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***FYI*—Commercial Bank Profits**

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Economic inequality is often viewed as a social problem calling for government attention. However, whether income disparities should be, or can effectively be, ameliorated by government intervention is an unsettled question. Many policies aimed at reducing inequality provide negative incentives for economic efficiency, implying that there is a trade-off between equality and growth. The terms of such a trade-off are unknown, though, and the result is sharp disagreement in evaluating policy options.

This article reviews selected recent research developments on the relation between income equality and economic growth. The author discusses the finding that countries that grow faster also exhibit a more egalitarian income distribution, which may suggest that redistributive policies have a positive effect on income growth. His analysis focuses on the two main classes of theories—politicoeconomic theories and financial imperfections theories—that have been advanced to explain the inequality-growth relationship. He concludes that at this point knowledge in the area has not developed enough to yield unambiguous lessons for public policy.

11 *I*nformation Ambiguity: Recognizing Its Role in Financial Markets
Jie Hu

Uncertainty plays a prominent role in the world of business and economics, yet traditional economic theory has had only limited success in providing models for dealing with uncertainty and individuals' behavior under this condition, and many economic issues remain unexplained. This article suggests that one promising area of research, essentially ignored until recently, may be the idea of information ambiguity.

Using lotteries as an example, the author provides a brief and intuitive illustration of why information ambiguity, or Knightian uncertainty, is significant in rational decision making and shows how it may be modeled. He demonstrates the usefulness of its application in understanding several unexplained phenomena in the financial markets such as why asset prices are usually more volatile than asset fundamental values. The author concludes that while the mathematical representation of information ambiguity is in developmental stages, applying the concept to analysis promises to add new and useful insights.

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As the economy as a whole improved, U.S. commercial bank profitability reached postwar record highs in 1993. And, by some measures, southeastern banks fared even better than their peers nationwide. This article examines the reasons for this increased profitability—primarily a decline in loan-loss provisions that resulted in wider adjusted net interest margins. Extensive tables provide details about bank profitability from 1989 through 1993.

Income Inequality and Economic Growth: Evidence and Recent Theories

Roberto Chang

People care about the behavior of gross national product. But people also care, perhaps with more intensity, about equality and the distribution of national income. Even in wealthy countries such as the United States, economic inequality is often associated with poverty, crime, and social unrest.[1] Extreme inequality is widely considered to be a major cause behind political instability and even civil wars.[2]

Because inequality is a social problem, a natural reaction is to demand that the government do something about it. But whether income disparities should be, or can effectively be, ameliorated by government intervention is an unsettled question. Much of the uncertainty arises from the imperfect knowledge of the relation between income equality and economic growth. Policies aimed at reducing inequality are commonly believed to provide negative incentives for economic efficiency, implying that there is a trade-off between equality and growth. However, the terms of such a trade-off are unknown, and this ignorance translates into sharp disagreements in evaluating policy options. Witness, for example, the recent debate about whether economic growth in the United States in the last decade benefited mostly the rich or the poor. Many economists argued that increased income inequality accompanied the long expansion of the 1980s—that is, the rich became relatively richer—and that public policy could have (and should have) prevented this outcome at little economic cost. Dissenting economists, while admitting that inequality increased, argued that policies toward preventing it would have provided strong incentives against growth.[3] The debate was not about the fact that inequality worsened but about the price that had to be paid, in terms of economic growth, for a more egalitarian outcome.

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Because of its importance for public policy, the relationship between income equality and economic growth has long been a major topic in economic research. This essay selectively reviews some recent developments in this area, emphasizing their consequences for public policy. Keeping in mind the perceived trade-off between equality and growth, the discussion in particular sifts recent findings for implications about the effects on economic growth of redistributive policies—that is, of policies whose main objective is to reduce inequality.

A review of recent studies using cross-country data discloses an important empirical fact: countries that grow faster also exhibit a more egalitarian income distribution.[4] This feature of the data suggests that redistributive polices may have not a detrimental but a positive effect on the growth rate of national income; there may in fact be no conflict between promoting growth and reducing inequality. Other interpretations are possible, however. For instance, the empirical association between growth and equality may imply that policies primarily aimed at stimulating growth also have a "trickle-down" effect, reducing inequality as a by-product.

Discriminating among the alternative interpretations of the evidence is important because deciding the emphasis of government policy depends on which interpretation is taken to be correct. But choosing wisely between the competing theories is a difficult matter. In particular, a crucial assumption concerns the direction of causality: Does growth affect income distribution? Or, is it that inequality affects growth? The discussion focuses on the two main classes of theories—politicoeconomic theories and financial imperfections theories—that have been advanced to explain the inequality-growth relationship. The conclusion reached is that, although much progress has been achieved on this subject, the state of current knowledge does not yet warrant firm prescriptions for public policy.

The Kuznets Curve

Although the link between inequality and growth has preoccupied economists for centuries, modern research on this connection originated in a seminal study by Simon Kuznets (1955). Kuznets advanced the surprising theoretical conjecture that as a country's national income grows, its income distribution must initially become less, rather than more, egalitarian. He also conjectured that growth brings about more equality only after the country's income has surpassed some threshold level. In other words, Kuznets argued that the evolution of income distribution follows a U-curve: economic expansion makes poor people relatively poorer in the initial stages of a country's development and relatively richer at more advanced stages.

Kuznets's hypothesis was based on the theories of economic growth prevalent in the fifties, coupled with empirical observation. Those theories explained growth as a process by which the working population moved from traditional activities such as agriculture to a more productive industrial sector.[5] The empirical observation was that incomes in the traditional sector were typically lower and more narrowly distributed than industrial incomes. Under these conditions, Kuznets argued, the development experience of a typical country was likely to be coupled with both higher per capita incomes and greater income inequality, as it meant that over time an increasingly larger fraction of the population would be located in the more productive but more unequal industrial sector.

Kuznets's theory implies that redistributive policies (those that tax the rich to give to the poor) have negligible effects on development. The behavior of income distribution is viewed as endogenous—that is, explained by the theory as an outcome of the development process. In contrast, growth is treated as exogenous, not explained by the theory and, in particular, not affected by income distribution. Because growth affects income distribution but not vice versa, economists say that causality in Kuznets's theory runs one way, from growth to income distribution. The implication is that, although one can justify redistributive policies on the basis of equity considerations, it cannot be argued that redistribution accelerates overall development.[6] The question of the effects of redistributive policies on growth resurfaces in the more recent literature, and again the answer depends crucially on assumptions about the direction of causality.

In spite of the importance of the questions Kuznets raised, subsequent research in macroeconomics largely ignored distributional issues.[7] Three conditions probably account for this fact. First, empirical evidence supporting the existence of a "Kuznets curve" turned out to be inconclusive.[8] Also, while the Kuznets curve was considered to be a long-run phenomenon, most macroeconomists were focused on short-run fluctuations—that is, on the business cycle.[9] Finally, in the 1970s and 1980s macroeconomic research turned attention to rational expectations models. These models assumed that economic actors make decisions efficiently using all information available about their environment.

Properly modeling these choice problems required mastering new tools from decision theory. So, in order to keep their models manageable, macroeconomists imposed some strong simplifying assumptions on them. In particular, it became conventional in macroeconomic models to assume that the behavior of households was well approximated by the behavior of an average or "representative" individual; likewise, the business sector was usually approximated by a "representative" firm. These assumptions allowed macroeconomics to make considerable progress, but they also prevented the study of distributional questions.

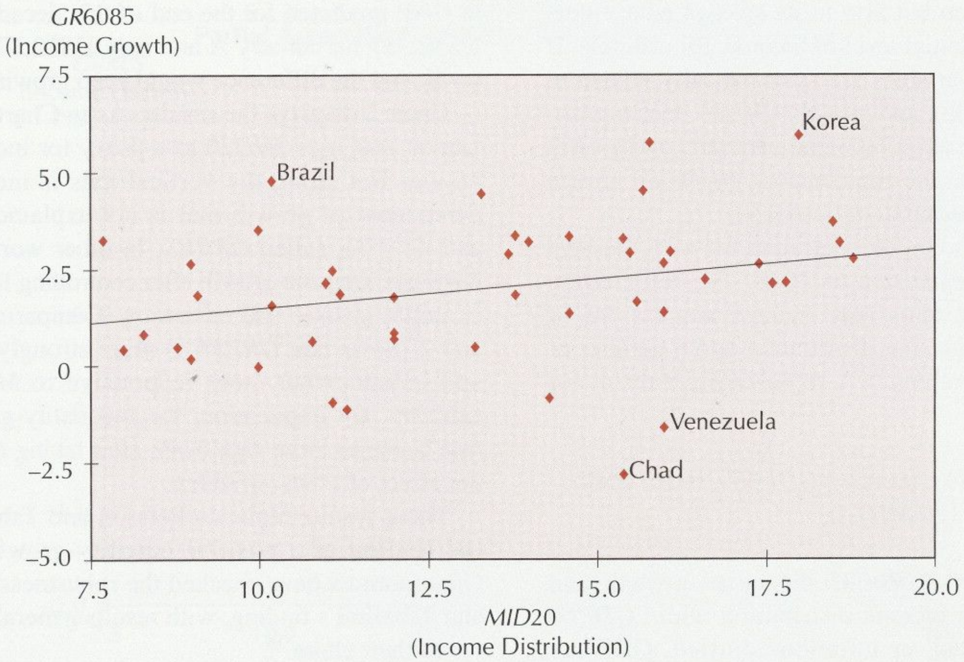
This situation has changed. There has been a recent resurgence of interest in the determinants of long-run growth, following the influential papers of Paul M. Romer (1986) and Robert E. Lucas (1988). In addition, models of dynamic macroeconomics are much better understood today, and incorporating distributional issues into them has become feasible. Finally, and perhaps most importantly, it was discovered that cross-country data yield a robust relation between inequality and not the level of income but the long-run growth rate of income.

*L*ong-Run Growth and Inequality

In an important contribution, Torsten Persson and Guido Tabellini (1994) showed, using data from many countries, that long-run growth rates of income are positively associated with measures of income equality. Their crucial finding is worth examining in some detail.[10]

Chart 1 displays representative data for a sample of forty-eight countries. Each country is represented by a point measuring the long-run growth rate of its income and the equality of its income distribution. In the vertical axis, the 1960-85 average annual growth rate of its per capita gross domestic product (*GR*6085) is a proxy for a country's income growth rate.[11] The

Chart 1
Income Distribution and Long-Run Growth



The chart displays representative data for a sample of forty-eight countries. Each country is represented by a point measuring the long-run growth rate of its income and the equality of its income distribution. In the vertical axis, the 1960-85 average annual growth rate of its per capita GDP (GR6085) is a proxy for a country's income growth rate. The proxy for its income equality, in the horizontal axis, is the share of its national income earned by the middle 20 percent of its population (MID20). The positive slope of the regression line indicates that, on average, countries that grew faster between 1960 and 1985 also had a more egalitarian distribution of income.

proxy for its income equality, in the horizontal axis, is the share of its national income earned by the middle 20 percent of its population (*MID*20).[12] *MID*20 is supposed to be a measure of the income of the middle class: a higher value of *MID*20 is taken to express a more egalitarian income distribution.[13]

It is apparent from Chart 1 that the data show a noisy but positive relation between *GR*6085 and *MID*20—that is, between growth and equality. The chart also shows a "regression line" that represents the best-fitting linear approximation to the data. The slope of the regression line is positive, indicating that, on average, countries that grew faster between 1960 and 1985 also had a more egalitarian distribution of income. As in any empirical relation, there are many, sometimes large departures from the regression line. For example, Venezuela and Chad display a relatively egalitarian distribution of income, but they have grown very slowly; Brazil has grown very rapidly in spite of substantial income inequality. But these are exceptions to the generally positive association between equality and growth.

