and individual investment, microfinance is a poverty-alleviation tool that has proven to be both effective and adaptable. Through innovations in group lending and dynamic incentives, MFIs have been able to successfully lend to those traditionally ignored by commercial banks, because of their lack of collateral and credit scores. The poor have responded in kind, by repaying their loans with significant repayment rates. As MFIs have grown and reached new clients, they have continued to innovate by offering individual loans, savings options, and life insurance and seeking new forms of capital in domestic and international markets. Microfinance has spread to five continents and hundreds of countries, yet its success in U.S. markets has been ill-defined, as lenders struggle with higher transaction costs of offering loans and starting micro-enterprises. As more and more MFIs become self-sufficient and continue to expand their client base, it will be the duty of all parties concerned with poverty relief to look for other ways to innovate. For now, microfinance remains a viable solution to economic development and poverty alleviation, both

in Bangladesh and around the world. With more transparency from institutions and better rating standards, the influx of investment capital from international markets will continue to drive microfinance toward Yunus's goal of a poverty-free world.

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A Primer on the Mortgage Market and Mortgage Finance

Daniel J. McDonald and Daniel L. Thornton

This article is a primer on mortgage finance. It discusses the basics of the mortgage market and mortgage finance. In so doing, it provides useful information that can aid individuals in making better mortgage finance decisions. The discussion and the tools are presented within the context of mortgage finance; however, these same principles and tools can be applied to a wide range of financial decisions. (JEL G0, G1)

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The United States was in the midst of a residential real estate boom from 1996 to 2005, and the U.S. Census Bureau reports for that period show that homeownership—the percentage of home-owning households—increased from 65.4 percent to 68.9 percent. During this decade, the Standard & Poor/Case-Shiller Home Price Index rose at a compounded annual rate of 8.5 percent per year, more than four times faster than the rate of inflation. Growth in home prices was particularly strong during the period 2000-05, when home prices rose at an annual rate of 11.4 percent. However, since the first quarter of 2006, house price growth has slowed dramatically; and, in the first quarter of 2007, prices fell for the first time since 1991. These price declines, combined with higher interest rates, have led to increased mortgage delinquency, especially in the subprime mortgage market. Federal Reserve Chairman Bernanke reported recently that the "rate of serious delinquencies for subprime mortgages with adjustable interest rates…has risen to about 12 percent, roughly double the recent low seen in mid-2005."[1] On news that the subprime woes may spill over to borrowers with good credit, rates on mortgage-backed securities rose, while rates on risk-free Treasury bills declined dramatically.[2]

Against this backdrop, this article serves as a primer on mortgage finance. It discusses the basics of the mortgage market and mortgage finance, providing useful information that can aid individuals in making better mortgage finance decisions. Although the discussion and the tools are presented within the context of mortgage finance, these same principles and tools can be applied to a wide range of financial decisions.

ETYMOLOGY

The term mortgage comes from the Old French, and literally means "death vow." This refers not to the death of the borrower, but to the "death" of the loan. This is because mortgages, like many other types of loans, have a fixed term to maturity—that is, a date at which the loan is to be fully repaid. Today, mortgages are paid in

[1] Bernanke (2007).

[2] For a discussion of the development of the subprime mortgage market, see Chomsisengphet and Pennington-Cross (2006).

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installments (most often, monthly), so that the loan is repaid over time rather than as a lump sum on the maturity date. The word for this repayment is *amortization*, which derives from the Middle English for "kill." It refers not to the borrower's murder, but to "killing off" the mortgage by paying it down over time. The morbid etymology of these real estate terms must have some subliminal impact on potential borrowers, as many continue to find the process of getting a mortgage unnerving; however, a mortgage is nothing to be afraid of, as we hope to demonstrate in the remainder of this article.

MORTGAGE BASICS

"Mortgage" is nothing more than the name given to a particular type of loan; in this case, a real estate loan.[3] Like any other loan, it is really an IOU—that is, a promise to repay a sum of money received today at some future time. Although the names of loans change for a variety of reasons, they all have the same basic characteristics: the loan amount, the loan term, the schedule for repayment, and the contract interest rate.

The amount of a loan is just that—a sum of money that the borrower receives upon signing the loan agreement. The term (or maturity) of the loan is the length of time over which the loan amount is to be repaid. The schedule for repayment simply states *how* the loan is to be repaid. Loans can be repaid in installments over the term of the mortgage, in a lump sum at the terminal date of the contract, or in some combination of installments and a final lump sum payment. In the case of mortgages, auto loans, and other consumer loans, the convention is that the loan is repaid in fixed periodic payments, typically monthly. The contract interest rate is the interest rate that the borrower pays the lender in exchange for having the money today.

There are two risks associated with lending. The first, called *default risk*, is the possibility that the borrower fails to repay the loan. The second, called *market risk*, arises when interest rates change over time. If market interest rates rise after the lender has offered a mortgage contract, not only will the lender earn less interest than he would have had he waited and lent at the higher interest rate, but the market value of the investment will decline. Of course, the reverse is also true: If market interest rates fall, the lender will earn more interest than if he waited and the market value of his investment will increase. The *risk* is due to the fact that it is very difficult to predict whether interest rates will rise or fall. The lender also risks losing the higher interest he would earn if the individual decides to refinance the loan at a lower rate.

The prospect of default has led societies to develop laws and mechanisms to protect the lender. One of these is collateral—an asset owned by the borrower that becomes the lender's in the event that the borrower fails to repay the loan. In the case of mortgages, the collateral is nearly always the property being purchased. Loan agreements may also contain a variety of restrictions. Some of these are intended to protect the lender, while others protect the borrower. For example, in the past, many mortgages were "assumable," meaning that if the borrower sold the house, the mortgage could be assumed or transferred to the new owner. This hurt lenders when interest rates rose because the new owner could get a "below-market interest rate" by assuming the previous mortgage. Today, mortgages are typically not assumable. There was also a time when many mortgages (and other consumer loan contracts) had a prepayment penalty. That is, the lender could assess a fee if the borrower repaid the loan before the terminal date of the contract. Present-day mortgage contracts typically stipulate that there is no penalty for paying the loan off before its maturity date.

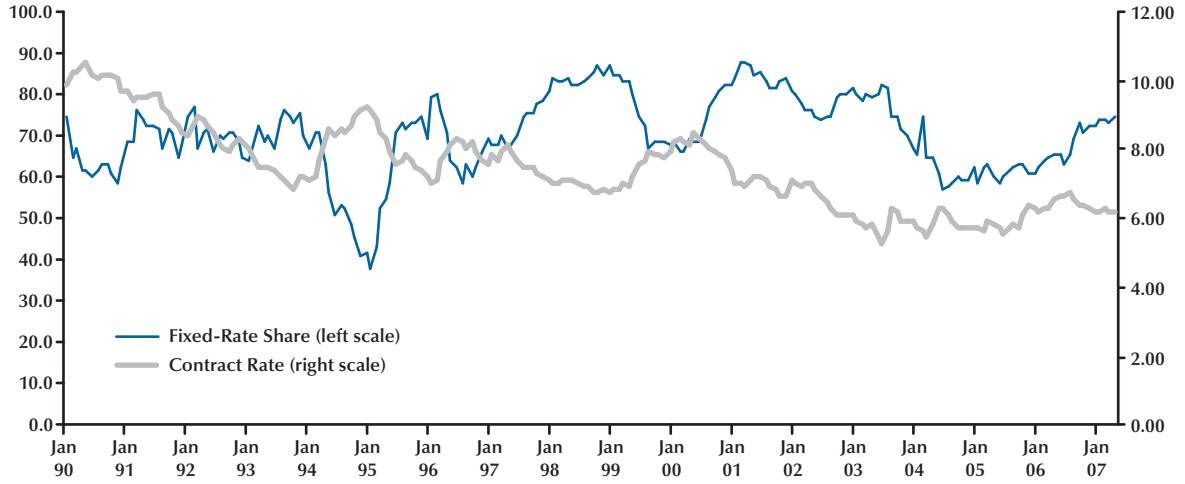
Types of Mortgages

There are a number of different types of mortgages, but the most common are the *fixed-rate mortgage* and the *adjustable-rate mortgage* (or ARM). Other types tend to be combinations of

[3] Legally speaking, the loan takes the form of a note and the mortgage per se is the agreement that secures the note by pledging the real estate as collateral. It is commonplace to refer to both the note and mortgage agreement that secures the note as the "mortgage."

Figure 1

Market Share of Fixed-Rate Mortgages and Contract Interest Rate



these two. Fixed-rate mortgages are by far the most common type of mortgage, accounting for about 70 percent of the total mortgage market. Figure 1 shows the percentage of the total mortgage market accounted for by 15- and 30-year fixed-rate mortgages since 1990 as well as the average contract interest rate. One would expect that lower contract interest rates would lead to a higher percentage of fixed-rate mortgages, as borrowers try to lock in low rates. This relationship seems to hold true over most of the period, but breaks down after 2002. The benefits of a fixed-rate mortgage are as follows: (i) the monthly payment (interest and principal) is constant for the term of the mortgage and (ii), regardless of the behavior of market interest rates, the interest rate paid by the borrower is the same for the life of the loan.

ARMs, however, have interest rates that vary over the term of the loan in step with some index. The two most common indices are the Eleventh Federal Home Loan Bank Board District Cost of Funds Index (COFI) and the National Cost of Funds Index. ARMs have various features depending on the mortgage broker. Most often, an introductory rate is fixed for a period of time ranging from 2 to 5 years. Following this period, the interest rate will rise or fall with the index (plus a fixed markup called the *margin*) at some specified time interval, generally every six months. Typically, the amount that the interest rate can rise or fall in a particular interval is limited and upper and lower bounds for the interest rate over the life of the loan are set.

Rates on ARMs are lower than on otherwise equivalent fixed-rate mortgages. The reason is that the borrower is bearing some of the market risk. Market risk arises because of the inverse (or negative) relationship between interest rates and bond prices. Specifically, if the market interest rate rises, the value of the bond (mortgage) falls and vice versa. For example, consider the effect of an increase in the market interest rate on the market value of a 30-year, $200,000, 5 percent fixed-rate mortgage. The price of the 30-year mortgage decreases by $20,925.31 (from $200,000 to $179,074.69) if the market interest rate rises from 5 percent to 6 percent. If the holder of the mortgage were to sell it, they would suffer what is referred to as a capital loss. Moreover, the price of a longer-term mortgage falls by more than the price of a shorter-term mortgage for a given increase in market interest rates. For example, the

Table 1

Comparing Effective Interest Rates on Fixed- and Adjustable-Rate Mortgages (assuming an LTV ratio between 0.8 and 0.9)

	Fixed-rate	ARM	Difference
1997	7.91	6.95	0.96
1998	7.21	6.69	0.52
1999	7.47	6.93	0.54
2000	8.3	7.5	0.8
2001	7.19	6.72	0.47
2002	6.84	6.13	0.71
2003	6.05	5.2	0.85

SOURCE: Federal Housing Finance Board, historical summary tables, by loan to price ratio; www.fhfb.gov/Default.aspx?Page=53.

price of a 5-year mortgage would have decreased by just $4,774.97 (from $200,000 to $195,225.03) with the same increase in the interest rate (from 5 percent to 6 percent). Because mortgages have maturities that are relatively long—up to 30 years, they have a relatively high degree of market risk.