To investigate the growth-equality relation more carefully, one needs to take into account the effect that third variables may have on that relation. The growth rate of a country's income may be linked not only to its income distribution but also to its level of educational attainment or its initial level of income, for example. If these additional variables are systematically related to measures of equality and growth, Chart 1 does not isolate the true association between inequality and growth but instead reflects the simultaneous effects on growth and equality of the additional variables.

Third variables can be controlled for with the help of multivariate regression analysis. Typically, doing so involves calculating least squares regressions of GNP growth on income distribution and a number of other control variables.[14] A representative result for this data set is

$$GR6085 = -2.59 - 0.00052\, GDP60 + 0.041\, PS60 + 0.187\, MID20,$$

where, as before, *GR*6085 measures growth and *MID*20 measures income distribution while *GDP*60 (level of 1960 real, or inflation-adjusted, GDP per capita) and *PS*60 (1960 primary school enrollment ratio) are control variables.[15]

The coefficients in the above regression are all statistically significant, and their signs may be given plausible interpretations. *GDP*60 has a negative sign, meaning that countries that had a relatively low per capita GDP in 1960 grew, on average, relatively faster than other countries during the 1960-85 period. This result is consistent with the view that poorer countries tend to "catch up" with richer ones or, equivalently, that the income levels of different countries tend to converge. The positive sign of *PS*60 indicates that countries whose educational system was more advanced by 1960 grew faster, on average, during the 1960-85 period. This finding agrees with the conventional view that countries with better-educated populations have more favorable growth experiences.

For the purposes of this study, the most important result is the sign and magnitude of the coefficient of *MID*20, which may be given the following interpretation: other things being equal, if the share of GNP accruing to the middle class of a country increases by 1 percent, its long-run growth rate increases by 0.187 percent. This effect may not seem significant, but differences in growth rates of this magnitude do make, after compounding, a large difference in income levels and welfare. For example, suppose that two countries A and B had a 1960 GNP per capita of US$1,000, and all their characteristics were identical and equal to those of the average country in the sample except that the middle-class GNP share in country A was 1 percent larger than that of the average. Then the per capita GNP predicted for the end of this decade would be US$2,337 for country A and only US$2,172 for country B, and the difference would keep growing.

Chart 2 displays the results. As in Chart 1, the horizontal axis uses *MID*20 as a proxy for income distribution. But along the vertical axis is measured the component of growth that is not explained by *PS*60 and *GDP*60, called *GRRES*. In other words, *GRRES* measures long-run growth after controlling for the effect of initial income and education. Comparing Charts 1 and 2 shows that *GRRES* is more strongly associated and is somewhat more responsive to *MID*20 than *GR*6085. By implication, the inequality-growth relation becomes more significant after taking into account the effect of other variables.

These results replicate Persson and Tabellini's initial finding of a positive equality-growth relation. Other authors have checked the robustness of Persson and Tabellini's finding, with results generally supportive of their claim.[16]

From these results, it is tempting to conclude that the data imply that income equality boosts growth. If that were the case, then the consequences for public policy would be enormous: one could argue that reducing inequality does not imply sacrificing economic growth but, on the contrary, results in faster growth.

But is the existence of an empirical association between equality and growth in fact sufficient to conclude that more equality helps growth? Generally not. College statistics courses stress that an empirical correlation between two variables does not necessarily tell anything about how one of the variables actually affects the other. That lesson applies in this context: the empirical evidence is consistent with the view that redistributive policies help growth but also with the alternative view that faster growth creates greater equality. This is an example of what economists call "observational equivalence": two different hypotheses—(1) equality helps growth, and (2) growth reduces inequality—may be consistent with the same evidence (equality and growth are positively correlated). In this case, solving the observational equivalence problem amounts to taking a stand about the direction of causality between equality and growth—that is, deciding which variable will be taken as being affected by the other.

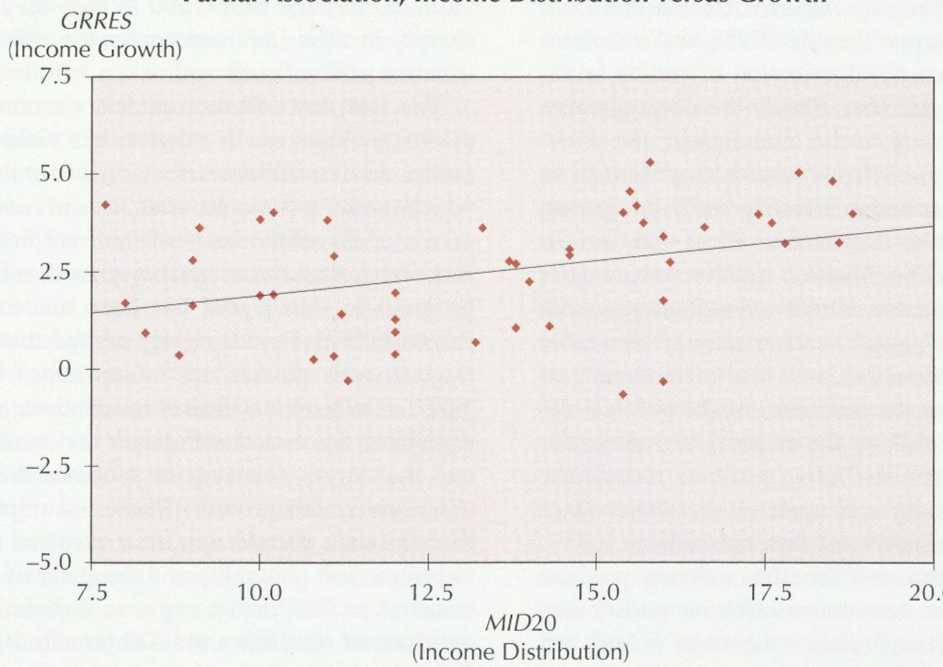
The only way to determine the direction of causality and, more importantly, to understand the economic mechanisms that explain the above empirical findings is to formulate theoretical models of the links between growth and inequality. By analyzing theoretical models one can isolate the assumptions underlying alternative explanations of the data. Doing so is helpful because sometimes these assumptions turn out to be implausible and also because it allows one to derive further implications of these assumptions that can be tested empirically.

Two main classes of theories of the growth-equality link have emerged: theories that focus on the relation between economics and politics, and theories that stress the role of imperfect financial markets. Each class shall be examined in turn.

Politicoeconomic Theories

In searching for explanations of the inequality-growth relationship, it is natural to start by looking at the links between politics and economics. After all, it is intuitively plausible that inequality is harmful for a country's political situation, which in turn is likely to affect growth. Many recent models of

Chart 2
Partial Association, Income Distribution versus Growth



As in Chart 1, the horizontal axis uses MID20 as a proxy for income distribution. Along the vertical axis, GRRES measures long-run growth after controlling for the effect of initial income and education. Comparing Charts 1 and 2 shows that GRRES is more strongly associated and is somewhat more responsive to MID20 than GR6085. By implication, the inequality-growth relation becomes more significant after taking into account the effect of other variables.

inequality and growth are attempts at formalizing this intuition.

Persson and Tabellini's original (1994) contribution provides a good example of politicoeconomic models. Persson and Tabellini advanced a theory that emphasized how government policies are determined in democratic societies. They examined a model in which taxes and transfers are chosen via majority rule. An implication of this political mechanism is that the poorer the majority of voters, the larger the amount of redistribution from wealthy to poor people that will be approved. The problem is that some of the taxes that finance redistribution also discourage capital accumulation, which in Persson and Tabellini's setup is the engine of growth.

Demonstrating why Persson and Tabellini's model implies a positive growth-equality relation, similar to the one found in cross-country data, is straightforward. Suppose that there are two countries, A and B, identical in all respects except that A has a more egalitarian wealth distribution. Then A's majority of voters is likely to be wealthier than B's. Since this fact implies, according to Persson and Tabellini, that A's majority will approve less redistribution than B's, taxes will be lower in A. Hence, there will be more investment and faster growth in A than in B.

Persson and Tabellini's model, and others in the same spirit (for example, Alberto Alesina and Dani Rodrik 1994; Giuseppe Bertola 1993), make the crucial assumption that the distribution of wealth is exogenously given, and then derive the consequences for growth. According to this assumption, the direction of causality runs from wealth distribution to growth: wealth distribution affects growth, but growth does not affect wealth distribution. (Note that causality runs in the opposite direction relative to Kuznets's model.) The implication is that redistributing wealth from rich to poor people, which may be desirable from an equity perspective, will also raise the rate of growth by changing the outcomes of the political decision process. By making the majority of voters relatively wealthier, redistributive policies reduce the taxes that the majority will approve, and lower taxes result in more investment and faster growth.

Note that Persson and Tabellini's theory predicts a negative relation between *wealth* inequality and growth. The empirical relation between *income* inequality and growth is seen as an approximation of that "true" relation. For explaining the empirical patterns, there may be some value in this position because income distribution and wealth distribution are highly correlated. But for policy analysis, neglecting the fact that income distribution is an endogenous variable may be dangerous, even if one accepts that a politicoeconomic mechanism is generating the inequality-growth relationship.

For example, it is possible that, in spite of the existence of a positive income equality-growth relation in the data, redistributing wealth has no effect on economic growth. This point was made formally by Roberto Chang (1993). In that study's model, fiscal policy is determined not by majority rule but by the negotiations between two political parties that represent different social groups. The model implies that income equality and growth are both endogenous variables and may exhibit a positive relation across countries, just as in cross-country data. If these results were taken as a proxy for an underlying relation between wealth equality and growth, one would conclude that redistributing wealth would increase the growth rate. But this would be an inaccurate conclusion. In Chang's (1993) model, redistributing wealth from the rich to the poor does not change the relative bargaining power of the two parties; hence, it has no effect on fiscal policy and growth.[17]

To summarize the discussion to this point: it has been shown that politicoeconomic models are consistent with the inequality-growth relation observed in cross-country data. But models of this kind are not identical to each other, and in fact they may differ sharply in their implications for the effects of redistributive policies on growth.

The fact that different models are consistent with the inequality-growth relation but yield conflicting policy advice indicates that, in order to determine which model is more accurate, it is necessary to compare models on the basis of their empirical implications other than the inequality-growth relation. Some progress in this regard has been made by Roberto Perotti (1992). Perotti rightly argued that many politicoeconomic models, including that of Persson and Tabellini, rely on two distinct assumptions: that more inequality is associated with larger tax-transfer schemes, and that larger tax-transfer schemes are negatively associated with growth. These assumptions imply that the data should exhibit a positive relation between income inequality and the share of government transfers in GDP and a negative association between the share of transfers and GDP growth. But in fact, as Perotti points out, the data show very weak support for both implications. Perotti concluded that models of the Persson-Tabellini type must be rejected: they imply a negative inequality-growth relation but for the wrong reasons.[18]

Perotti's contribution has placed a question mark on models in which inequality hurts growth through its effect on the majority's choice of taxes and transfers, although his conclusions can be challenged on a number of points. First, the share of government transfers in GDP may be a very bad proxy for redistributive policy. In many countries redistribution takes the form not of formal transfers but of "informal" ones: creation of unproductive bureaucratic jobs for party members, allocation of valuable licenses and quotas to friends, and so forth. Second, the data seem to provide little information about the hypothesis that Perotti wants to test, partly because he works with a relatively small number of observations.