Of course, the reverse is also true. If the market interest rate were to fall, the value of the mortgage would rise and the holder of the mortgage would realize a capital gain. The problem is that interest rates are extremely difficult to predict. If the markets were populated by investors who are indifferent to whether they sustain a capital loss or a capital gain (i.e., indifferent to risk), the fact that bond prices and interest rates are inversely related would not be an issue. Interest rates would be invariant to the maturity of the asset. However, financial markets are populated by risk-adverse lenders (i.e., those more concerned with suffering a capital loss than a getting a capital gain). Consequently, there is a *risk premium* on bonds (including mortgages) that increases as the term of the loan increases. The risk premium is tiny—essentially zero—for loans of only a few months. The risk premium for 30-year loans can be fairly large, depending on market circumstances.

Because the interest rates on ARMs adjust over the term of the loan, ARMs have less market risk than the corresponding fixed-rate loan with the same maturity. Consequently, with an ARM, some of the market risk associated with mortgage lending is assumed by the borrower. As noted earlier, like anything else, risk is priced. Hence, ARMs have an initial rate that is lower than the rate on an otherwise equivalent-maturity fixed-rate loan. Table 1 shows the annual average difference between the initial rates on conforming fixed-rate mortgages and ARMs from 1997 to 2004. The differences vary from year to year, but range from about 50 to about 100 basis points.[4] Because ARMs have a lower initial interest rate, they are particularly good for individuals who plan either to sell their house or pay off the loan after a short period of time.

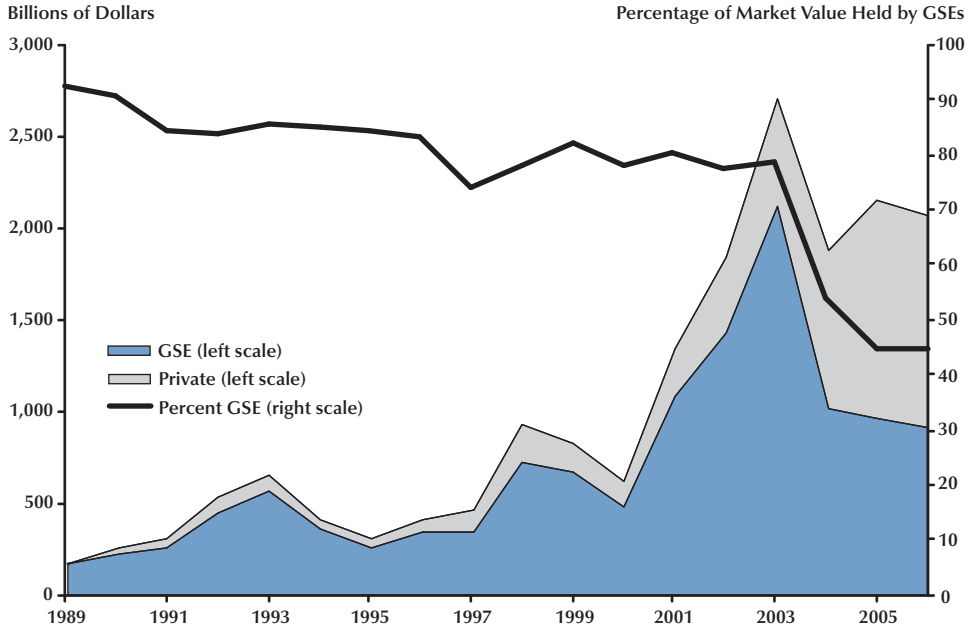
THE MORTGAGE MARKET

The *mortgage market* is a phrase that describes a vast array of institutions and individuals who are involved with mortgage finance in one way or another. This market is broken down into two separate yet connected entities: the *primary mortgage market* and the *secondary mortgage market*. The primary mortgage market is a market where new mortgages are originated. The secondary mortgage market is a market where existing mortgages are bought and sold. Historically, the secondary mortgage market was small and relatively inactive. Two entities, the Federal National

[4] One basis point is one one-hundredth of a percentage point.

Figure 2

Secondary Market Activity of Total Mortgage Loans



Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac), have changed that.[5] These firms were chartered by Congress to create a secondary market in residential mortgages. They are private companies and not part of the U.S. government; however, they are called government-sponsored enterprises (GSEs) because the government places looser restrictions on them relative to fully private companies. Specifically, Fannie Mae and Freddie Mac are exempt from state and local taxes (except property taxes) and have conditional access to a $2.25 billion line of credit from the U.S. Treasury.

Fannie Mae and Freddie Mac issue debt and use the proceeds from the sale of their debt to purchase mortgages in the secondary market. Although the debt that they issue is not backed by the full faith and credit of the United States government—i.e., is not explicitly government debt—GSE debt typically trades at interest rates only a few basis points more than that of otherwise equivalent government debt. This suggests that investors believe that the United States government would honor GSE debt in the event of a crisis.

Because of Fannie Mae and Freddie Mac and the increased sophistication of U.S. financial markets more generally, the secondary market in residential mortgages expanded rapidly in the 1990s and now plays a major role in residential finance. Figure 2 shows the growth of the secondary mortgage market since 1989 on the left axis. The right axis displays the percentage of secondary market value created by GSEs. Although the GSEs account for much of the secondary mortgage market growth in the late 20th century, their influence has decreased sharply in recent years as more and more private firms have entered the market. Before the growth of the secondary mortgage market, banks and savings and loan associations made most of the residential real estate loans.

[5] For a more detailed discussion of the evolution of the secondary mortgage market, see Gerardi, Rosen, and Willen (2007), Frame and White (2005), and Green and Wachter (2005).

Most often, they originated the loan, serviced the loan contract, and actually lent the money. The growth of the secondary market has resulted in increased specialization in mortgage finance. It is now frequently the case that the originator of the loan does not hold it until maturity. They take applications and do all of the necessary credit checks and paper work until the time that the loan is *closed* (i.e., the loan agreement is signed). In many cases the mortgage originator initially makes the loan; however, their intention is to sell the loan quickly. Such firms generate earnings from the fees they charge. The individual or entity that purchases the mortgage is actually making the loan. It is also the case that the entity that makes the loan does not necessarily service the loan contract—that is, collect the periodic interest and principal payments, notify the borrower of overdue payments, keep records, and make property tax and homeowner's insurance payments. Instead, other firms charge a fee for providing these services. In some cases, loans are sold individually, while in other cases they are packaged together and sold as a single asset. The practice of consolidating loans or other debt instruments into single assets or securities is called *securitization*. Securitization is now common in the mortgage market. Mortgage-backed securities, as these assets are called, are bought and sold in financial markets much like stocks or IOUs from private companies or the government: for example, corporate bonds, government Treasury bills and bonds, commercial paper, and negotiable certificates of deposit.

To limit the risk of default, Fannie Mae and Freddie Mac place restrictions on the mortgage debt that they will purchase. Factors that play an important role in assessing the risk of a particular loan are as follows: the payment-to-income ratio, the debt-to-income ratio, the loan-to-value ratio, and the size of the loan. The payment-to-income ratio is the monthly loan payment including real estate taxes divided by the borrower's monthly income. The debt-to-income ratio is the ratio of all monthly debt expenses to monthly gross income. The loan-to-value, or LTV, ratio is the loan amount divided by the estimated (or appraised) value of the property where the difference between the estimated property value and the loan amount is the down payment.

There are no hard and fast rules about limits to these ratios because other factors, such as an individual's credit history, enter in to the determination of an individual's creditworthiness; however, there are some guidelines. Traditionally, a payment-to-income ratio much larger than 25 percent or a debt-to-income ratio of more than about 36 percent is considered cause for concern. A loan is considered "conventional" or "conforming" if the LTV ratio is 80 percent or smaller. As a general rule, the higher these ratios are, the greater is the risk of default. Loans made to borrowers that have ratios significantly larger than those stated above or other impairments, such as low credit scores, are considered subprime.[6] Fannie Mae and Freddie Mac do not purchase loans that exceed a certain amount. The maximum loan amount changes yearly based on the results of a survey by the Federal Housing Finance Board. For a one-family home in the lower forty-eight states in 2007, the maximum loan amount is $417,000. Loans larger than this amount are referred to as *jumbo loans*. Taken together, these guidelines and requirements give lenders an idea of the level of risk that the secondary market is willing to bear.

Like anything else, risk has a price. Lenders compensate for making higher-risk loans by charging a higher interest rate. There are a number of ways this can be done. The most obvious is that the lender merely charges a higher interest rate on more-risky mortgage loans—the greater the risk of default, the higher the rate. Hence, it is not surprising that on average subprime loans have a higher stated interest rate than conventional loans. There are other ways to charge a higher effective rate, however. For example, in the case of an LTV ratio that is greater than 80 percent, the lender often requires the borrower to purchase private mortgage insurance (PMI), whereby a third party bears the risk of default. The borrower may prefer this option to paying a higher mortgage rate because once the LTV ratio reaches 80 percent (either by an appreciation of the property value

[6] For more details, see Chomsisengphet and Pennington-Cross (2006).

or a reduction in the loan balance over time), the PMI can be discontinued.

The lender is also protected if the borrower achieves an LTV ratio of 80 percent by taking a second mortgage to make up the difference. For example, the borrower may have an 80-10-10 mortgage, indicating that 80 percent of the loan is financed by the first mortgage, 10 percent is financed by a second mortgage, and 10 percent is a down payment. Even smaller down payments, including no down payment at all, are possible. Such loans are frequently, but not always, subprime. Because the second mortgage is subordinate to the first—meaning that in the case of default, it is repaid only after the first mortgage is repaid—the holder of the second mortgage bears most of the default risk. Consequently, the interest rate on the second mortgage is higher than that on the first. Borrowers may benefit from using this method, however, because the second mortgage typically has a shorter maturity than the first. Hence, once the second mortgage is paid off, the borrower has only the lower-interest first mortgage. In any event, borrowers with LTV ratios greater than 80 percent can expect to pay more either by paying a higher rate on the first mortgage, by taking out PMI, or by having a higher-interest second mortgage. Mortgage borrowers with LTV ratios less than 80 percent do not, however, typically receive significantly lower interest rates. The reason is that the default risk is very small when the LTV ratio is 80 percent. Lenders know that with this LTV ratio, it is very likely that they will be able to recover all or nearly all of the loan balance in the event of a default. Consequently, a smaller LTV ratio provides essentially no reduction in default risk; hence, there is no reason for the lender to compensate the borrower by giving the borrower a lower interest rate.

The existence of a secondary mortgage market is beneficial to both the borrower and the lender. For the borrower, robust mortgage trading allows for more intense competition; 20 or 30 years ago, local financial institutions were the only option for some borrowers. Today, borrowers have access to national (and even international) sources of mortgage finance. Additionally, the Internet has provided an outlet to quickly compare mortgage rates. Investors also benefit by having a wider range of investments that they can use to diversify their portfolio. Moreover, a well-functioning secondary mortgage market allows investors to realign their portfolios as circumstances change.