To address the questions raised by Perotti's findings, Alesina and Perotti (1993) have recently argued that the link between inequality and growth is not through fiscal policy but is more direct. In their view, income inequality causes "political instability," which in turn depresses investment and retards growth. This kind of mechanism sounds intuitively plausible, but economic analysis requires more concreteness. What exactly is political instability? How can it be measured? Alesina and Perotti avoid giving a definition, instead treating political instability as an unobservable variable that affects a number of other variables, such as the number of coups per year, number of political assassinations, frequency of changes in the executive power, and the like. In this way they construct, for each country, an "index" of political instability. Finally, they examine international data to see if greater income inequality is associated with a higher value of the instability index and if a higher index is related to lower investment and/or growth. The data show support for both links.

Alesina and Perotti have pushed the theory in an interesting direction, and their initial examination of international data seems to lend some credence to their conjectures. More research is needed, however, to verify the robustness of their results as well as to further understand the notion of "political instability" that is central to their theory. Moreover, the policy implications of their theory are unclear.

This section has shown that politicoeconomic models have had success at reproducing the empirical relation between equality and growth. Some prominent models imply that redistributive policies increase growth. But the fact that other models do not support that conclusion points to the need for discriminating among the competing models on the basis of empirical implications other than the equality-growth relation. Work along these lines has yet to yield clear-cut answers.

*F*inancial Imperfections Theories

The intuition behind a second class of models of the inequality-growth relationship can be illustrated with a simple story. Consider an economy peopled by many families that, initially, have different levels of wealth. Each family has access to two different productive opportunities or projects. One of the projects is more attractive than the other; in particular, the output of the first project grows faster than the output of the second. Undertaking the more profitable, high-growth project requires paying a set-up cost up front, however, while the less-productive project entails no such cost.

In the absence of its set-up cost, all families would undertake only the high-growth project. The same would be true if borrowing and lending markets were perfect because then an initially poor family would be able to obtain a loan to pay for the set-up cost of the better project. Suppose, though, instead that families cannot borrow; the project that any given family can undertake is limited by its initial wealth. Such families may be unable to pay the set-up cost associated with the high-growth project, and this situation may persist over time if families that are too poor initially never accumulate enough funds.

The initial distribution of wealth becomes crucial for determining the economy's overall growth rate. If initial wealth is concentrated in very few families, only these few undertake the high-growth project while most others will be stuck in the relatively unproductive project, making the economy's average growth rate low. A more even wealth distribution may enable more families to start the high-growth project, increasing overall growth. This story is therefore consistent with the empirical positive association between growth and equality: countries with very unequal initial wealth distribution must grow more slowly and exhibit less income inequality than countries in which initial wealth was more evenly distributed.

The above story illustrates the basic mechanism behind models that stress that financial imperfections may explain the cross-sectional results of concern here.[19] Two assumptions are crucial in these models. The first is that a high-growth project requires some set-up cost that must be paid for up front although the project's output is obtained only in the future. The second important assumption is that borrowing markets are imperfect, which implies that families without enough funds to cover the set-up cost of the high-growth project cannot undertake the project for lack of financing.

A good example of this approach is research by Oded Galor and Joseph Zeira (1993). Galor and Zeira examined a model in which parents leave bequests to their children, who in turn leave bequests to their own children, and so on. Acquiring education is costly (the set-up cost). Going to school is a good investment because an educated person can work as a skilled worker, and skilled workers are more productive and earn higher income than unskilled ones; also, the productivity and income of the former grow faster than those of the latter. As a consequence, everybody would like to get an education. But—and this is the point at which financial market imperfections play an important role—only those with large enough bequests can afford to pay for their education. In the long run, the population is split between two groups of families: wealthy families earning high and fast-growing income, and poor families whose members are unskilled, low-wage workers caught in a relative poverty trap. The number of families that become wealthy or poor, and hence the economy's overall growth rate and income distribution, depends on the initial distribution of wealth, which determines which families can pay for education.

Models of financial imperfections have noteworthy implications for public policy. One of them is that adequate redistributive policies may simultaneously reduce income inequality and enhance growth. This possibility is similar to that suggested in some politicoeconomic models, but the mechanism is different: in models of financial imperfections, redistributive policies may accelerate growth by helping poor families finance set-up costs and escape from relative poverty.

A more novel and more interesting implication of these models is that policies aimed at reducing imperfections in borrowing markets may, in the long run, reduce income inequality and enhance growth. Recall that in these models poor families remain poor because they cannot borrow enough to finance the set-up costs of undertaking high-growth projects, even if such projects are the most profitable ones. It follows that poor families would escape relative poverty if public policy could help remove their borrowing constraints.

It must be acknowledged, however, that whether public policy can in fact alleviate the effects of borrowing market imperfections may depend on why such imperfections exist in the first place. For example, suppose that borrowing constraints are caused by an asymmetry of information between borrowers and lenders.[20] Then it is likely that government policy can eliminate the borrowing constraints if and only if the government has better information than do borrowers and lenders (an assumption that is often difficult to defend). If so, policy analysis may be sensitive to the exact specification of financial imperfections. More research is needed on this aspect of the theory.[21]

In fact, more development of the theory is needed also because some prominent models in the literature have some counterfactual implications, the elimination of which will probably require nontrivial modifications. For instance, Galor and Zeira's (1993) model implies that there is very limited social mobility: in the long run, rich families remain rich and poor families remain poor. This conclusion contradicts the fact that advanced economies exhibit a significant degree of social mobility. On the other hand, models that predict significant social mobility typically assume, because of technical difficulties, that there is no long-run growth (for instance, Banerjee and Newman 1991). While such simplifying assumptions have been important to enabling development of the theory, one must recognize that actual economies exhibit both social mobility and long-run growth. Developing a satisfactory model that reproduces both features of the data remains an important theoretical challenge.

Models of imperfect financial markets seem promising for explaining the equality-growth relation, and they have been useful for directing attention toward the link between credit markets, distribution, and growth. Before accepting their policy recommendations, though, further development of the theory is needed. It must also be kept in mind that financial imperfections models are not the only ones that explain the correlation between income equality and growth; politicoeconomic theories are also consistent with that correlation. Demonstrating the superiority of financial imperfections explanations will probably require developing models with a more complete specification of the financial sector and testing their other implications in addition to the growth-equality correlation.

Conclusion

Empirical evidence discussed in this paper displays a positive association between income equality and economic growth. Does this observation imply that appropriate government intervention can simultaneously achieve more equality and faster growth? The jury is still out, and the answer depends on delicate but interesting questions of economic theory.

The discussion has shown that many alternative models can generate a positive relation between growth and equality. But these models differ on important aspects, most fundamentally on which variables are taken as exogenous and which ones are determined endogeneously. It is clear that more research is needed (and is currently taking place) in order to determine the relative relevance of the different theories. In particular, the alternatives need to be evaluated on the basis of their additional implications for the data, perhaps by applying econometric methods: Perotti's (1992) study is a good start in that direction. Less formal checks may also be useful. For instance, some of the competing models have counterfactual implications, such as limited social mobility in the Galor-Zeira model. These implications may turn out to be decisive reasons to reject such models.

Discriminating among the alternative models is not merely an intellectual exercise but is fundamental for policy evaluation. Although all the models reviewed in this paper are consistent with the observed correlation between growth and equality, they have very different policy implications. Thus it is fair to say at this point that knowledge has not developed enough to yield unambiguous lessons for public policy. Nevertheless, it should be evident that there has been progress and that ongoing research in this area will continue to contribute toward that goal.

Notes

1. See, for instance, chapter 4 of the *1992 Economic Report of the President*, which discusses income distribution and poverty.
2. A good example is contemporary Peru, where the income received by the top fifth of the population is seventeen times as large as the income received by the bottom fifth. This degree of inequality is widely blamed for the Shining Path terrorist rebellion that has resulted in more than 25,000 deaths since 1980.
3. See Baily, Burtless, and Litan (1993), Krugman (1994), and Haslag and Taylor (1993) for recent discussions of the U.S. case.
4. One reason to focus on cross-country studies is that time series studies of the inequality-growth correlation are rather scarce. Perhaps this is due to two facts: (1) income distribution time series are difficult to find except for a few advanced countries, and (2) constructing a series of the underlying "long-run" growth component from the per capita GNP series is a hard and unsettled question.
5. The classic statement of such views is Lewis (1954).
6. In recent models of the Kuznets curve, such as that of Greenwood and Jovanovic (1990), causality runs both ways, and redistributive policies do affect development.
7. But the Kuznets hypothesis was a very active area of research in the field of economic development. For a survey, see Adelman and Robinson (1989).
8. For a recent examination, see Anand and Kanbur (1993).
9. It is not that long-run issues were ignored. In fact, research in the field of economic growth and development was very active, and many growth models developed between 1960 and 1985 were the forerunners of the current generation of growth models. But it is fair to say that macroeconomics was dominated by business cycle questions.
10. The calculations in this section were performed by the author, based on data described below.
11. *GR*6085 is taken from the appendix to Barro (1991), which in turn is extracted from the Penn World Table described by Summers and Heston (1988).
12. *MID*20 is measured around 1960 and is taken from Persson and Tabellini (1993), who in turn took the series from Paukert (1973).
13. Using other measures of income inequality, such as Gini coefficients, does not affect the qualitative conclusions described here. See, for instance, Galor and Zang (1992), who report similar findings using Gini coefficients as their measure of income equality.
14. See Barro (1991) for a thorough analysis of growth in a cross-section sample.
15. *MID*20 and *PS*60 are also taken from the Barro data set. The t statistics associated with *GDP*60, *MID*20, and *PS*60 are –2.97, 2.29, and 4.38, respectively. They are all significant at the 5 percent confidence level. The R^2 of the regression is 0.363.
16. Among others, see Alesina and Rodrik (1994), Perotti (1992), Galor and Zang (1992).
17. How is it, then, that the data exhibit a positive income equality–growth correlation? The author's suggested explanation is that there are underlying differences in productive technologies across countries. The model implies that a more productive technology may tilt bargaining power toward the political party that represents the poor, thus implying that more redistribution will be agreed upon. But a more productive technology also allows for faster growth, even after taking into account the higher taxes needed to finance redistribution. Hence, if the main source of the variation in cross-country data is some unobserved determinant of technology, the data will exhibit a positive relation between income equality and growth. Such a relation cannot be exploited by public policy, however. For a related argument, see Wright (1993).

18. In contrast, Perotti's results are consistent with the model in Chang (1993).
19. Examples of this line of research are Aghion and Bolton (1991), Banerjee and Newman (1991), Galor and Zeira (1993), Galor and Zang (1992).
20. An example is a situation in which each borrower has access to either a "good" or a "bad" project, and lenders cannot observe the quality of the borrowers' projects. In this case, it may happen that a borrower with a good project cannot get a loan because he cannot convince lenders that his project is in fact a "good" one.
21. For more detailed analyses of the effects of government intervention in economies with imperfect capital markets, see Lacker (1994) and Srinivasan (1994).

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Information Ambiguity: Recognizing Its Role in Financial Markets

Jie Hu

As uncertainty plays a salient role in economic life, proper models for capturing uncertainty and individuals' behavior under uncertainty are crucial for a sound understanding of the economic world. While traditional economic theory has had its successes in providing such models, many economic issues cannot be satisfactorily explained within its framework. For example, in financial markets several phenomena remain unexplained: Why are asset prices usually more volatile than asset fundamental values? Why is it that asset prices may fall discontinuously or crash? Why are assets for initial public offering often underpriced? Why do public announcements cause increased trading volume of assets? These and other open questions have prompted economists to search outside existing theoretical models for answers. One of the missing ingredients, according to recent economic research, may be the concept of information ambiguity.

Uncertainty that an economic agent faces usually arises from the inaccuracy of available information. Different degrees of accuracy may serve to classify information into three categories. Consider drawing a ball from an urn that contains a number of balls, each with one of three possible colors: red, black, and yellow. If one is allowed to see the ball, information about its color is deterministic; if one is not allowed to see the ball but is given the ratios of the three colors, then the chance that each color will be chosen is known and information about the color of the drawn ball is probabilistic; if one is neither allowed to see the ball nor given the exact ratios of the three colors, the exact chance for each possible color cannot be pinned down, and information about the color of the ball to be selected is ambiguous.

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Economic information available to an agent can be classified into the same categories. Accordingly, the indeterminateness featured by probabilistic information is called risk, and the indeterminateness caused by ambiguous information is called Knightian uncertainty, after Frank Knight (1921), the first economist to distinguish between the two types of indeterminateness. Subsequent to Knight's contribution, however, the formal mathematical framework for analyzing information and uncertainty has essentially ignored the class of information that is ambiguous, and the practice of theory has been to reduce both risk and Knightian uncertainty to the single concept of risk. While such an approach offers the virtue of simplifying economic models, it may ignore many important insights. Recent developments in decision science—the branch of economic theory that studies people's rational behavior—have provided some tools for modeling information ambiguity, and economists have begun to apply them successfully to solving puzzles in traditional economic theory.[1]

Pricing a stock is like evaluating a lottery, with its payoff contingent upon the future performance of the firm.

This article provides a brief and intuitive illustration of why information ambiguity—referred to synonymously as Knightian uncertainty—is significant in rational decision making. The discussion demonstrates one way in which information ambiguity may be modeled. While there are a number of decision theories that model rational choices under Knightian uncertainty, they are logically related, and focusing on only one—developed by Itzhak Gilboa and David Schmeidler (1989)—will serve the purpose of illustrating the basic intuition.[2] The article also shows applications of the concept of Knightian uncertainty in the study of financial markets, confining itself to the issues raised earlier.

The Significance of Information Ambiguity

Using lotteries as an example will facilitate the discussion of information ambiguity since lotteries are useful for modeling many economic issues. For example, a contingency embedded in a financial asset is a kind of lottery, which entitles its owner to one of several possible payoffs depending on the outcome of some future events. Therefore, pricing a stock is like evaluating a lottery, with its payoff contingent upon the future performance of the firm. As another example, the effects of an economic policy may also be viewed in terms of a lottery whose payoff depends on other unknown factors. The following analysis of lottery choices will be used to explain the so-called Ellsberg paradox and demonstrate the role of information ambiguity in people's behavior.

To illustrate, imagine yourself in the following scenario, which tests your choices. Suppose you have won a game in a carnival. Your award is a strange one: you are given the opportunity to get two lotteries.

An opaque urn contains nine balls of identical size. Among them, three are red, and the other six are either all black, or all yellow, or some black and some yellow. As listed in Table 1, four lotteries—A, B, A′, and B′—are based on drawing a ball from the urn. For example, lottery A entitles its owner to a payoff of $1 if a red ball is drawn from the urn and to a payoff of $0 if a black or yellow ball is drawn. Similar interpretations are for the lotteries B, A′, and B′.

The game host leads you to the urn and tells you exactly the above information. He also points to a certificate signed by an independent agent, which confirms the contents of the urn. After you are convinced that the information given to you is true, the game host explains, "You will make two decisions: the first is to choose between lotteries A and B, and the second is to choose between lotteries A′ and B′. Then, you will draw a ball from the urn, and the color of the ball will determine your cash award according to the lottery you have chosen from A and B. After that, you will put the ball back in the urn and draw again. The color of the ball drawn next determines your additional cash award according to the other lottery you have chosen from A′ and B′. Now, please choose lotteries and draw the balls."

Although the choice between A and B and the choice between A′ and B′ may vary from one person to another, most people have the same choice pattern: A is preferred to B, and B′ is preferred to A′. In this discussion these will be referred to as the typical choices. The underlying intuition may be as follows. While lotteries A and B both have the same possible payoffs of $1 and $0, the chance for each payoff in lottery A is unambiguous but in lottery B is ambiguous. Choosing A over B "feels safer." A similar line of thinking would apply to the choice of B′ over A′.

The Ellsberg Paradox. Daniel Ellsberg (1961) was the economist who first proposed a setup similar to that in the carnival for considering economic choice patterns. He reported casual tests on the choices of some decision scientists and economists, including some founders of orthodox decision theory. Other researchers followed up with variants of his experiment in controlled environments, and it has now been established that the above preferences are indeed a systematic pattern (Colin F. Camerer and Martin Weber 1992).

However, there is a paradox in the above typical choices. Orthodox decision theory (Leonard J. Savage 1954) "converts" ambiguous information into unambiguous information by assuming that a rational person has a unique guess about how many black or yellow balls are among the remaining six balls and makes decisions based on the guess—more balls of a certain color mean a greater chance for its corresponding payoff. If an agent follows this rule, preferring A to B should indicate that the ball combination is guessed to be less than three black balls or, equivalently, more than three yellow balls. However, preferring B′ to A′ indicates a guess that there are fewer than three yellow balls. The typical choices therefore imply more than one unique guess about the ball combination, which is inconsistent with orthodox decision theory (see Table 2).

The essence of the Ellsberg paradox is that traditional decision theory has failed to capture the special characteristic of ambiguous lotteries relative to unambiguous lotteries. An unambiguous lottery is one whose chance for each possible payoff is known, like lottery A, with its one-third chance for a payoff of $1 and two-thirds chance for a payoff of $0, or lottery B′, which has a one-third chance for a payoff of $0 and two-thirds chance for a payoff of $1. In contrast, an ambiguous lottery is one whose exact chance for every possible payoff is not known, like lottery B or lottery A′. The reason for the ambiguity in this case is that the number of black or yellow balls is not known. In general, any information that is less accurate than can be represented by a unique probability distribution is ambiguous.[3]

Orthodox decision theory does not distinguish evaluation techniques for the two types of lotteries but approaches them in practically identical ways by assuming that an agent can always have a unique guess about the underlying chances for the payoffs of an ambiguous lottery. For example, an agent may have the unique guess that there are four black balls and two yellow balls and may make all choices according to this guess. In other words, the traditional techniques have denied that ambiguous lotteries have any economic implications different from those of unambiguous lotteries. It turns out that although such techniques are very successful in capturing people's choices when only unambiguous lotteries are involved, they fail to capture people's evaluation of ambiguous lotteries.

Significance of the Paradox. The resolution of the Ellsberg paradox is important because in theoretical models people's economic decisions are often reduced to evaluating and choosing lotteries. Viewing

Table 1
Choosing among the Lotteries

	Three balls	Six balls	
	Red	Black	Yellow
(Unambiguous) Lottery A	$1	$0	$0
(Ambiguous) Lottery B	$0	$1	$0
(Ambiguous) Lottery A′	$1	$0	$1
(Unambiguous) Lottery B′	$0	$1	$1

Table 2
The Ellsberg Paradox

There is a paradox in the typical choices because . . .

	Three balls	Six balls	
	Red	Black	Yellow
"A is preferred to B" implies a guess such that . . .	3 balls	<3 balls	>3 balls
"B′ is preferred to A′" implies a guess such that . . .	3 balls	>3 balls	<3 balls

. . . but only one guess is allowed for the same setting in the orthodox decision model.

the economic world as a system of correlated uncertain economic variables, assume that behind the system there is an urn that contains colored balls. The outcome of the economic world is determined by the color of the ball randomly drawn out. For example, to feature a system of economic variables that has four possible outcomes—X, Y, Z, and W—with relative chances of 1/10:2/10:3/10:4/10, the urn may contain ten balls, with one ball (white) corresponding to the outcome X, two balls (green) corresponding to Y, three balls (gray) corresponding to Z, and the other four balls (orange) corresponding to W. Given that the economic world can be visualized as an urn containing colored balls, any economic action—a portfolio choice, a production plan, a policy decision, and so forth—whose effect is contingent on the outcome of the economic world is then a lottery determined by the color of the ball randomly drawn.

In many cases ambiguous lotteries are more appropriate than unambiguous lotteries for capturing essential economic realities. More and more evidence suggests that it is inappropriate to blur the difference between unambiguous lotteries and ambiguous lotteries as orthodox decision theory does. Knight (1921) emphasized the economic significance of this difference and pointed out that people's economic behavior when facing uncertainty differs significantly from that when facing risk. This is the case because the uncertainty of an ambiguous lottery is more "uncertain" than the risk of an unambiguous lottery. The former involves one more fold of indeterminateness—not even the chance of each payoff is yet identified. This "one more fold of indeterminateness" in ambiguous lotteries and people's additional cautiousness in evaluating them are missing in the traditional models.

Box 1
Expected Value and Variance of an Unambiguous Lottery

A lottery is represented by its random payoff—say, X. Denote the possible values of X by $(x_1, \ldots, x_n)$ and their corresponding probabilities by $(p_1, \ldots, p_n)$. Its expected value, denoted by $E[X]$, is then

$$E[X] = x_1 p_1 + \ldots + x_n p_n.$$

Its variance, which measures the average deviation of the payoff from its expected value, is

$$VAR[X] = (x_1 - E[X])^2 p_1 + \ldots + (x_n - E[X])^2 p_n.$$

Recent developments in decision theory have laid a foundation for more appropriate techniques for evaluating ambiguous lotteries. One example is the theory by Gilboa and Schmeidler (1989). Evaluation techniques based on such theories have provided a tool for modeling economic situations that involve ambiguous information.[4] The following section reviews traditional decision theory and then investigates ways in which the new developments in decision science capture information ambiguity and Knightian uncertainty, along with their potential applications in financial markets.

*E*valuating a Lottery in the Orthodox Theory

As stated above, orthodox decision theory approaches both lottery types in similar ways based on the assumption that an agent can always have a unique guess about the chances for payoffs of an ambiguous lottery. The following discussion illustrates the evaluation techniques for both types of lotteries.

An Unambiguous Lottery. Consider lottery A in Table 1 as an example. Its evaluation rule is the answer to the following question: How much money (at most) is one willing to pay for this lottery? The (highest) price one is willing to pay for a lottery is called its certainty equivalent. (It may also be defined as the lowest price for which one is willing to sell it. The two definitions are the same.)