MORTGAGE FINANCE

Now that we have discussed some facts about mortgages and the mortgage market, it is time to discuss the nuts and bolts of mortgage payment schedules and the real effective interest rate that one pays when taking out a mortgage. We begin our discussion by showing how the fixed, monthly payment on a fixed-rate mortgage is determined. To make the discussion as concrete as possible, we consider a borrower who wants a $200,000, 30-year, fixed-rate mortgage with a contract interest rate of 6 percent annually. The question is how much will this borrower have to pay each month to pay off the loan in 30 years? The answer, $1,199.10, is obtained from the formula

$$(1) \qquad MP = MB_0\left(1+r\right)^n \frac{r}{\left(1+r\right)^n - 1},$$

where MP is the monthly mortgage payment, MB_0 is the initial mortgage balance—the amount borrowed—n is the number of months over which the loan is amortized, and r is the monthly interest rate (annual interest rate divided by twelve). Consequently, the monthly payment is

$$MP = \$200{,}000\left(1+0.06/12\right)^{360}\left[\frac{0.06/12}{\left(1+0.06/12\right)^{360}-1}\right] = \$1{,}199.10.$$

This formula may seem complicated, but it has an intuitive explanation. The first part of the formula, $MB_0(1 + r)^n$, is just the total outstanding balance if someone borrowed $200,000 and made no payments for 30 years. It demonstrates the effect of what is called *compound interest*—that is, accumulating interest on both the principal and the interest in the previous month every month for 30 years. To illustrate, assume that no payment is made during the first month. The outstanding balance at the end of the first month,

MB_1, would be \$201,000 = \$200,000 + \$200,000 (0.005), i.e., $MB_1 = MB_0 + rMB_0$. Note that this expression can be rewritten more compactly as $MB_1 = MB_0(1 + r)$, i.e., \$200,000(1.005) = \$201,000. If no payment were made the next month, by the end of the second month the total amount owed, MB_2, would be \$201,000 + \$201,000(0.005) = \$201,000(1.005) = \$202,005—the amount of the initial loan, plus \$1,000 in interest for the first month and \$1,005 in interest the second month. Note that the additional \$5 for the second month is interest paid on the \$1,000 in interest owed at the end of the first month—earning interest on interest, i.e., "compound interest." Also, note that the amount owed at the end of the second month could be written more compactly as \$200,000 $(1.005)^2$ = \$202,005, i.e., $MB_2 = MB_1(1 + r) = MB_0(1 + r)(1 + r) = MB_0(1 + r)^2$. This process generalizes to any number of months so that

$$MB_m = MB_0(1+r)^m. \tag{2}$$

Equation (2) is the equation for compound interest. In the case of our 30-year mortgage example, if no payments were made for the life of the loan, the balance at the end of 30 years would be $\$200{,}000(1.005)^{360} = \$1{,}204{,}515.04$.

The second part of the monthly payment equation, $r/[(1 + r)^n - 1]$, aggregates the effects of monthly interest and principal payments. It reflects the fact that rather than letting the interest accumulate over time, the fixed monthly payment covers all of the interest accrued during the month and pays off part of the principal. Instead of owing \$201,000 at the end of the first month of the mortgage if no monthly payment were made, the individual who makes monthly payments would owe \$199,800.90 = \$201,000 – \$1,199.10. Each successive month, more of the fixed monthly payment goes to principal and less goes to interest as the principal balance declines. An *amortization schedule* for our hypothetical loan is presented in Table 2. Notice that it takes a long time to repay the principal. After 10 years of the 30-year mortgage, only about 16 percent of the principal has been repaid. It takes 21 years before half of the principal has been repaid.

Annual Percentage Rate

The analysis above is based on the contract rate on the mortgage. The effective rate on the mortgage can be higher—in some cases, considerably higher. The purpose of this section is to discuss the factors that affect the effective rate that is paid on a mortgage. To help borrowers compare the cost of borrowing, the Truth in Lending Act requires that lenders disclose the *annual percentage rate*, or APR. The Federal Truth in Lending Act was contained in the Consumer Credit Protection Act of 1968. This act is implemented by the Board of Governors of the Federal Reserve System with Regulation Z. Among other things, Regulation Z requires that all lenders disclose the APR on credit to potential borrowers. The purpose of the APR is to make the interest costs of loans with different structures, fees, etc., comparable. However, because loans can differ in many ways, the stated APR may not reflect the actual interest rate paid by the borrower. We begin by discussing the rationale for the APR and its calculation. We then discuss reasons and situations where the stated APR will not reflect the true interest rate paid by the borrower.

Calculating the APR. To understand the calculation of the APR, it is necessary to show how to determine the current price of any asset. Basically, the value of any asset is equal to the *present value* of the income it generates over time. The idea of present value is closely related to the idea of compound interest covered here previously. Compound interest answers the question: If I invest a sum of money (say \$200,000) today, how much will I have at some future date (say 30 years from now) if the annual interest rate is r percent (say 6 percent)? In our mortgage example, the question was fundamentally the same—if I borrow \$200,000 today at an interest rate of 6 percent, how much will I owe in 30 years if I make no monthly payments? Our answer was \$1,204,515.04.

Present value asks the reverse question: If I am to get a sum of money (say \$1,204,515.04) at some future date (say 30 years from now), how much would it be worth to me today if the annual interest rate is 6 percent? Now of course the answer is \$200,000. Hence, the present value

Table 2

Partial Amortization Table for a 6 Percent Fixed-Rate Mortgage

Month	Beginning mortgage balance	Monthly payment	Interest for month	Principal repayment	Ending mortgage balance
1	$200,000.00	$1,199.10	$1,000.00	$199.10	$199,800.90
2	199,800.90	1,199.10	999.00	200.10	199,600.80
3	199,600.80	1,199.10	998.00	201.10	199,399.71
4	199,399.71	1,199.10	997.00	202.10	199,197.60
5	199,197.60	1,199.10	995.99	203.11	198,994.49
6	198,994.49	1,199.10	994.97	204.13	198,790.36
7	198,790.36	1,199.10	993.95	205.15	198,585.21
8	198,585.21	1,199.10	992.93	206.17	198,379.04
9	198,379.04	1,199.10	991.90	207.21	198,171.83
10	198,171.83	1,199.10	990.86	208.24	197,963.59
11	197,963.59	1,199.10	989.82	209.28	197,754.31
12	197,754.31	1,199.10	988.77	210.33	197,543.98
35	192,641.11	1,199.10	963.21	235.90	192,405.22
36	192,405.22	1,199.10	962.03	237.07	192,168.14
59	186,641.83	1,199.10	933.21	265.89	186,375.94
60	186,375.94	1,199.10	931.88	267.22	186,108.71
118	168,447.40	1,199.10	842.24	356.86	168,090.54
119	168,090.54	1,199.10	840.45	358.65	167,731.89
120	167,731.89	1,199.10	838.66	360.44	167,371.45
121	167,371.45	1,199.10	836.86	362.24	167,009.21
122	167,009.21	1,199.10	835.05	364.06	166,645.15
238	109,964.76	1,199.10	549.82	649.28	109,315.48
239	109,315.48	1,199.10	546.58	652.52	108,662.96
240	108,662.96	1,199.10	543.31	655.79	108,007.17
241	108,007.17	1,199.10	540.04	659.07	107,348.11
242	107,348.11	1,199.10	536.74	662.36	106,685.75
251	101,266.24	1,199.10	506.33	692.77	100,573.47
252	100,573.47	1,199.10	502.87	696.23	99,877.23
253	99,877.23	1,199.10	499.39	699.71	99,177.52
254	99,177.52	1,199.10	495.89	703.21	98,474.30
355	7,070.36	1,199.10	35.35	1,163.75	5,906.61
356	5,906.61	1,199.10	29.53	1,169.57	4,737.04
357	4,737.04	1,199.10	23.69	1,175.42	3,561.63
358	3,561.63	1,199.10	17.81	1,181.29	2,380.33
359	2,380.33	1,199.10	11.90	1,187.20	1,193.14
360	1,193.14	1,199.10	5.97	1,193.14	0.00

formula is just the inverse of the compound interest formula, i.e.,

$$MB_0 = MB_m / (1+r)^m. \tag{3}$$

In the case of mortgages, and most investments, all of the money is not paid on the maturity date. Rather, income is received periodically over time. The present value of the entire stream of income to be received over time is just the sum of the present value of each of the future payments. In the case of our mortgage example, the present value of the mortgage loan is given by

$$MB_0 = \frac{MP_1}{(1+r)^1} + \frac{MP_2}{(1+r)^2} + \cdots + \frac{MP_{360}}{(1+r)^{360}}, \tag{4}$$

where MP_i denotes the monthly payment to be received i months in the future. In the case of a fixed-rate loan, the monthly payments are the same—that is, $MP_i = MP_j$ for all i and j—and equation (4) can be written more compactly as

$$MB_0 = MP\left(\frac{(1+r)^m - 1}{r(1+r)^m}\right). \tag{5}$$

For our hypothetical mortgage, the present value of receiving \$1,199.10 per month for 30 years is

$$\$1199.10\left(\frac{(1.005)^{360} - 1}{0.005(1.005)^{360}}\right) = \$200{,}000.$$

This shows that the mortgage lender is, in essence, purchasing an investment that pays \$1,199.10 per month for each of the next 360 months.

In this example, we knew MP and r, so we could solve the equation for the present value, MP_0. Although it is more complicated to solve, if we knew MP and MP_0 we could have solved the equation for r. The question is, If I were to pay \$200,000 today for the right to receive \$1,199.10 each month for the next 360 months, what would be the effective annual interest rate? Of course, we know the answer is 6 percent (0.005 times 12).

Equation (5) can be modified slightly to determine the APR. The modification stems from the fact that there are expenses associated with financing the purchase of a home rather than paying cash for it. These additional expenses are considered *pre-paid interest*. For example, if you borrow \$200,000 to buy a home but, in doing so, incur \$3,000 in expenses solely because you are financing the purchase, you are in effect only borrowing \$197,000. The calculation of the APR accounts for this fact by making an adjustment for these expenses, which are referred to as fees. Hence, the APR is the interest rate that solves

$$MB_0 - \text{Fees} = MP\left(\frac{(1+r)^m - 1}{r(1+r)^m}\right). \tag{6}$$

So, applying this formula to our hypothetical example, solving the equation

$$\$200{,}000 - \$3{,}000 = \$1{,}199.10\left(\frac{(1+r)^{360} - 1}{r(1+r)^{360}}\right)$$

for r, yields a monthly interest rate of 0.512 percent or an annual APR of 6.142 percent.

Obviously, the larger are the fees, the smaller is the effective loan and the higher is the APR. Hence, when considering a mortgage, one must consider both the stated mortgage rate and the fees that are required to get this rate. Indeed, it is often possible to get a lower mortgage rate by paying higher fees. When considering such options, the APR can be very useful for deciding which mortgage option is best.

It is important to note that the APR is not always calculated the same way by all financial institutions; different fees may or may not be included. According to the Federal Reserve Board, fees that are considered part of the finance charge are as follows: interest, service charges, buyer's points, assumption fees, and insurance charges required by the lender (with a few exceptions). Fees that are not part of the finance charge are application fees (if charged to all applicants), late fees, bounced check fees, seller's points, titling fees, appraisals, credit report fees, taxes, notary fees, and fees for opening an escrow account.[7]

[7] The general rule is that if the fee is charged solely because the purchase is being financed, it should be included. Excluding credit report fees would appear to violate this rule because they are included solely because the purchase is being financed. Congress wrote this exclusion into the Truth in Lending Act.

Table 3

Fees and the Annual Percentage Rate

Included	Excluded	Sometimes included
Interest	Late payment fees	Appraisals (excluded if required of all applicants)
Service or carrying charges	Returned check fees	Home inspections and pest inspections (excluded if required of all applicants)
Broker fees	Title fees	Voluntary insurance
Private mortgage insurance	Taxes	Application fees (excluded if required of all applicants, otherwise included)
Assumption fees	License fees	
Points	Appraisal fees	
Fees for establishing an escrow account	Credit report fees	

Table 3 displays the fees that are included and excluded from the APR. The third column displays fees which may or may not be included, depending on the lender and the size of the fee.

It is also important to note that the lender has some leeway in terms of the accuracy of the APR that he reports. The actual finance charge can be underreported by as much as $100. Also, according to Regulation Z, the reported rate is considered accurate if it is within one-eighth of 1 percent of the true rate. If one bank quotes a rate of 6.125 percent while another bank quotes a rate of 6.25 percent, it is hard to determine which rate is really lower because of the allowed margin of error.