One question is whether the certainty equivalent of this lottery is equal to the expected value, which is the sum of the possible payoffs of the lottery, each weighted by its chance of occurring (its probability) (see Box 1). For this lottery, it is

$$\$1(1/3) + \$0(2/3) = \$1/3.$$

This is an intuitively sensible conjecture because the expected value is somehow related to the "average value." If one could play the lottery repeatedly, then the average payoff—the sum of all the payoffs divided by the number of repetitions—would indeed approach the expected value \$1/3, with a very small error. The more one plays, the more likely one is to get a small error. Therefore, a price of \$1/3 would let one "break even on average" in the long run. However, this argument is based on the assumption that lottery A is played repeatedly. What if there is not the chance to repeat? A modified justification is as follows: Although one may not play the same lottery repeatedly, playing many different and independent lotteries may also allow one to "break even on average" if the price for each lottery is set at its expected value (see Box 2).

While this evaluation rule seems sensible, two important points are missing. First, the fluctuation of a lottery's payoff should discount its value because of one's limited ability to incur losses. For example, if not for a limited ability to incur losses, one could get rich by hanging around in Las Vegas with a simple strategy: Start betting an arbitrary amount—say, $100; for the next bet, wager twice (or a million times if one is greedy) as much as was lost previously; and stop as soon as one wins. (Restart the cycle to win even more money.) However, gamblers often go broke because they do not have an unlimited ability to incur losses before they get rich. This premise underlies the "Gambler's Ruin" (Morris H. DeGroot 1987, 82).

Second, and more important to this discussion, is that people dislike uncertain situations because of not only their limited ability to incur losses but also their tendency to prefer sure gains—as the saying goes, "a bird in the hand is worth two in the bush." Suppose you are given the choice between two alternatives: Take $10 million and walk away, or play a lottery similar to lottery A in Table 1—call it A*—for which you could win $30 million for drawing a red ball and $0 for drawing a black or yellow ball. Which option would you prefer? If you are like the majority of people, you prefer the first option, even though the expected value of lottery A* is also $10 million. The price you are willing to pay for lottery A* must therefore be less than $10 million.

In general, the tendency for people to discount a lottery from its expected value is called risk aversion. The problem is how to redefine the certainty equivalent to reflect risk aversion. The potential fluctuation of the payoff of a lottery needs to be incorporated. A natural measure of the fluctuation is the variance of the lottery payoff, which is the average deviation of the payoff from its expected value. For lottery A, the variance is introduced as follows. If the ball drawn is red (with one-third chance that it will be), the actual payoff is $1, and the difference of this payoff from the expected value $1/3 is $1 – $1/3; if black or yellow (with two-thirds chance), the actual payoff is $0 and the difference is $0 – $1/3. When the differences are summed, each term being weighted by its chance, the result is

$$(\$1 - \$1/3)(1/3) + (\$0 - \$1/3)(2/3) = \$0,$$

which is not a good measure of the fluctuation because the positive deviation cancels the negative deviation. To correct this cancellation, sum up the squared differences, each term being weighted by its chance, to get

$$(\$1 - \$1/3)^2(1/3) + (\$0 - \$1/3)^2(2/3) = \$2/9,$$

which is called the variance of lottery A. The bigger the variance, the riskier the lottery is.[5] Given this intuition, one way to model the certainty equivalent of a lottery may be

$$\textit{Certainty Equivalent} = \textit{Expected Value} - C \times \textit{Variance},$$

where C is a positive coefficient. The bigger the coefficient C, the more risk averse the agent is. For example, if the coefficient C is equal to 3/4, the agent will assign a certainty equivalent of $1/6 to lottery A because $1/3 – (3/4)($2/9) = $1/6—that is, he or she thinks lottery A is worth $1/6.

One step remains in completing the evaluation rule. What is the remaining problem? Recall the two lotteries A and A*, both contingent on the result of drawing a ball from the same urn, the only difference being that one has possible payoffs of $1 and $0 and the other has possible payoffs of $30 million and $0. Intuitively, an agent is more risk averse in regard to lottery A* because the payoff is much bigger. Generally speaking, attitudes toward risk change with the wealth

Box 2
Break Even on Average

Consider unambiguous lotteries that are independent of each other. Suppose the random payoff for lottery 1 is X_1, for lottery 2 is X_2, . . . , and for lottery n is X_n. The average of the random payoffs,

$$(X_1 + X_2 + \ldots + X_n)/n,$$

is distributed around the average of their expected values,

$$(E[X_1] + E[X_2] + \ldots + E[X_n])/n,$$

with a small variance,

$$(VAR[X_1] + VAR[X_2] + \ldots + VAR[X_n])/n^2,$$

that is of magnitude $1/n$ and approaching zero as n becomes big.

The average payoff for playing the same lottery n times exhibits the same properties.

Box 3
Evaluating an Unambiguous Lottery with a Utility Function

It is assumed that a payoff gives an agent a certain level of satisfaction, called utility. Mathematically, utility is represented as a function of payoff, called the utility function. Suppose a lottery X has possible payoffs $(x_1, \ldots, x_n)$ with probabilities $(p_1, \ldots, p_n)$ and $U(x)$ is the utility level of an agent when payoff x is received. Then the certainty equivalent of lottery X is a price P such that

$$U(P) = p_1 U(x_1) + \ldots + p_n U(x_n) \equiv E[U(X)],$$

where $E[U(X)]$ is called the expected utility of lottery X. On the basis of its expected utility, a lottery is ranked. In other words, when an agent's action determines which lottery she will have, she chooses an action such that the ensuing lottery yields the highest expected utility.

Two properties are usually attributed to a utility function. One is that it is increasing in payoff—that is to say, a higher payoff gives higher satisfaction, which is a reasonable statement. The other is that a utility function increases at a decreasing rate: for example, $20 million gives more satisfaction than $10 million but not twice as much. This latter property ensures that an agent discounts a lottery from its expected value, which is a generalized representation of risk aversion. Among its many niceties, this representation allows for risk aversion to change with wealth. In the context of this article, the formula for computing the certainty equivalent P of lottery X:

$$P = E[X] - C\,Var[X],$$

is an approximation of the expected utility theory in a special case (Chi-fu Huang and Robert H. Litzenberger 1988, 59-62).

involved. The above evaluation rule is cumbersome in representing such changes because its only free parameter is the coefficient C—that is, because higher risk aversion is represented by a higher value of C, the value of C must be adjusted as an agent's attitude changes with wealth level. If this is the case, C is no longer a constant, which is not a very convenient factor for analysis. This scenario motivates the expected utility theory, which is a natural generalization of the above evaluation rule. Interested readers are referred to Box 3 for a brief illustration of the theory.

An Ambiguous Lottery. Lottery B in Table 1 is an example of an ambiguous lottery. Because all the chances for the payoffs are not known, the techniques developed for unambiguous lotteries are not directly applicable. However, a simple trick bridges the gap: Assume that an agent has a unique guess about the number of black or yellow balls in the urn—one black ball and five yellow balls, for example. Using the techniques for unambiguous lotteries, the agent computes the certainty equivalent on the basis of the ball combination as guessed. With this approach, lottery B is the same as an unambiguous lottery.

There is, of course, one question that must be answered in order to complete such an evaluation rule: What is the relationship between the ball combination as guessed by the agent and the true ball combination in the urn? Current economic theory assumes a blunt answer: They are identical. What, then is the justification for such an assumption?

Answer A: The agent learns through time. As the balls are drawn from the urn again and again, the agent modifies her guess, which gradually approaches the true ball combination. This answer essentially ignores the fact that there are cases in which balls may not have been drawn repetitively before. Consider a new firm, for example, that issues stock to raise capital. One may not have enough information to figure out the chance for each of its possible dividend levels. To determine the price of the stock, one is essentially dealing with an ambiguous lottery. The above argument simply ignores that such cases exist.

Answer B: People who have a "wrong" guessed ball combination in mind will be weeded out by competition from those who happen to have the "correct" guess. Therefore, models with all agents having the "correct" guess in mind represent the essence of the economic world. In reality, the mismatch of the guessed ball combination and the true ball combination will not necessarily lead one to ruin. One possible scenario is that agents with "wrong" guesses may distort market prices to such an extent that agents with "correct" guesses may be intimidated, constrained by financial ability to rectify the distortion or by time limitations on outwaiting the distortion, and the incorrect guessers remain alive and well in the markets. Moreover, the "wrong" guessers may earn higher average return by bearing the additional risk of the price distortion they have created (J. Bradford De Long and others 1990). In other words, the agents with "wrong" guesses—in traditional theory called "irrational" market participants—will not necessarily be weeded out.

In summary, the evaluation rule for an ambiguous lottery in the traditional decision theory consists of two points: (1) A rational agent forms a unique guess of how many balls of each color are in the urn and computes the certainty equivalent of the lottery based on the guess (Savage 1954). (2) The guess is always correct.

Practically speaking, this evaluation rule has denied the need to distinguish an ambiguous lottery from an unambiguous lottery since "the guess is always correct." However, as the Ellsberg paradox demonstrates, the above techniques for evaluating an ambiguous lottery are not consistent with most people's choices. This inconsistency motivates revising the orthodox decision theory.[6]

A New Approach to Evaluating an Ambiguous Lottery

One such revision features Knightian uncertainty and resolves the Ellsberg paradox. From the discussion in the first section, it is clear that any model with a single guessed ball combination will not achieve this goal. Furthermore, it is observed that the ambiguous lotteries, B and A′, are inferior when the other conditions are "comparable" to their respective unambiguous counterparts, A and B′. With this intuition gained from the example of the nine-ball urn, it may be conjectured that an agent has several guessed ball combinations in mind instead of a unique one and uses one of the guessed ball combinations to compute the certainty equivalent of each ambiguous lottery. The choice of the guessed ball combination may vary for different lotteries and reflect the common sense of "playing it safe"—that is, the agent picks a guessed ball combination that provides a conservative evaluation of each lottery.

Gilboa and Schmeidler (1989) have formalized the theory of such a modification (see Box 4). They have proposed a set of rules that a rational agent may have followed in evaluating lotteries, and the rules are equivalent to claiming that an agent has multiple guessed ball combinations in mind and evaluates an ambiguous lottery conservatively: The agent evaluates it according to the "worst" guessed ball combination to get the "lowest certainty equivalent." As risk aversion is the tendency to discount the certainty equivalent of an unambiguous lottery from its expected value because of the indeterminateness of its payoff, the additional discount for an ambiguous lottery in the above evaluation rule is called uncertainty aversion. Without detailed mathematical derivations, the example of the Ellsberg paradox can help provide an intuitive illustration of the theory.

It is plausible to suggest that an agent has seven guessed ball combinations in mind: the first one with no black balls and six yellow balls, the second one with one black ball and five yellow balls, and so on. When making choices, the agent will pick one from among the seven guessed ball combinations and treat it as if it were the true ball combination. Which ball combination is picked for evaluating each of the lotteries A, B, A′, and B′? To be consistent with the behavior of most people, the rule supposes that the agent "plays it safe." That is to say, the agent thinks about the worst scenario and acts as if that were the case (Table 3).

The worst case for lottery B is to be evaluated with the guessed ball combination that has no black balls and six yellow balls. The agent therefore should calculate the certainty equivalent of lottery B with this guessed ball combination. For lottery A, the seven guessed ball combinations give the same certainty equivalent, which is higher than the worst case for B. For this reason, the agent prefers A to B.