Value of the APR. The APR is very useful, but it has limitations. Important among these is the fact that the APR assumes that you will have the mortgage for its entire term. Although most mortgages have a term of 30 years, only a small portion of mortgages last their full term. Most mortgages are paid off early, because the borrower prepays the loan, sells the property, refinances the mortgage, or defaults. According to Douglas Duncan, chief economist of the Mortgage Bankers Association, the average term of a mortgage is 3 to 5 years. The APR for our previous hypothetical $200,000, 30-year mortgage—assuming closing costs of $3,000—is 6.142 percent. This APR is based on the assumption that this mortgage will run to term (i.e., 30 years). But if the house is sold or the mortgage refinanced after 3 years, the effective APR would be 6.577 percent. If it is sold or refinanced after 5 years, the effective APR would be 6.367 percent. A modification to our original formula is necessary to calculate the APR of a loan that is paid off before maturity. The modification comes from the fact that rather than paying off the entire loan over the term of the mortgage, the borrower must pay off the remainder of the mortgage balance, RB_m, when the loan is repaid. The modification takes the present value of this payment into consideration in calculating the APR. Specifically, the modified APR formula is

$$(7)\quad MB_0 - \text{Fees} = MP\left(\frac{(1+r)^m - 1}{r(1+r)^m}\right) + \frac{RB_m}{(1+r)^m}.$$

The remaining balance on our mortgage can be read off the corresponding row of our amortization table (Table 2). After 5 years, the remaining mortgage balance is $186,375.94 (the balance at the end of 59 months or the beginning of 60 months). Applying the formula to our example,

$$\$200{,}000 - \$3{,}000 =$$
$$\$1{,}199.10\left(\frac{(1+r)^{59} - 1}{r(1+r)^{59}}\right) + \frac{\$186{,}375.94}{(1+r)^{59}};$$

solving for r gives a monthly interest rate of 0.531 percent, or an annual rate of 6.367 percent. Hence, the quoted APR understates the true effective interest rate if the borrower plans to prepay the loan before its maturity date.

The APR is also less useful for comparing ARMs. The quoted APR on an ARM is not only based on the full term of the loan, but also assumes that the index to which future rate adjustments are linked will remain constant for the life of the loan. It neither accounts for the volatility of the index nor allows borrowers to compare the different indices that may be available. It also ignores the maximum rates allowed under a particular adjustable rate structure.

Refinancing

There are three reasons that someone might want to refinance a mortgage: to obtain a lower interest rate, to consolidate interest payments that are not tax deductible into mortgage interest payments which are tax deductible, or to obtain cash for some other purpose. Refinancing to lower interest payments is often a good idea if interest rates have fallen since the original mortgage closed or if a person currently has an ARM and wants to avoid the uncertainty of future interest rate adjustments. There are two important facts to keep in mind when considering refinancing solely to obtain a lower interest rate. The first is the term of the loan. If the new mortgage has a term that is shorter than the term remaining on the existing mortgage, the only issue is whether the effective interest rate is lower than that on the current fixed-rate mortgage. If the term on the new mortgage is longer than the remaining term of the exiting mortgage, the decision is more complicated. For example, if one refinances a 30-year mortgage with a remaining term of 20 years with a new 30-year fixed-rate mortgage, at a lower interest rate, the interest rate savings may be offset by the fact that interest will be paid over 30 years instead of 20. Of course, if the loan has no prepayment penalty, the effective term of any mortgage can be set anywhere the borrower desires simply by adjusting the payment to that of the desired term. For example, assume that after 10 years we want to refinance our current $200,000, 30-year mortgage that we took out when interest rates were 6 percent with a new 30-year fixed-rate mortgage with a 5 percent rate. The amortization table (Table 2) shows that the remaining balance on the loan is $167,371.45. Using equation (1) we calculate that our monthly payment for borrowing $167,371.45 for 30 years is $898.49, which is $300.62 less than the current monthly payment of $1,199.10. While the interest rate is lower, the total interest cost over the life of the loan is $156,083.56, compared with $120,412.80 for a 20-year fixed-rate mortgage at 6 percent (the current mortgage). The difference is due to the fact that interest is being paid over 30 years with the new mortgage and only 20 years with the old. Hence, while the annual interest rate is lower, the total interest cost over the life of the loan is higher.

Because there are no prepayment penalties, the borrower can effectively determine the term of the mortgage simply by adjusting the monthly payment. For example, using equation (1) we find that the monthly payment on a 20-year, fixed-rate loan with an annual rate of 5 percent is $1,104.58. Hence, with a monthly payment of $1,104.58, the 30-year loan would be paid off at the same time that the existing loan would have been paid off (20 years), with a total interest cost of $97,727.15. Alternatively, one could maintain the monthly payment at the level of the old mortgage, $1,199.10. In this case, the loan would be paid off in about 17 years, 6 months, with a total interest cost of about $84,000.[8]

Some financial institutions offer a *no-cost refinance*. This means that there are no costs to the loan. In this case, the stated rate and the APR are identical. In effect, the costs are covered in the interest rate: That is, the costs have been financed, resulting in a contract interest rate that is higher than the rate for loans that have finance costs.

Comparisons such as the above are particularly important when considering consolidating non-tax-deductible debt (e.g., credit card debt and auto loans) into a mortgage. The mortgage has two advantages: the interest rate will likely

[8] Note that if MB_0, MP, and r are known, it is possible to solve equation (5) for m.

be lower and the interest is deductible for tax purposes. However, if one anticipated paying off the consolidated loan before the term of the new mortgage, the interest costs could be higher because the loan is being repaid over a much longer period.

Home Equity Loans

The *equity* in a home is the difference between the current market value of the home and the remaining balance on all of its mortgages. Of course, the true market value of the home is not known until the house is actually sold; consequently, the home's equity is estimated by subtracting the principal remaining on existing mortgages from an estimate of the property's market value. A home equity loan is simply money borrowed using the equity in the home as collateral. Home equity loans have two advantages: First, because the loan is collateralized by the home, the interest rate is lower than what could be obtained on an otherwise identical unsecured loan. Second, with some exceptions, the interest paid on home equity loans is deductible for tax purposes. Hence, home equity loans (or home equity lines of credit) are low-cost methods of finance for many homeowners. For many people, the equity in their home is their major source of wealth. Hence, using home equity loans to finance current consumption may put their wealth at risk.

A *reverse mortgage* can be thought of as a particular type of home equity loan, because in this case the individual is borrowing money using the equity in the home as collateral. Instead of making payments, the homeowner receives payments. The homeowner can select to have a fixed monthly payment, a line of credit, or both. The amount owed increases with the payments or draws on the line of credit, and interest cost is based on the outstanding loan balance.

From the point of view of the lender, reverse mortgages are investments. Instead of receiving monthly payments to cover interest, fees, and principal, all of the money lent, interest payments, and incurred fees are received in a single payment when the house is sold.

Reverse mortgage loans are available only to individuals who are 62 years or older. The loan payments are not taxable and generally do not affect Social Security or Medicare benefits. Like other mortgages, lenders charge origination fees and other closing costs; consequently, the effective interest rate will be higher than the contract rate. As is the case for regular mortgages, this means that the effective interest rate may be considerably higher for individuals who stay in their homes for only a short time after taking out a reverse mortgage. Lenders may also charge servicing fees during the life of the mortgage. As with regular mortgages, the interest rate can either be fixed or variable, with the variable rate tied to a specific index that fluctuates with market rates. Reverse mortgages may be useful for people with home equity but relatively low periodic income. Because the loan is repaid when the home is sold, the danger is that the borrower will use up all of the equity in the home, having nothing to leave to their heirs. Most reverse mortgages have a "nonrecourse" clause, which prevents the borrower, or their estate, from owing more than the value of the home when it is sold. This protects the borrower, but it also means that the lender will be conservative in determining how much they are willing to lend. There are basically two types of reverse mortgages: (i) federally insured reverse mortgages known as home equity conversion mortgages (HECMs), which are backed by the U.S. Department of Housing and Urban Development (HUD), and (ii) proprietary reserve mortgages, which are privately funded.

As with any mortgage, care must be exercised when considering the costs and benefits of a reverse mortgage. To better understand reverse mortgages, it is useful to consider a hypothetical example of how a reverse mortgage works. Assume the homeowner would like to receive a monthly payment of $1,000 and that they can obtain a reverse mortgage at an annual interest rate of 6 percent. At the end of the first month, the homeowner would owe $1,005, the $1,000 payment received at the beginning of the month plus $5 interest for the month. Letting LB_i denote the loan balance at the end of the ith month, the amount owed at the end of the first month would be $LB_i = MP(1 + r)$. The balance at the end of the second month would be the $1,005 balance at

the end of the first month, plus the interest on this amount for the month—that is, \$1,005(1.005)—plus the \$1,000 payment at the beginning of the second month plus interest—that is, \$1,000 (1.005). This can be expressed as $LB_2 = MP(1 + r)^2 + \text{MP}(1 + r)$. The amount at the end of the mth month is given by

$$LB_m = MP(1+r)^m + MP(1+r)^{m-1} + \cdots + MP(1+r),$$

which can be written more compactly as

$$LB_m = MP\left(\frac{(1+r)^m - 1}{r}\right). \tag{8}$$

Note the similarity between this equation and the right half of equation (1). Now ask the question, What would be the outstanding balance at the end of 10 years if an individual drew \$1,000 per month and the annual interest rate charged was 6 percent? The answer is \$163,879.35—that is,

$$\$1{,}000\left(\frac{(1.005)^{120} - 1}{0.005}\right) = \$163{,}879.35.$$

This means that if a homeowner had equity of \$165,000, they could draw \$1,000 per month for 10 years before the total amount of the loans plus interest essentially consumed all of the home's equity.

Of course, the question that individuals considering a reverse mortgage are most concerned about is, How much will I be able to receive each month given the value of my home? The answer is obtained by solving equation (8) for *MP*—that is,

$$MP = HE\left(\frac{r}{(1+r)^m - 1}\right), \tag{9}$$

where *HE* replaces LB_m and denotes the homeowner's equity—the maximum amount that the lender will lend on a reverse mortgage. Again, using our example, if the home equity is \$165,000 and the annual interest rate is 6 percent, equation (9) indicates that the individual could receive \$1,006.84 per month for 10 years.

Equation (9) considers only the interest costs. It ignores loan origination fees and other closing costs, as well as servicing fees that the lender may charge. These costs and fees are treated as loans. Origination fees and closing costs are incurred at the time of the loan, whereas servicing fees may be charged in each period. Such costs reduce the equity available to make monthly payments. For example, assume that the closing costs are \$1,000. We know from our compound interest formula, equation (2), that in 10 years the total amount owed on this \$1,000 loan plus interest will be \$1,819.40. This means that only \$163,180.60 of the home's equity will be available for monthly payments. In our example, this means that monthly payment would be reduced from \$1,006.84 to \$995.74.

An important factor in determining the size of the monthly payment is the period of time over which payments are expected to be made. For example, assume the individual is 65 and expects to live in the home until age 85. Hence, they would like to receive monthly payments for 20 years. Following up on our example, if we assume there are no closing costs, the monthly payment that would exhaust the \$165,000 in home equity in 20 years would be \$357.11. If we assume there is \$1,000 in closing costs, this amount is reduced to just \$349.95.

Generally speaking, the older you are when taking out the reverse mortgage, the more you will be able to borrow. This is due to the fact that the period over which you receive payments is likely to be shorter. Also, the higher the value of your home and the larger the equity, the more you can borrow. Your monthly payments will also be higher the lower the interest rate. Because the investor must project the home's future value, which is often difficult to do, reverse mortgages are relatively risky investments. Consequently, the interest rates on reverse mortgages are typically higher than those on otherwise equivalent mortgages.