The worst scenario for lottery A′ is to be evaluated with the guessed ball combination that has no yellow

Box 4
Expected Utility Theory with Multiple Priors and the Maxmin Rule

Gilboa and Schmeidler (1989) propose a set of rules that a rational agent may have followed in evaluating ambiguous lotteries. Their rules are equivalent to the following claim: The agent has a utility function $U(x)$, where x is the payoff, and multiple subjective probabilities, denoted by $\pi_1, \ldots, \pi_n$, which form a set Π. The certainty equivalent of lottery X is a price P such that

$$U(P) = MIN_{\pi \in \Pi} E[U(X)|\pi].$$

The essence of this evaluation rule is that an agent is conservative when information is ambiguous, which is to say that he or she reacts with uncertainty aversion. When choosing among different lotteries, an agent will pick the one with the maximum certainty equivalent. The choice is determined by the solution of

$$MAX\ MIN_{\pi \in \Pi} E[U(X)|\pi],$$

which is the so-called maxmin rule.

balls and six black balls. This guessed ball combination should be used to compute the certainty equivalent for lottery A′. For lottery B′, the seven possible guessed ball combinations give the same certainty equivalent, which is higher than the worst case for A′. The agent's preference, therefore, is for lottery B′.

This illustration demonstrates how a theory of multiple guessed ball combinations plus the "playing it safe" rule explains the typical choice pattern. As a result, the Ellsberg paradox is resolved.

The next point to be addressed is the relationship between the guessed ball combinations and the true ball combination. It is assumed that, in most economic applications, the guessed ball combinations of a rational agent "match" the true ball combination in the following way: Among the guessed ball combinations, there is one that is identical to the true ball combination. This assumption reflects the idea that a rational agent may not be able to weed out all the incorrect guessed ball combinations when information is ambiguous, but she does not want to miss the true ball combination that serves as the grain of truth buried among the guessed ball combinations. As an example, in the nine-ball urn game, the agent's seven guessed ball combinations include the true ball combination.

The assumption does not require that agents always include all the possible ball combinations in their guesses, as in the above example, nor does it mean that there is no chance that agents miss the true ball combination. Instead, the idea is that in most economic situations, most agents will have a reasonably wide band of guesses that contains the true ball combination, leaving only an insignificant number of agents having too narrow a band of guesses and missing the true ball combination (see Box 5).

The new rule for evaluating an ambiguous lottery is summarized as follows: (1) A rational agent forms multiple guesses about the ball combination, picking the "worst" one to compute the certainty equivalent of the lottery. (2) The set of guessed ball combinations contains the true ball combination.

Table 3
Resolving the Ellsberg Paradox

Evaluating Lotteries with Multiple Guesses

	Red	Black	Yellow
(Unambiguous) Lottery A	3 balls	6 balls	
	$1	$0	
(Ambiguous) Lottery B	3 balls	0 balls	6 balls
	$0	$1	$0
(Ambiguous) Lottery A′	3 balls	6 balls	0 balls
	$1	$0	$1
(Unambiguous) Lottery B′	3 balls	6 balls	
	$0	$1	

With a "safe" guess for each lottery, it follows that A is preferred to B and B′ is preferred to A′.

Some Applications of Information Ambiguity

Economists keep modifying their theories in attempts to better match empirical observations and predict future outcomes. Introducing the idea of information ambiguity is such an example. It will be useful to review some applications of the concept and consider how it aids in the understanding of financial markets.

A financial asset, say, a bond or a stock, is a legal contract that entitles its owner to one of a set of possible payoffs or payoff streams contingent upon the future outcomes of some uncertain factors, such as the state of the economy, the performance of the firm, the overall demands in the financial markets, and so on. As economists compare uncertainties in the economic world to uncertainties in gambling games, a financial asset is likened to a lottery. The models for pricing a financial asset therefore are based on techniques for evaluating a lottery, as discussed above.

An unambiguous lottery models a financial asset whose fundamental value has a known chance for each possible level—that is, each uncertain economic variable contributing to the fundamental value has been repeatedly observed before and its outcomes have exhibited certain frequencies. An ambiguous lottery models a financial asset whose fundamental value is determined by uncertain economic variables that have not been repeatedly observed before. Such economic variables commonly exist given that repetitive observations of an economic variable are feasible only if the variable persists in the economy, and many uncertain variables like political shocks are unique, by nature denying repetitive observations. One example is the opening of the East European market after the Berlin

Box 5
Too Conservative or Not?

One may suspect that an agent is being perhaps overly conservative in choosing the worst among the seven possible ball combinations to evaluate the lotteries. In other words, does the theory proposed by Gilboa and Schmeidler (1989) allow differentiating degrees of uncertainty aversion? The answer is yes.

The theory accommodates differential conservativeness by varying the number of guessed ball combinations. For example, if another agent is less uncertainty averse, he may shrink his guesses to three ball combinations: the first is that there are two black balls and four yellow balls; the second, three black balls and three yellow balls; and the third, four black balls and two yellow balls. This agent's evaluations of the ambiguous lotteries B and A′ will be higher than those of the previous agent. However, the choice pattern of "A is preferred to B and B′ is preferred to A′" is still explained.

One may question whether the agent's three guessed ball combinations include the true ball combination. The answer is, not necessarily. However, the assumption is that the guessed ball combinations do include the true ball combination because in most cases it is reasonable to believe that most people are uncertainty averse to such an extent that their set of guesses is wide enough to cover the true ball combination. That is to say, this assumption represents the essence of most economic situations.

Wall crumbled. Other uncertain factors that appear to persist may in fact have to be viewed differently because of the evolution of environments. For example, as the structure of the financial markets has changed, the monetary policy of the Federal Reserve today may not be treated as the same variable it was fifteen years ago.

Two caveats should be stated. First, as observed earlier, there are several decision theories that differ slightly in their mathematical formulations, but all essentially aim to capture the notion of information ambiguity. For the purposes of this discussion, the application examples presented here are demonstrated using the decision theory of Gilboa and Schmeidler (1989). Any of the others might have served as well.

Second, each of the problems discussed below is a research area in and of itself. There may be other theories that provide alternative or complementary answers to the issues raised. It is not the intent of this paper to survey those areas, however, so the discussion will be limited to an intuitive illustration of plausible explanations based on information ambiguity.

Underpricing of Initial Public Offerings. It is an empirical fact that most assets exhibit higher-than-average return after their initial public offerings. In other words, they are usually underpriced when initially offered (see Roger Ibbotson 1975). This pricing is inconsistent with efficient markets theory, which predicts that any such abnormally low prices would be arbitraged away. Keuk-Ryoul Yoo (1990) explains this puzzle by observing that outside investors usually view a new asset as an ambiguous lottery because they lack knowledge about its historical returns. When they evaluate it, they tend to follow a conservative approach by underpricing it. After the asset is issued, people acquire more information, ambiguity declines, and the price rebounds.

Price Crashes. Any standard finance textbook is likely to include the statement that the price of a financial asset is determined by information about its fundamental value in such a fashion that no price drop is possible without commensurate adverse news (see, for example, Huang and Litzenberger 1988). The price crash of 1987, among other less dramatic ones, has challenged this theory.

Jie Hu (forthcoming) demonstrates the plausibility of price crashes in terms of information ambiguity. Being an ambiguous lottery, an asset can be overvalued when a marketmaker is dealing with more buy orders than sell orders in a bull market, and in turn it can be undervalued when the marketmaker deals with more sell orders than buy orders in a bear market.[7] Deep in a bull market, if trade orders due to liquidity demands fluctuate such that the overall orders switch from net demand to net supply at a point in time, then the asset price will fall from its overvalued level to its undervalued level. Such discontinuous price drops do not necessarily require any bad news as a catalyst and therefore can provide a plausible cause for price crashes.

Volatility of Asset Prices. According to the standard representation of efficient markets theory, the price volatility of a financial asset cannot exceed the volatility of its fundamental value. This observation is not consistent with empirical findings, however (see Stephen F. LeRoy 1989, for example). James Dow and Sergio Ribeiro da Costa Werlang (1992), Larry

Epstein and Tan Wang (1994), and Hu (1993) demonstrate that information ambiguity can cause the excess price volatility.

Consider a marketmaker who executes trade orders with a price schedule with "positive slope." (A bigger buy order is executed at a higher unit price, or, equivalently, a bigger sell order is executed at a lower unit price). The steeper the price schedule, the more sensitive the price is to demand fluctuations, and the more volatile the price is. Information ambiguity increases the slope of the price schedule.

The reason the price schedule is positively sloped is that higher asset value leads to higher demand from better-informed traders and therefore higher overall demand, which warrants a higher price. Because it is fluctuation in the fundamental value that drives the fluctuation of informed traders' demand, it follows that the price volatility should be proportional to the fundamental value volatility. However, when the fundamental value of a financial asset is ambiguous, the marketmaker will "play it safe" by exaggerating his own information disadvantage. The result is a steeper price schedule than might be expected—and a more volatile price.

Trading Caused by Information Release. Traditional theory claims that neither public nor private information causes trading among rational people if they agree on the interpretation of information and the portfolios are balanced before the information has arrived (see Paul Milgrom and Nancy Stokey 1982, for example). However, high trading volume observed around corporate announcement dates contradicts that statement (see William Beaver 1968, 91). Dow, Vicente Madrigal, and Werlang (1990) resolve the problem by considering information ambiguity. They reason that the return on a financial asset may be ambiguous and featured by multiple probabilities. New information may resolve the ambiguity, and when it does so there is portfolio rebalancing among investors.

Conclusion

While risk is the indeterminateness featured by probabilistic information, Knightian uncertainty is the indeterminateness featured by ambiguous information. Information ambiguity exists widely in the economic world, and Knightian uncertainty has profound effects on economic behavior. However, the economics profession has ignored the significance of information ambiguity until very recently. The mathematical representation of information ambiguity is only in its developmental stage, but applying the concept of information ambiguity to analysis has already yielded new and useful insights into many economic phenomena.

Notes

1. The British economist G.L.S. Shakle (1955) developed a theory of choice based on nonprobablistic descriptions of uncertainty. While similar in spirit to Knightian uncertainty, this theory has yet to gain wide acceptance.
2. Others include Bewley (1986), Gilboa (1987), and Schmeidler (1989). No judgment is implied about the relative virtues of the various decision theories. For a survey, see Camerer and Weber (1992).
3. A probability distribution is simply a listing of all possible outcomes of a lottery with their probabilities of occurring.
4. Hart (1974) establishes the conditions necessary for choice theories, such as the ones discussed here, to be consistent with financial market equilibrium.
5. Variance measures the tightness of spread of a probability distribution around its expected value and is used extensively in finance as a measure of risks.
6. For an application of the orthodox theory to the forecasts of corporate earnings made by security analysts, see Ackert and Hunter (forthcoming). For a theoretical explanation of how "irrational" security analysts are able to remain gainfully employed while making inaccurate forecasts of corporate earnings, see Ackert and Hunter (1994).
7. When a marketmaker expects to end up with net sales of an ambiguous asset, she will set the price at the high end for protection. The opposite happens in a bear market.

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Commercial Bank Profits in 1993

W. Scott Frame and Christopher L. Holder

Profitability of commercial banks in the United States reached postwar records in 1993, building on the earnings improvements achieved in 1992. Banks in the Southeast enjoyed a similar performance. These unusually high profits allowed banks to continue to add significantly to their capital positions. The growth in earnings resulted primarily from a decline in loan-loss provisions, which further widened adjusted net interest margins.[1] (Tables 1 and 2 provide interest margin and loan-loss data on the nation's banks for the years 1989 through 1993). This decline was a result of banks' portfolios improving in concert with the U.S. economy as a whole, the disappearance of many problem institutions, and years of charge-offs.[2] Increases in loan growth, net noninterest revenue, and gains from securities sales also boosted the industry's 1993 record net income (see Tables 3-7).

The uncommonly high earnings achieved by U.S. commercial banks during the past two years have been a direct result of a favorable banking climate. Macroeconomic factors and a relatively steep yield curve have provided the best conditions for high profitability in more than a decade. Falling interest rates in 1993, coupled with declining provisions for loan losses, widened banks' interest margins. However, future interest rate increases could reduce earnings.

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Bank Profitability Measures

The two primary profitability ratios, return on assets (ROA) and return on equity (ROE), reflect the large increase in net income (5.75 percent) enjoyed by banks in 1993. (See Tables 8 and 9. A detailed discussion of the various profitability measures and their significance can be found in Box 1.) Banks' ROA increased to 1.23 percent in 1993 from 0.95 percent in 1992, and ROE rose to 15.78 percent from 13.24 percent. The improvement in ROE lagged slightly behind growth in ROA because banks used some of their profits to improve their capital ratios.[3] While banks of all sizes achieved healthy gains, the largest banks (those with assets exceeding $1 billion) made the greatest advances in profitability.

The improvement in banks' adjusted net interest margin from 1992 to 1993 can be attributed primarily to declining loan-loss expenses. Three additional factors led to improvements in net income in 1993: interest expenses fell more than interest revenues; gains from securities sales remained close to historically high levels (although down from 1992); and noninterest revenues continued to grow. (While noninterest expenses remained higher than noninterest revenue, the gap narrowed in 1993.)

Provision for Loan and Lease Losses. Bank credit quality continued to improve rapidly in 1993 as a result of three factors. The first was the sustained U.S. economic expansion. A second factor was the disappearance of many weak institutions through mergers and failures. The number of U.S. commercial banks fell from 12,493 at the end of 1989 to 10,892 as of December 31, 1993, a net loss of 1,601 institutions. The Federal Deposit Insurance Corporation (FDIC) was involved in 660 bank closings and assistance transactions during this four-year period. A third factor that led to improved credit quality in 1993 was that many problem loans had been purged from banks' balance sheets during the previous few years. As the condition of the banking industry has improved, banks have needed to put aside less for future bad loans, leading to increased profits.

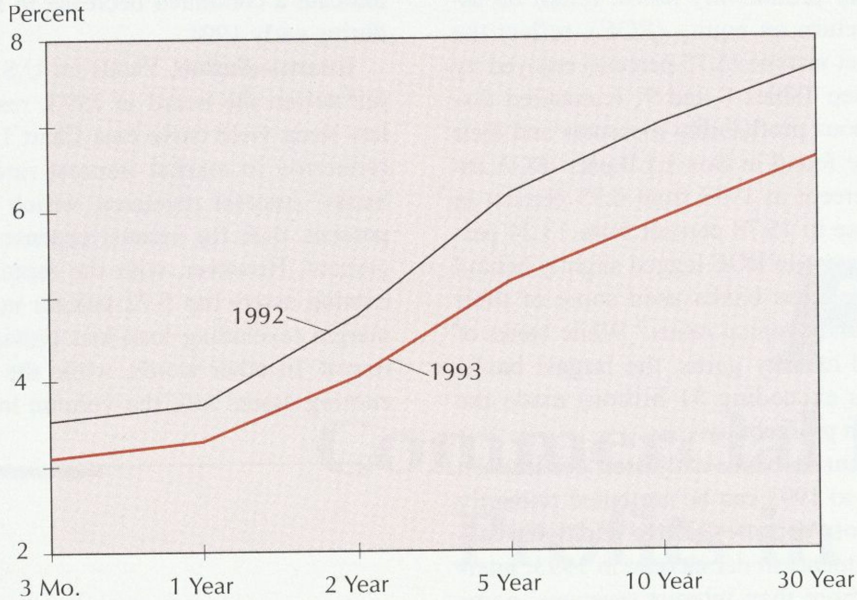
In 1993 total provisions for loan and lease losses declined 36.38 percent from the 1992 level. Table 2 shows that commercial banks' loan-loss provisions as a percentage of interest-earning assets fell to 0.53 percent (from 0.88 percent in 1992 and 1.17 percent in 1991). While the nation's largest banks still set aside the greatest percentage of their assets for loan losses (0.61 percent), they posted the most impressive decline in loan-loss provisions and accounted for the bulk of the 1993 reduction (in dollar terms) of loan-loss expenses. Preliminary figures for the first quarter indicate a continued decrease in loan-loss provisions during early 1994.

Intermediation. Yields for U.S. Treasury securities fell across the board in 1993, resulting in a slightly less steep yield curve (see Chart 1). The effect of this reduction in market interest rates was smaller for banks' interest revenues, which decreased by 3.97 percent, than for interest expenses, which fell 13.17 percent. However, with the rapid growth in interest earning assets (up 5.72 percent in 1993), the interest margin (excluding loan-loss provisions) actually narrowed. In other words, while the margin on interest earning assets fell, the volume increased, adding to 1993 net income (see Tables 1, 3, and 4). The 5.72 percent increase in interest earning assets was the largest in seven years, reflecting the first increase in net loans since 1990. (Commercial bank balance-sheet developments for U.S. and southeastern banks during 1993 are shown in Box 2.)

Profitability of commercial banks in the United States reached postwar records in 1993.

Interest earnings on commercial and industrial loans and interest and dividend income on U.S. Treasury securities and U.S. government agency and corporation obligations declined most in percentage terms.[4] The largest factor in banks' 1993 decline in interest expenses was a reduction of interest paid on deposits (which fell by 23.04 percent from 1992 levels), due to both declining interest rates and a shift by banks toward the use of less costly deposit accounts, such as transaction accounts and money market deposit accounts (MMDAs) (see Table 10). Lower interest rates have reduced the opportunity costs associated with holding cash balances in these types of accounts.

Chart 1
Yield Curve for U.S. Treasuries



Source: *Federal Reserve Bulletin*, Table 1.35; three-month bill adjusted to bond equivalent.

In addition, nonearning compensating balances increased during 1993. Banks responded to a steepening and falling yield curve in 1992 by cutting interest expense (per dollar of assets). Table 4 shows that this trend continued in 1993.

Securities Gains. Banks have dramatically increased their securities holdings in recent years, particularly of U.S. Treasury securities and U.S. government agency and corporate obligations.[5] In 1993 banks continued to take advantage of declining interest rates by selling securities previously acquired at higher rates.[6] However, as Table 5 shows, pretax gains from the sale of securities (per dollar of assets) decreased by one-third from record 1992 levels. Still, gains from securities sales remain near historically high levels and contributed to high earnings in 1993. In addition, banks held large amounts of unrealized capital gains at the end of 1993, which could be used to help profitability in the future.[7] Interest rate increases in early 1994, however, have reduced these unrealized gains, as well as those expected from securities sales this year.

Noninterest Income. Increases in activities generating fee income have been a long-term trend in the banking industry.[8] A more competitive lending environment and information and technology changes have prompted banks to use fee income to replace lower interest revenues. While noninterest expenses continued to be larger in dollar terms than noninterest revenues, banks of all sizes continued to reduce this gap last year. In 1993 banks increased their noninterest revenue an average of 14.28 percent from 1992 levels (see Table 6); gains and fees from assets held in trading accounts (up 107.39 percent), other fee income (up 9.43 percent), and other noninterest income (up 20.42 percent) accounted for most of the gain. The nation's largest banks continue to record the highest levels of noninterest income (2.34 percent of assets in 1993), reflecting the greater array of fee-based products and services they offer. Total noninterest expense rose modestly in 1993, up 6.59 percent over 1992 levels, with the increase evenly divided among several categories (see Table 7).

Capital Improvements

Banks have been adding significant capital to their balance sheets since the late 1980s. Total equity capital at banks rose from $203.7 billion on December 31,

Box 1
Profitability Measures

The three primary measures presented in this article to gauge bank performance are adjusted net interest margin, return on assets, and return on equity. Adjusted net interest margin is simply the difference between a bank's interest income (adjusted for tax-exempt securities earnings and loan-loss provisions) and interest expenses, divided by average interest-earning assets. This measure is similar to a business's gross profit margin except that sales of fee-based services by banks are not included.[1]

Return on assets, or the ratio of net income to average assets, demonstrates how profitably a bank's management is using the firm's assets. In contrast, return on equity, or the ratio of net income to average equity, tells a bank's shareholders how much the institution is earning on the book value of their investments. Analysts looking to compare profitability (while ignoring differences in equity capital ratios) generally focus on ROA, while those wishing to focus on returns to shareholders look at ROE.

The three measures are defined as follows:

Adjusted Net Interest Margin =

$$\frac{\text{Adjusted Interest Revenues} - \text{Interest Expense}}{\text{Average Interest-Earning Assets}}$$

Return on Assets =

$$\frac{\text{Net Income}}{\text{Average Consolidated Assets}}$$

Return on Equity =

$$\frac{\text{Net Income}}{\text{Average Equity Capital}}$$

Average interest-earning assets, consolidated assets, and equity capital are derived by averaging beginning-, middle-, and end-of-year balance-sheet figures.

The bank data used in this article were taken from the federal bank regulators' quarterly Report of Condition and Income (Call Report) for insured domestic commercial banks. The sample consists of all banks that had the same identification number at the beginning and the end of the year. The number of banks in the 1993 sample is 10,892, a 4.20 percent decline from 1992. The number of banks in the six-state region defined as the Southeast was 1,565, a 2.43 percent decline from 1992.

Note

1. Fee-based (noninterest) income is derived from deposit service charges, charges for letters of credit, and other bank-related activities.

1989, to $295.1 billion at the end of 1993, an increase of 44.8 percent over the four-year period. Following the poor performance of U.S. commercial banks in the late 1980s, regulations initiated in the early 1990s have given banks particular incentive to increase their capital positions. New risk-based capital requirements divide assets into risk categories and require holding additional capital against the riskiest assets. In addition, the Federal Deposit Insurance Corporation Improvement Act (FDICIA) gave advantages to highly capitalized banks and specified penalties, including closure, for banks with low capital levels. Creditors and stockholders also have required increased capital as a greater cushion against failure, in light of deposit insurance reform, which has shifted some risk from the government to market participants.

Distribution by Size and Condition

Banks of all sizes and conditions again grew more profitable in 1993, signaling broad strength within the industry. In analyzing 1993 bank profitability, a distribution ranking each bank by ROA (from lowest to highest) was constructed, and banks representing the twenty-fifth, fiftieth, and seventy-fifth percentile were singled out. Comparing these banks' 1993 returns with those achieved in previous years demonstrates the vast improvement by banks of all sizes and conditions (see Tables 11-13).