CONCLUSIONS

This paper addresses a number of significant issues facing the prospective home buyer. For

most people, buying a home is the largest purchase they will ever make, and a thorough understanding of the terminology and structure of the residential finance market can mean the difference between an agonizing experience and a rewarding one. Although the mortgage industry is too sophisticated to describe completely in this short paper, hopefully the concepts elucidated here will reduce the anxiety for those trying to finance the American dream.

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Changing Trends in the Labor Force: A Survey

Riccardo DiCecio, Kristie M. Engemann, Michael T. Owyang, and Christopher H. Wheeler

The composition of the American workforce has changed dramatically over the past half century as a result of both the emergence of married women as a substantial component of the labor force and an increase in the number of minority workers. The aging of the population has contributed to this change as well. In this paper, the authors review the evidence of changing labor force participation rates, estimate the trends in labor force participation over the past 50 years, and find that aggregate participation has stabilized after a period of persistent increases. Moreover, they examine the disparate labor force participation experiences of different demographic groups. Finally, they survey some of the studies that have provided explanations for these differences. (JEL J21, E32)

Federal Reserve Bank of St. Louis *Review*, January/February 2008, *90*(1), pp. 47-62.

One of the primary indicators of the state of the U.S. labor market is the labor force participation rate (LFPR). It is measured each month by the Bureau of Labor Statistics (BLS) as the fraction of the civilian, non-institutional population 16 years or older who are either working or actively seeking work. The LFPR is a useful complement to other indicators, such as employment and the unemployment rate, in assessing labor market conditions. For example, a low unemployment rate is a much stronger indication of a tight labor market when accompanied by a high participation rate.

Although the LFPR is constantly changing over the business cycle, the most noticeable feature is its dramatic increase over the post-World War II period. Between 1948 and 2006, the U.S. LFPR rose by more than 7 percentage points, with the majority of the rise taking place between the early 1960s and 2000. This increase implies that, compared with several decades ago, there are more individuals currently participating in the labor market relative to the total number of residents in the country. Such a trend has likely contributed to the rise in U.S. living standards (e.g., income per capita) over the postwar period.

In spite of this long-run rise in the LFPR, there has been a modest drop in the overall participation rate within the past six years, which has generated some concern among economists. If this decrease represents a change in the trend LFPR, the U.S. economy may be faced with fewer work-oriented individuals per resident in the coming decades.

What accounts for the changes in the LFPR in the United States over the past several decades? Numerous studies have documented changes in various U.S. demographics, including the age and ethnic composition of the population, that have significantly affected the nature of the labor force. In 1960, prime-age white males—from 25 to 54 years of age—comprised, by far, the largest labor force component: nearly 40 percent. Although this group still represented 31 percent of the work-

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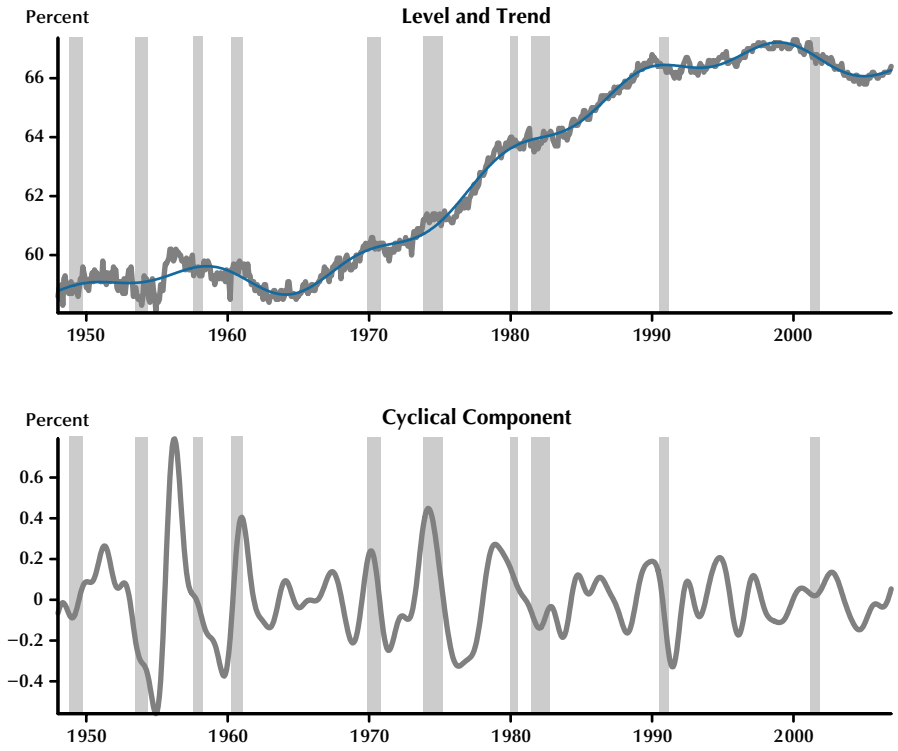
Figure 1

Labor Force Participation Rate



NOTE: Top panel: level (gray) and trend (blue) extracted with an LP_{96} filter. Bottom panel: cyclical component extracted with $BP_{18,96}$ filters. The shaded areas denote National Bureau of Economic Research (NBER) recessions.

force in 2005, the gap with other demographic groups appears to be closing. In particular, increases in both minority and women workers have dramatically altered the composition of the workforce. Moreover, the aging of the baby boomers has changed the age profile of the American population.

In this paper, we review the trends in labor force participation over the past half century, including a look at both the long-run movements in the LFPR as well as its short-run fluctuations. We then examine the components of the LFPR—disaggregating by gender, age, and race—to determine the extent of and possible explanations for the dispersion in labor force participation across demographic groups. Finally, we consider the future of the LFPR in the United States.

TRENDS IN AGGREGATE LABOR FORCE PARTICIPATION

The BLS maintains a monthly history of labor force participation statistics dating back to 1948. These figures are derived from the Current Population Survey, which reports information on approximately 60,000 households.[1] The top panel of Figure 1 shows the historical path of aggregate labor force participation in the United States; the overall increase in the participation rate since 1948 is evident. In January 1948, the overall rate of labor force participation in the United States was roughly 59 percent. This rate held fairly steady until the early 1960s, when it

[1] Unless otherwise noted, the source for data used in the figures is the BLS.

began to rise; during the first quarter of 2000, the LFPR achieved its highest level—67.3 percent of the working-age population. Over the past few years, however, the LFPR fell from its 2000 level to 65.8 percent in January 2005. It has since rebounded to 66.4 percent as recently as December 2006.

Although the LFPR unquestionably trended upward over the latter half of the twentieth century, the nature of its recent decline has sparked some debate. Some economists argue that the decrease reflects structural changes in the labor market (i.e., a change in the trend of the LFPR), whereas others view it primarily as a cyclical deviation from the trend. Aaronson et al. (2006), for example, use a cohort-based model to show that the decline from 2000 until 2002 occurred as a result of the weak labor market conditions stemming from the 2001 recession. Although the initial drop in the LFPR was due to cyclical factors, their estimates indicate that the trend LFPR began to decline in 2003. On the other hand, Bradbury (2005) argues that the decline since 2001 is a reflection of slack in the economy and is purely cyclical, although she does note that, relative to previous economic recoveries, the period following the 2001 recession was characterized by unusually low participation rates among teenagers and women.

To gauge the degree of labor market tightness, it is important to determine how changes in the trend and in the cyclical component contribute to movements in the LFPR. If structural factors cause most of the decline in participation, then a low unemployment rate indicates a tight labor market. On the other hand, if business cycle movements cause most of the decline, a substantial part of it should be reversed in a relatively short period of time. People who temporarily dropped out of the labor force will start looking for jobs again and thus will be recorded as unemployed. In the latter case, a low unemployment rate overstates labor market tightness.

A cursory examination of Figure 1 suggests that there may have been at least three different regimes describing the LFPR over the past six decades: zero growth before 1960, a constant trend growth between 1960 and 2000, and a declining trend subsequent to the turn of the century. To estimate more formally how the trend in the LFPR has evolved over time, we follow a standard technique in which we use a low-pass filter to remove high-frequency fluctuations from the raw data.[2] In particular, we remove cycles with a period less than 96 months. The resulting trend is shown in the top panel of Figure 1. Consistent with the business cycle tradition, we then identify the business cycle component of the LFPR data with cycles of periods between 1.5 and 8 years—i.e., 18 and 96 months—which we extract by applying a band-pass filter.[3] The bottom panel of Figure 1 shows the business cycle components of the LFPR.[4]

Based on these calculations, we find that the trend component peaked in October 1998 at 67.2 percent, declined afterward to a minimum of 66.1 percent in January 2005, and increased by 0.2 percentage points by the end of 2006.[5] The cyclical component of the LFPR increased slightly after the 2001 recession, declined until August 2004, and recovered afterward.

To demonstrate some of the short-run cyclical properties of the LFPR series, we compare the business cycle component of the LFPR with those of a common indicator of aggregate activity, industrial production.[6] The correlation between the two and their relative standard deviations are reported in Table 1. Based on the correlation, we see that the LFPR is moderately procyclical (i.e., it rises during expansions and falls during contractions). This finding is consistent with the idea that during economic upturns, potential workers are lured into the labor force because they perceive their job prospects to be strong. During recessions, on the other hand, workers not only

[2] For an overview of terminology, see the appendix.

[3] See Baxter and King (1999) and Christiano and Fitzgerald (2003).

[4] To consider the decline in the LFPR from early 2000 to the end of 2005 and its slight recovery afterward as purely cyclical phenomena, fluctuations with a period of up to 36 years would need to be removed in the definition of the trend.

[5] Clark and Nakata (2006) estimate the trend growth rate in the LFPR to be 0.3 percent from 1957-81 and 0.2 percent from 1981-2005. They attribute the decline in the trend to the deceleration of women's LFPR.

[6] Industrial production data come from the Federal Reserve Board.

Table 1

Second Moments of the Business Cycle Components of LFPR, Total and by Gender

	Total	Men	Women
Corr(*x*,*ip*)	0.35 (0.13, 0.53)	0.41 (0.24, 0.56)	0.28 (0.04, 0.46)
Std(*x*)/Std(*ip*)	0.09 (0.07, 0.11)	0.07 (0.05, 0.08)	0.19 (0.14, 0.24)

NOTE: *ip* denotes industrial production. Block-bootstrapped 95 percent confidence intervals are in parentheses.

lose jobs—thereby increasing unemployment—but also exit the labor force altogether because the number of employment opportunities becomes relatively scarce.

These fluctuations in the LFPR, however, are small compared with those in industrial production. Indeed, we find that the LFPR is one-tenth as volatile as industrial production at business cycle frequencies. This property of the LFPR may reflect a high degree of inflexibility in the average individual's labor force participation decision over time. Because individuals need an income to support their consumption, many decide to work (or at least seek work) regardless of whether the economy is expanding or contracting.

The vast majority of the movement of the LFPR, however, is associated with its trend, not its cyclical components. In the next sections, we explore the long-run evolution of the LFPR by looking at its disaggregate components—specifically, its gender, age, and racial components.

GENDER AND THE LFPR

A substantial portion of the rise in the aggregate LFPR beginning in the 1960s can be attributed to the rise in the labor force participation of women. In 1950, approximately one in three women 16 years of age or older participated in the labor force. Figure 2 illustrates the rise in female labor force participation over the latter half of the twentieth century: The LFPR for all women is depicted by the solid blue line, while the solid black and dotted lines show the LFPR for married and single women, respectively.[7] By 1999, the overall female LFPR rose to its peak of 60 percent. As Figure 2 shows, much of the increase in women's participation can be attributed to married women, whose LFPR rose by more than 30 percentage points between 1955 and 2005. The LFPR of single women has also increased over the past several decades, but much more modestly. Since 1999, the overall women's LFPR has remained fairly steady: between 59 and 60 percent.

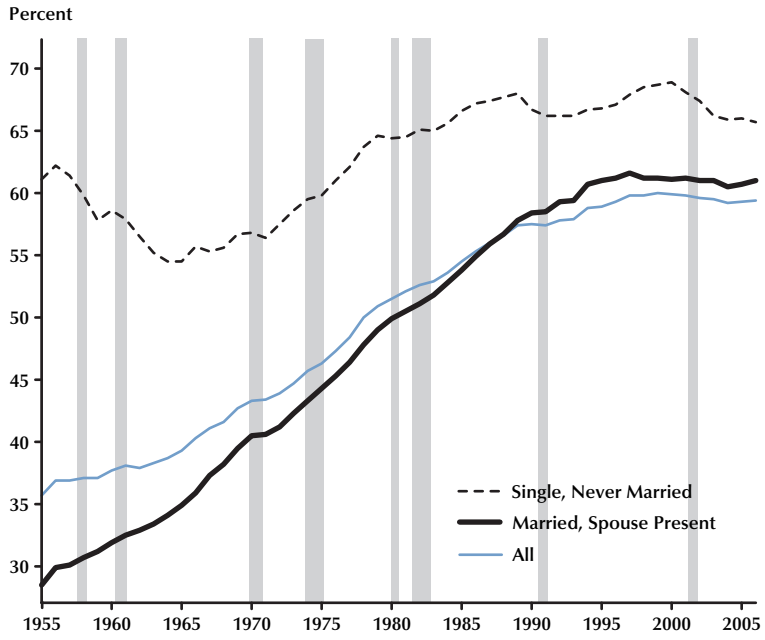
Figure 3 highlights the differences in the LFPR across genders. In particular, Figure 3 reveals a persistent decline in men's LFPR since 1950, the same period over which women's LFPR saw its most significant increase. During that period, the male LFPR fell by 13 percentage points to its 2006 rate of less than 75 percent.

The cycle decomposition of the LFPR by gender bears some similarity to that of the aggregate (Table 1); however, two important differences emerge. First, men's participation tends to be somewhat more procyclical than women's participation. The correlation between industrial production and men's LFPR at business cycle frequencies is 0.41, whereas the same correlation for women's LFPR is 0.28. This result may, in part, reflect the added-worker effect, in which women enter the labor force to compensate for a spouse's loss of a job. That is, as men become unemployed during an economic downturn, some women may choose to enter the labor force to off-

[7] A fourth category, not shown in the figure, includes widowed, divorced, and separated women. Their LFPR held fairly steady around 40 percent between the mid-1950s and the mid-1970s and increased by less than 10 percentage points by the early 2000s.

Figure 2

LFPR by Marital Status (Women)



NOTE: The data used in this figure are unadjusted annual percentages. The shaded areas denote NBER recessions.

SOURCE: 1955-75, U.S. Census Bureau, *Statistical Abstract of the United States*, 2003, www.census.gov/statab/hist/HS-30.pdf; 1976-2005, Bureau of Labor Statistics.

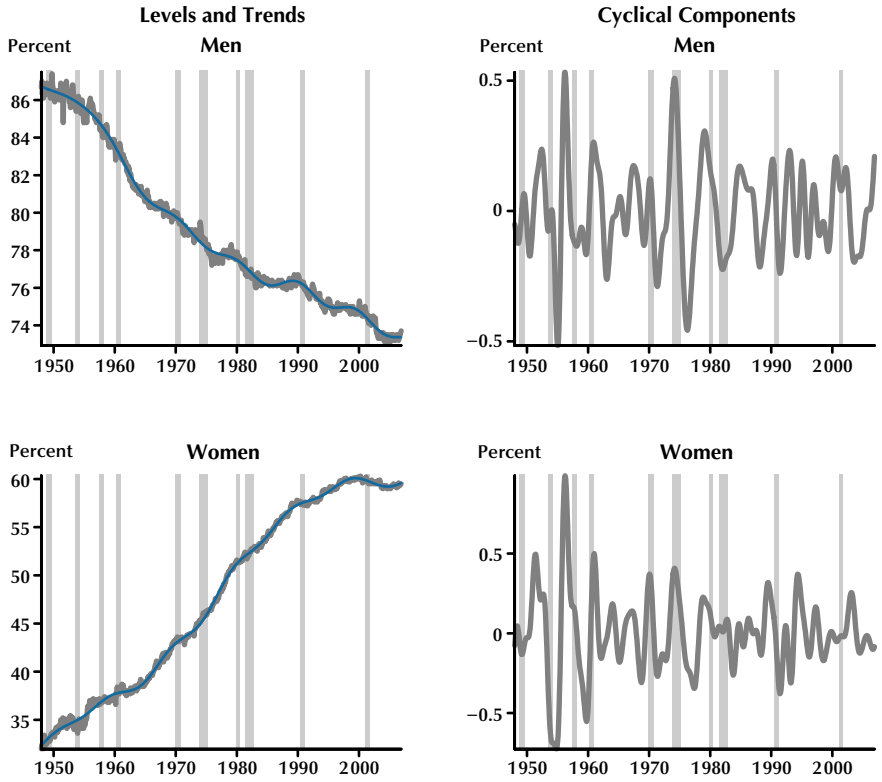
set the loss in household income. This phenomenon may temper the procyclicality of the female participation rate somewhat. Second, the LFPR for women is nearly three times more volatile than the LFPR for men, which may reflect the idea that society has viewed women as the primary child-rearer and the secondary earner.[8] Thus, while these days more women may be working at any given time, they may remain more likely than men to move in and out of the labor force.

The dramatic increase in married women's labor force participation has been the subject of many studies, too numerous to detail here. We highlight only a few of the myriad possible explanations. The improvement in labor-saving household technologies has simplified many daily tasks, such as cooking and cleaning, thereby giving women greater time to pursue work outside of the home (Greenwood, Seshadri, and Yorukoglu, 2005). This hypothesis is supported by evidence on the differences in married women's labor force participation decisions across cities. In a recent study, Black, Kolesnikova, and Taylor (2007) find that married women's LFPR was substantially lower in cities with more traffic congestion, proxied by longer average commuting time. Controlling for other factors such as the woman's age, education, non-labor income, number of children by age group, and MSA unemployment rate among white men, a small increase in a city's average commuting time significantly reduced married

[8] Compared with the first part of the sample, the volatilities of the business cycle components were 1.5 and 3 times smaller for men and women, respectively, after 1984. Stock and Watson (2003) demonstrate the decline in volatility of many macroeconomic variables, but they do not consider the labor force. However, they do show that the conditional variance for civilian employment has declined since the mid-1980s (or since the mid-1970s when a trend is included).

Figure 3

LFPR by Gender



NOTE: Left column: levels (gray) and trends (blue) extracted with an LP_{96} filter. Right column: cyclical components extracted with $BP_{18,96}$ filters. The shaded areas denote NBER recessions.

women's labor force participation.[9] If cities with greater congestion involve greater amounts of time required to run errands (part of household production), women might participate in the labor force less in those cities.

Alternatively, medical advances, such as the birth control pill, have allowed women to delay marriage and pregnancy, thus providing more opportunity to invest in a career early in life (Goldin and Katz, 2002). Changes in societal attitudes have also made it more acceptable for married women and women with young children (under the age of 6) to work (Aaronson et al., 2006). Fernández, Fogli, and Olivetti (2004) find that men whose mothers worked when they were young children seemingly had a preference for wives who also worked. These social changes have enabled more women to pursue careers in professional fields such as business, law, and medicine, which has in turn led to higher returns to experience, both in absolute terms and relative to those of men (Goldin, 2006).

Fogli and Veldkamp (2007) consider that "learning" is the underlying force behind the sharp rise in participation rates for married women with young children. When deciding whether to join the labor force, women try to understand

[9] For women with children under the age of 5, the effects were largest. In particular, an increase of one minute in the average MSA commuting time led to a 0.53-percentage-point decrease in the LFPR of women with a high school education. For women with a college education, their LFPR decreased by 0.22 percentage points.

how important stay-at-home child rearing is in determining the future labor market outcomes of their offspring; stated another way, they observe the outcomes of children of working women to assess the importance of nature versus nurture. As more women join the labor force, learning happens at a faster pace, which reinforces the increase in participation and generates the S-shaped participation rate observed in the data. Fogli and Veldkamp's model is consistent with survey data that indicate an increasing positive attitude toward mothers who participate in the labor force. The model is also consistent with the continuous increase in women's wages over the past two decades, despite a flattening participation rate. In a related paper, Fogli, Marcassa, and Veldkamp (2007) argue that the rise in women's LFPR over the second half of the previous century can be partly explained by a spatial component. In other words, a county whose neighbors have high female LFPRs is likely to also have a high female LFPR. This is because, over time, learning occurs and cultural effects—including women's increased participation in the labor force—spread to nearby counties.

Figure 2 shows that the increase in women's LFPR began to slow in the 1990s. Blau and Kahn (2007) argue that the responsiveness of women's labor supply to changes in their wages decreased by about half between 1980 and 2000. Moreover, changes in their husbands' wages had less of an impact on married women's labor supply during this period. One explanation that the authors provide is that, as more women entered the labor force, they became more attached to working and thus less responsive to changes in wages. Also, higher rates of labor force participation meant that fewer women were on the margin, taking a wait-and-see approach to entering the labor force. The end result was slower growth of women's LFPR during the previous decade.[10]

As with the rise in women's LFPR, many factors have likely caused the decline in men's LFPR. Hotchkiss (2005) cites several reasons that have led to earlier retirement, such as the creation of Social Security in 1935 and firms' increased provision of private pensions following the Revenue Act of 1942. She also notes that the expansion of Social Security to include disability insurance gave workers more incentive to leave the labor force due to disability. Juhn (1992) argues that the decline in real wages of less-skilled workers between 1967 and 1987 caused most of the decline in employment of prime-age men over the sample's last 15 years. Similarly, Welch (1997) finds that a shift in labor supply caused the LFPR of prime-age men to decrease in the late 1960s and early 1970s, but the decline in the subsequent two decades was caused by a change in relative wages (i.e., lower wages for less-educated compared with college-educated men). One might think that the rise in women's participation rates would be a contributing factor to the decline in men's participation rates; primarily, if a husband has a working wife, he has less incentive to be in the labor force. However, Juhn and Murphy (1997) show that the evidence does not support this claim. Despite an increase in employment among wives of low-wage men between 1969 and 1989, the change was much less than the increase in employment among wives of middle- and high-wage men.

AGE AND THE LFPR

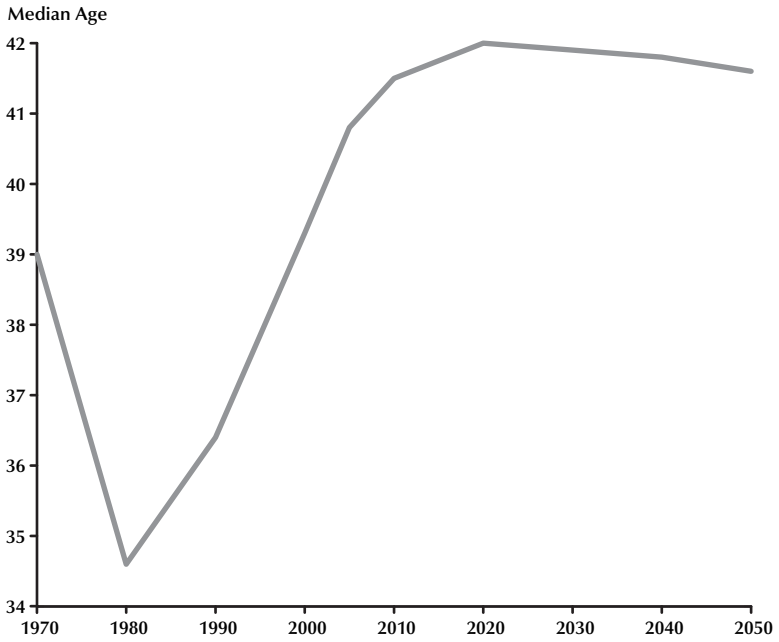
One of the most important demographic changes affecting the U.S. LFPR is the evolution of the population's age distribution. Most noticeably, the approximately 78 million individuals belonging to the baby-boom generation—those born between 1946 and 1964—have been reaching the latter stages of their working lives. With such a large fraction of the U.S. population growing older, the recent decline in the overall LFPR is understandable.

To get a sense of the influence the boomers have exerted on the LFPR, consider first the change in the median age of the U.S. labor force. As the baby-boom cohort (representing roughly one-third of the potential workforce) has grown older, the median age of the U.S. labor force has

[10] Cohany and Sok (2007) discuss changes in the LFPR of married women with children of various ages. They show that of all married mothers, those with infants have experienced the largest decline in their LFPR since the late 1990s.

Figure 4

Median Age of the Labor Force



NOTE: The 1970 and 1980 data were obtained from Toossi (2002), and the remaining data were obtained from Toossi (2006).

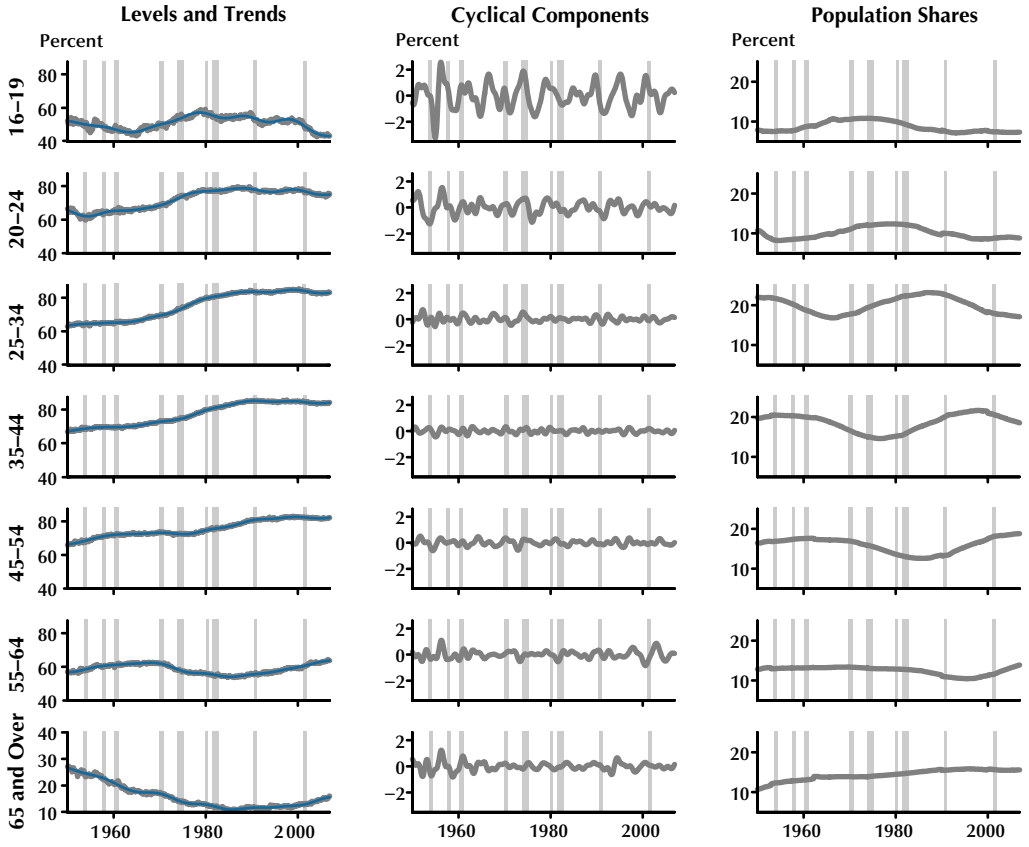
risen from less than 35 in 1980 to almost 41 in 2005. As demonstrated by Figure 4, which shows how the median age of the labor force has changed across decades going back to 1970 as well as projections through 2050, the aging of the labor force is expected to continue at least until 2020.

The importance of the baby-boom generation in explaining the recent trends in the LFPR can be inferred from Figure 5, which highlights the differences in labor force participation across age groups. In 2000, the baby boomers were 36 to 54 years old, putting them in the prime-age working group. Not surprisingly, this group had relatively high participation rates that year: 91.6 percent of men and 76.7 percent of women had or actively sought employment (Toossi, 2005). However, after 2000, baby boomers began moving into age categories with typically lower LFPRs. In 2005, the age group 55 to 59 was composed entirely of baby boomers, and only 78 percent of these men and 66 percent of these women were in the labor force.

Aaronson et al. (2006) estimate that about 95 percent of the total decline in the LFPR between 1995 and 2005—which was 0.44 percentage points—can be attributed to changing population shares of the different age groups. The decline in the population shares of those aged 25 to 34 and 35 to 44 caused the LFPR to decrease by 0.57 and 0.35 percentage points, respectively. The increase in the share of those aged 45 to 54, which was made up entirely of baby boomers, caused a rise in the LFPR of 0.41 percentage points. The increase in those aged 55 to 64 put downward pressure on the LFPR, causing a 0.1 percent decline. As baby boomers begin to approach retirement, however, further downward pressure will be exerted on the overall rate of labor force participation. According to Aaronson et al. (2006), the LFPR will fall by 0.87 percentage points between 2005 and 2010 as a result of the population being more heavily concentrated among older age groups. They expect the increase in the shares aged 55 to

Figure 5

LFPR by Age Group



NOTE: Left column: levels (gray) and trends (blue) extracted with an LP_{96} filter. Middle column: cyclical components extracted with $BP_{18,96}$ filters. Right column: population shares. The shaded areas denote NBER recessions.

64 and 65 and older to cause a total decline in the LFPR of about half a percentage point.

There is, however, one especially interesting, countervailing trend that has partially offset the natural decrease in the LFPR among an aging population. Within the past two decades, there has been a steady rise in the participation rate among individuals 55 years of age and older (see Figure 5). Just among those aged 55 to 64, the LFPR has increased by approximately 10 percentage points over the past two decades.

A number of reasons may help explain the increase in participation rates among older workers.[11] First, the ability to draw full benefits from Social Security depends on a person's year of birth; later generations must work longer to receive full benefits. For example, full retirement occurs at age 65 for individuals born in 1937 or earlier, age 66 for those born between 1943 and 1954, and age 67 for individuals born in 1960 or later. Furthermore, delaying retirement until age 70 allows workers to be eligible for even higher benefits. These features of the Social Security program should push back the age at which some workers exit the labor force (Social Security

[11] Friedberg (2007) gives an overview of some possible explanations for the recent increase in delayed retirement (e.g., changes in Social Security, Medicaid, and Medicare benefits and changes in preferences).

Table 2

Second Moments of the Business Cycle Components of LFPR by Age Group

	16-19	20-24	25-34	35-44	45-54	55-64	65+
Corr(x,ip)	0.55 (0.42,0.66)	0.30 (0.07,0.50)	0.18 (–0.03,0.40)	0.10 (–0.11,0.28)	0.03 (–0.21,0.28)	–0.14 (–0.31,0.03)	0.10 (–0.07,0.25)
Std(x)/Std(ip)	0.57 (0.48,0.69)	0.22 (0.18,0.27)	0.09 (0.08,0.12)	0.06 (0.05,0.08)	0.08 (0.07,0.10)	0.15 (0.12,0.20)	0.55 (0.43,0.71)

NOTE: *ip* denotes industrial production. Block-bootstrapped 95 percent confidence intervals are in parentheses.

Administration, 2006). Second, Social Security benefits have grown at a substantially slower pace since the mid-1980s. Data from the Social Security Administration show that real average monthly benefits rose by 88 percent between 1965 and 1985 but by only 23 percent over the following 20 years. For 65 percent of the beneficiaries, Social Security benefits represent over half of their total income (Social Security Administration, 2006). Hence, this decreased growth in benefits could force some retirees back into the labor force to help finance their retirement years. Third, Americans are now living longer than in previous decades. For 65-year-old men, life expectancy has risen by nearly four years since 1970; for women, it has risen by three years. With greater numbers of both productive years in which they can work and "retirement" years that they must finance, individuals may decide to work longer. Fourth, older workers may choose to remain employed longer to maintain health insurance coverage. Recent surveys (Kaiser Family Foundation and Health Research and Educational Trust, 2006; Kaiser Family Foundation and Hewitt Associates, 2006) have suggested that the fraction of firms offering their active workers the benefit of health insurance after they retire decreased by one-half between 1988 and 2005 (Burtless, 2006). Because workers, in general, do not qualify for Medicare until age 65, this development may also encourage workers to delay retirement.

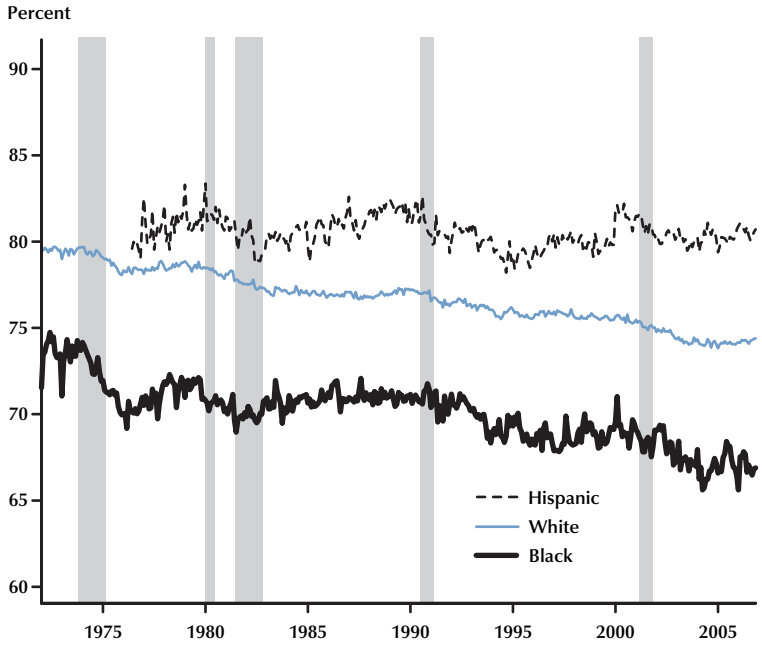
Along with the baby-boom generations, teenagers have also contributed to the recent decline in labor force participation. Although the teen LFPR has been trending downward since the 1970s, it experienced a sharper-than-usual decline beginning in 2000. Over half of the decline in the overall LFPR since then can be attributed to changes among those aged 16 to 19. Between 2000 and 2003, their LFPR dropped by 7.5 percentage points—a much larger decline than the 0.6-percentage-point drop in the overall LFPR. Since that time, teen participation rates have yet to recover, and they remain around 44 percent (Aaronson, Park, and Sullivan, 2006).

Once again, economists studying this downward trend have identified a number of possible explanations. Because teen workers have a weak attachment to the labor market, they are particularly sensitive to economic downturns. Consequently, when the U.S. economy entered its most recent recession, teen participation rates declined significantly. However, Aaronson, Park, and Sullivan (2006) argue that a weakened demand for teen labor is unlikely to be the main source of the recent downturn, especially because there was no simultaneous increase in the rate at which teenagers reported that they sought employment. Instead, they argue that the failure of the teen LFPR to rebound within the first five years after recovery means that the decline is caused by supply-side factors—namely, the decision to acquire more education.

The fraction of 16- to 19-year-olds who are currently enrolled in school has risen over the past 20 years: from 61 percent in 1987 to 68 percent in 1997, and further to 73 percent by 2005. A large part of this rise can be linked to the increase in the economic return to education, especially a college degree, since the late 1970s. There is also some evidence that the expansion of educational opportunities, particularly in the

Figure 6

LFPR by Race/Ethnicity: Men



NOTE: The shaded areas denote NBER recessions.

form of increased financial aid, has led to an increase in college enrollment. A possible explanation for the recent larger-than-normal decline in the teen LFPR could stem from teenagers placing even higher value on education than in the past (Aaronson, Park, and Sullivan, 2006).

In addition to its influence on the long-run LFPR trends, the age distribution of the American workforce can also influence the short-run fluctuations exhibited by the aggregate participation rate because there are substantial differences in the cyclical properties of the LFPRs of various age groups. In particular, the business cycle components for persons older than 20 are moderately procyclical/acyclical (Table 2), while teen participation is strongly procyclical. The volatilities are low for those between 25 and 54 years of age, but much higher for young and elderly workers.[12] Thus, changes in the labor force's age distribution may lead to variations in how the LFPR responds to business cycle conditions.

RACE, ETHNICITY, AND THE LFPR

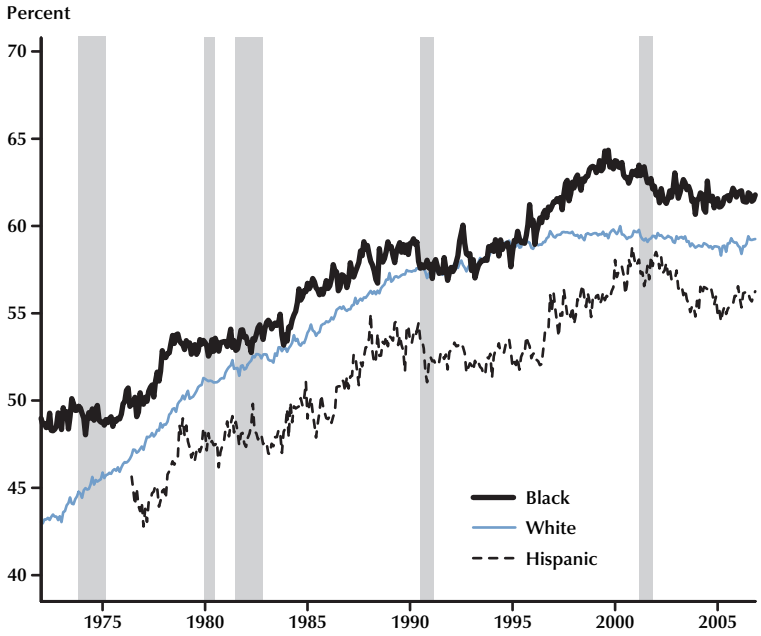
A third demographic feature influencing the evolution of the aggregate LFPR is the increase in the racial and ethnic diversity of the U.S. population over the past several decades. Whether because of social, economic, or political factors, participation rates appear to vary across racial groups. Figure 6 plots the LFPRs for white, black, and Hispanic men since the 1970s: Clearly, Hispanic men tend to have higher participation rates than either white men or black men. Over the sample time frames, the average LFPR for Hispanic men was 80.5 percent. White men and black men averaged 76.8 percent and 70.1 percent, respectively.[13] Similarly, the average yearly

[12] The volatilities declined after 1984 by a factor of 1.6 to 1.8 for ages 20 to 54 and by a factor of 1.3 for teenagers. For workers 55 and over, the volatilities increased slightly in the post-1984 period.

[13] The sample spans from January 1972 to November 2006 for whites and blacks and June 1976 to November 2006 for Hispanics.

Figure 7

LFPR by Race/Ethnicity: Women



NOTE: The shaded areas denote NBER recessions.

growth rate among Hispanic men was higher than for the other two groups. The LFPR of white men declined by 0.2 percent each year and that of black men declined by 0.3 percent each year on average, while the LFPR of Hispanic men had zero growth on average. From the early 1970s to 2000, the Hispanic share of the total population increased by more than 7 percentage points (to 11.3 percent); it is therefore not surprising that the aggregate U.S. LFPR rose in the decades prior to 2000.

Among women, however, these three groups show the reverse ordering: Hispanics tend to have the lowest participation rates while blacks tend to have the highest. The average over the entire sample of the LFPR for white, black, and Hispanic women was 54.7 percent, 57.0 percent, and 52.2 percent, respectively. The rise in the fraction of Hispanic women in the population, therefore, very likely had the opposite effect that the rise in the fraction of Hispanic men had: It decreased the average LFPR. Still, participation rates among women of all racial groups showed general increases between 1980 and 2000, and these increases were similar across the three groups (Fullerton and Toossi, 2001). Figure 7 plots the evolution of women's labor force participation broken down by race/ethnicity. In this case, white women experienced the highest average yearly growth in their LFPR. It increased by 0.9 percent each year on average, while Hispanic women saw their LFPR increase by 0.8 percent per year and black women saw theirs increase the least, by 0.7 percent per year.

Once again, a number of explanations exist for differences in rates of labor force participation across races.[14] One of the most likely causes for the higher LFPR of Hispanic men is that they tend to be younger than the general population

[14] For a more complete overview of the black-white gaps in various labor force statistics, see Bradbury (2000).

and in age groups that have higher LFPRs. Several studies cite the increased demand for skilled labor beginning in the 1980s as a reason for some men—especially less-skilled black men—to drop out of the labor force. Chandra (2000) shows that in 1940, employment rates for white and black men were similar across education groups. However, in 1990 the less-educated black men were much less likely to be employed than their white counterparts. Similarly, Bound and Holzer (1993) show that although industrial shifts from manufacturing to other sectors hurt wages for both white and black men, black employment (especially among less-educated young blacks) declined the most during the 1970s, which also carried over into the 1980s.

Although all women saw an increase in their LFPR over this time period, black women saw a much larger increase during the 1990s than the other groups. Juhn and Potter (2006) argue that black women were affected the most by changes in welfare and tax policy during that time, which led to a rise in the LFPR of single mothers.

CONCLUSION: THE FUTURE OF LABOR FORCE PARTICIPATION

During the past half century, the U.S. LFPR has seen dramatic changes, which have been driven by the rise of women's participation, an aging of the baby-boom generation, and growing ethnic diversity within the general population. What does the future hold for U.S. labor force participation? According to a report published by the Bureau of Labor Statistics, the overall LFPR is projected to decrease slightly to 65.6 percent in 2014 (Toossi, 2005). Two main factors are expected to continue to exert downward pressure on the participation rate: the continued decline in the teen LFPR—which is projected to decline from 43.9 percent in 2004 to 39.3 percent in 2014—and the aging of the baby-boom generation. This second factor, however, is likely to lower aggregate participation rates for the next several decades.

As mentioned earlier, the baby boomers have already begun entering into the 55-and-older age category. In her BLS report, Toossi (2005) projected that the fraction of Americans in this age group will rise from 28.4 percent of the adult population today to 33.7 percent by 2014; the Census Bureau projects this figure to be 39 percent by 2030. In contrast, the fraction of the population in the prime-age working group is projected to fall from 55.3 percent today to 51.1 percent by 2014 and 47 percent by 2030.

As baby boomers enter successive age groups, their LFPR should fall dramatically. For instance, the 55 to 59 age group had an LFPR of 72 percent in 2006, and the 60 to 64 age group had an LFPR of approximately 53 percent. Among those 65 and older, the LFPR was just over 15 percent. These numbers, coupled with the increasing proportion of the U.S. population beyond their prime working age over the coming years, suggest that successive generations will be unable to compensate for the baby boomers' exit from the labor force and U.S. labor supply will decline.

To be sure, participation rates for groups 55 and older are expected to increase, which will partially offset the downward pull that older groups have on the overall LFPR. In fact, there is already some evidence of this following the 2001 recession, when this age group had larger-than-normal increases in the LFPR (Bradbury, 2005). In 2014, approximately 41 percent of the group is expected to be in the labor force, up from 38 percent in 2006.

Still, most studies estimate that the rate of labor force growth in the United States will decrease over the next decade, if not longer (e.g., Aaronson et al., 2006). In the event of such a drop-off, it may become increasingly difficult to maintain growth in our standard of living because there will be fewer workers generating goods, services, and income for each resident in the country. The principal challenge in the presence of a declining LFPR, therefore, will be to find ways to enhance the productivity of the individuals that do choose to work. Investing in education, physical capital accumulation, and research and development may be three avenues to such an end.

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APPENDIX

Trend and Business Cycle Components

Any time series can be decomposed into cyclical components of different frequencies. The frequency of a cycle is inversely related to its period. The period of a cycle is simply the time between subsequent peaks. We consider three components:

Trend component: The trend is obtained by removing fluctuations with periods higher than 8 years (i.e., 96 months) with a low-pass filter.

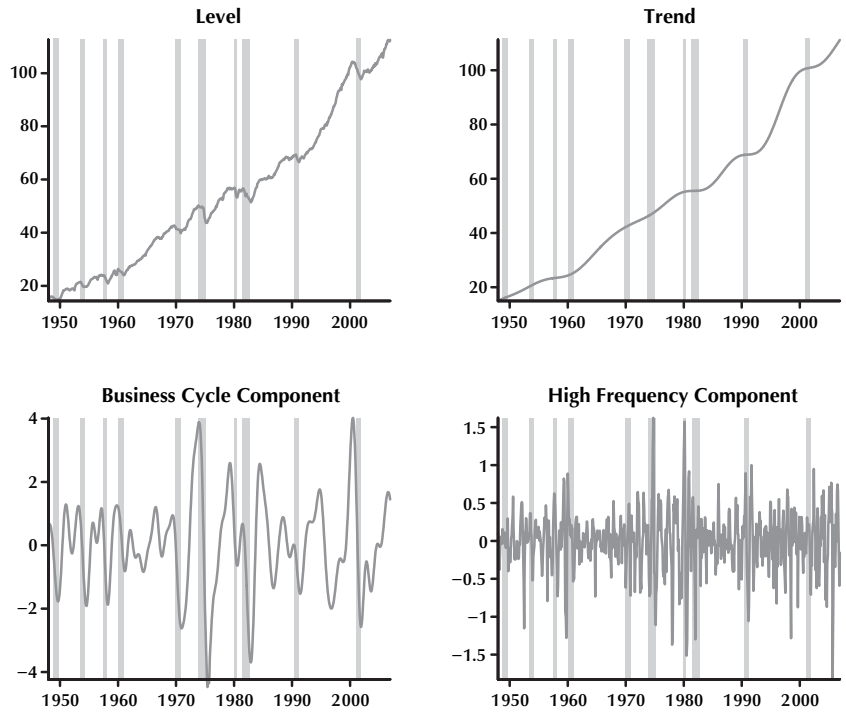
Business cycle component[15]: We extract the business cycle component of a time series using a band-pass filter, which removes the trend component (period higher than 8 years) and the high-frequency component (period less than 1.5 years).

High-frequency component: This corresponds to fluctuations with periods less than 1.5 years.

Figure A1 illustrates this decomposition for industrial production. We use the business cycle component of industrial production to determine the correlation of participation rates for various demographic groups with aggregate economic activity over the business cycle (see Tables 1 and 2).

Figure A1

Industrial Production



NOTE: Industrial production data are from the Federal Reserve Board. The shaded areas denote NBER recessions.

[15] We sometimes refer to the business cycle component as the cyclical component with a slight abuse of terminology.