The least profitable banks, in particular, made tremendous strides, posting a 12.8 percent increase in ROA from 1992 levels. The significant progress by banks in the twenty-fifth percentile indicates the viability of the least profitable institutions and may be primarily attributed to the disappearance of many problem institutions and an improvement in loan portfolios, as reflected by the significant across-the-board declines in loan-loss provisions.

*B*anks in the Southeast

Bank performance in the Southeast generally mirrored or exceeded that of banks nationwide (see Tables 14-28 for data on bank profitability in the Southeast).[9] In 1993 average ROA for all banks in the region rose to 1.26 percent, and average ROE climbed to 15.56 percent. Only Georgia banks posted declines in ROA and ROE in 1993 after leading the region in ROA during 1992. Georgia banks' profitability slid in 1993 primarily because they continued to expense the greatest amount for loan losses. In contrast, Louisiana banks realized large profitability gains in 1993 as ROA and ROE led the region at 1.73 percent and 20.88 percent, respectively. Louisiana's remarkable improvement can be directly attributed to the state's negative loan-loss expense ratio of –0.19 percent, an improving local economy, and the resolution of most problem institutions. (Banks usually reduce current income to add to loan-loss reserves. However, Louisiana banks, on average, entered 1993 with high loan-loss reserves, and many took the unusual step of using excess loan-loss reserves to increase net income.)

Some profitability measures indicate that southeastern banks fared better in 1993, on average, than their peers across the United States.

Some profitability measures indicate that southeastern banks fared comparatively better in 1993, on average, than their peers across the United States. The adjusted net interest margin (as a percentage of interest-earning assets) was higher for banks in the Southeast, at 4.53 percent, than the national average of 4.02 percent. In addition, loan-loss expenses as a percent of assets decreased substantially in the Southeast and remain well below the national average. These figures reflect the continued overall health of the region's banks.

Noninterest revenues and expenses for the smallest and largest southeastern banks differed markedly from comparable 1993 national averages. The Southeast's smallest banks were able to earn considerably more noninterest revenue (as a percent of assets) than their national counterparts primarily because of service charges on deposit accounts and other fee and noninterest income.[10] In contrast, the region's largest institutions generated noninterest revenues well below the national average because they relied less on off-balance-sheet activities (such as foreign exchange transactions and fiduciary activities) and other fee income. All noninterest expense categories were above the national average for the smallest southeastern banks and below the national average for the largest institutions.[11]

The viability of the Southeast's smallest institutions has been questioned in recent years because they had consistently underperformed (as measured by ROA and ROE) banks of similar size in the rest of the nation and larger banks in the region.[12] In 1993, however, ROA for the region's smallest banks rose sharply to 1.06 percent, and ROE climbed to 9.23 percent.[13] The weaker performance of the region's smallest banks has been attributed to the large number of de novo institutions established in recent years (especially in Florida and Georgia) and higher loan losses. Many of the smaller institutions chartered in the past decade have disappeared. Growth, mergers, and failures explain the 44.66 percent decline in the number of small banks in the region since 1989. Florida, which previously had the greatest number of underperforming small banks, saw the largest drop in the number of banks with less than $25 million in assets (63.75 percent since 1989). Of the eighty banks classified as small in 1989, approximately half grew out of the category, eleven were purchased by another institution, and five failed.[14] Also, loan-loss expense (as a percent of assets) for the region's smallest institutions continued to fall, to 0.34 percent. However, this figure remains 47.06 percent above the national average for banks of comparable size. The increased profitability of the region's smaller banks is encouraging, but their performance as the business cycle progresses will indicate how successful the remaining small banks have been in carving out market niches.

Conclusion

Banks of all sizes and conditions had record profitability in 1993's environment of declining interest rates and an improving economy. The favorable conditions that have enabled banks to achieve unusually high profits in 1992 and 1993 contrast sharply with those that prevailed in the past decade. A major decline in loan-loss provisions was the catalyst for an increase in adjusted net interest margins, which led to higher 1993 earnings. Net income in 1993 was also higher because of an increased volume of interest-earning assets, gains from securities sales, and continued growth in noninterest income.

Preliminary figures for the first quarter of 1994 indicate a continued decline in loan-loss provisions (as a percent of assets), leading to even wider adjusted net interest margins. Banks also appear to have maintained profitable spreads on interest earning assets despite the recent rise in interest rates, probably because loan rates have risen faster than rates paid on deposits. However, increased loan demand in 1994 (particularly in the consumer and commercial segments) may soon lead to increased competition by banks for time and savings deposits, putting upward pressure on deposit rates and squeezing margins. Also, 1994's rising interest rate environment may have evaporated a portion of banks' unrealized securities profits. These conditions will make further advancements in commercial bank profitability difficult to achieve in 1994.

Box 2
Balance-Sheet Developments in 1993[1]

During 1993 commercial banks increased their total assets by 5.70 percent (see Tables A and B). The three asset categories that grew most were assets held in trading accounts (up 51.95 percent), securities holdings (up 8.10 percent), and net loans (up 6.07 percent). The increase in net loans is noteworthy because loan growth has been slow recently, averaging only 2.3 percent per year during the previous three years.

On the right-hand side of the balance sheet, banks' liabilities rose 5.14 percent and total equity capital climbed 12.68 percent. Among liabilities, domestic bank deposits—the largest traditional source of bank funds—rose a meager 0.52 percent, with all of the gain coming from growth in non-interest-bearing accounts (interest-bearing accounts fell slightly). Total transaction accounts were up 5.47 percent because of a 5.69 percent jump in demand deposits, and nontransaction accounts were down 1.99 percent. (For a breakdown of deposit classes, see Table 10.) However, other types of liabilities increased, with the categories of borrowed money and other liabilities significantly higher (up 42.80 and 22.65 percent, respectively).[2]

The equity position of commercial banks improved significantly in 1993 as undivided profits and capital reserves shot up 18.35 percent. This increase indicated banks were using their record profits to further enhance capital positions. In addition, net unrealized losses on marketable equity securities fell from $62.3 million on December 31, 1992, to –$2.9 billion at year-end 1993, representing a large unrealized gain.

Notes

1. The discussion on balance-sheet items measures statement changes over the year from December 31, 1992, to December 31, 1993. For a comprehensive discussion of recent balance-sheet developments at commercial banks, see English and Reid (1994).
2. Other borrowed money is made up of the total amount borrowed on a bank's promissory notes, rediscounted notes and bills, loans sold that carry the bank's guarantee, and so forth.

Continued on page 28

Continued from page 27

Table A
Balance Sheet for U.S. Commercial Banks
(Millions of dollars)

	Dec. 31, 1993	Dec. 31, 1992	Percentage Change
Assets			
Cash and balances due from depository institutions			
Non-interest-bearing balances and currency and coin	188,135.2	198,981.8	(5.45)
Interest-bearing balances	83,755.3	97,883.6	(14.43)
Securities	827,937.8	765,911.0	8.10
Federal funds sold	122,794.0	130,714.8	(6.06)
Securities purchased under agreements to resell	27,012.2	26,896.8	0.43
Loans and lease financing receivables			
Loans and leases net of unearned income	2,139,682.2	2,022,088.9	5.82
Less allowance for loan and lease losses	52,380.3	53,968.5	(2.94)
Less allocated transfer risk reserve	172.2	343.0	(49.81)
Loans and leases, net of above items	2,087,129.7	1,967,777.3	6.07
Assets held in trading accounts	122,389.8	80,546.0	51.95
Premises and fixed assets	55,094.2	52,713.0	4.52
Other real estate owned	16,768.4	26,341.8	(36.34)
Investments in unconsolidated subsidiaries and associated companies	3,565.3	3,172.1	12.40
Customers' liability to this bank on acceptances outstanding	13,307.9	16,018.6	(16.92)
Intangible assets	17,892.5	15,413.8	16.08
Other assets	119,107.6	103,700.3	14.86
Total assets	3,684,890.0	3,486,070.8	5.70
Liabilities			
Deposits			
In domestic offices	2,407,838.6	2,395,388.4	0.52
Non-interest-bearing	553,054.1	524,412.6	5.46
Interest-bearing	1,854,784.5	1,870,975.7	(0.87)
In foreign offices, Edge and Agreement subsidiaries, and IBFs	329,906.4	286,736.8	15.06
Non-interest-bearing	15,641.1	13,369.4	16.99
Interest-bearing	314,265.3	273,367.4	14.96
Federal funds purchased	177,037.6	164,071.6	7.90
Securities sold under agreements to repurchase	95,231.0	86,908.4	9.58
Demand notes issued to the U.S. Treasury	34,951.8	22,413.0	55.94
Other borrowed money	186,029.7	130,277.0	42.80
Mortgage indebtedness and obligations under capitalized leases	1,803.4	1,901.2	(5.15)
Bank's liability on acceptances executed and outstanding	13,402.4	16,176.6	(17.15)
Subordinated notes and debentures	37,147.8	33,521.0	10.82
Other liabilities	106,431.0	86,773.8	22.65
Total liabilities	3,389,779.9	3,224,167.8	5.14
Limited-life preferred stock and related surplus	3.7	3.0	21.99

	Dec. 31, 1993	Dec. 31, 1992	Percentage Change
Equity Capital			
Perpetual preferred stock and related surplus	1,491.2	1,574.7	(5.30)
Common stock	32,479.1	31,780.4	2.20
Surplus	126,130.9	116,961.6	7.84
Undivided profits and capital reserves	133,244.0	112,584.2	18.35
Less net unrealized loss on marketable equity securities	(2,890.1)	62.3	(4,737.84)
Cumulative foreign currency translation adjustments	(1,128.8)	(938.6)	20.26
Total equity capital	295,106.6	261,890.0	12.68
Total liabilities, limited-life preferred stock, and equity capital	3,684,890.0	3,486,070.8	5.70

Table B
Balance Sheet for Commercial Banks in the Southeast
(Millions of dollars)

Assets			
Cash and balances due from depository institutions			
Non-interest-bearing balances and currency and coin	22,306.7	23,410.0	(4.71)
Interest-bearing balances	4,600.5	5,895.3	(21.96)
Securities	107,669.8	101,830.8	5.73
Federal funds sold	13,978.5	17,056.9	(18.05)
Securities purchased under agreements to resell	2,326.7	2,219.7	4.82
Loans and lease financing receivables			
Loans and leases net of unearned income	242,699.5	218,047.6	11.31
Less allowance for loan and lease losses	4,770.2	4,535.9	5.17
Less allocated transfer risk reserve	14.4	20.1	(28.36)
Loans and leases, net of above items	237,914.9	213,491.6	11.44
Assets held in trading accounts	1,091.0	1,112.4	(1.92)
Premises and fixed assets	6,999.2	6,673.5	4.88
Other real estate owned	1,568.6	2,573.1	(39.04)
Investments in unconsolidated subsidiaries and associated companies	139.3	133.2	4.58
Customers' liability to this bank on acceptances outstanding	1,177.4	922.8	27.59
Intangible assets	1,776.7	1,516.3	17.17
Other assets	7,156.5	7,266.9	(1.52)
Total assets	408,705.8	384,102.8	6.41
Liabilities			
Deposits			
In domestic offices	323,256.6	313,692.0	3.05
Non-interest-bearing	63,649.8	60,546.8	5.12
Interest-bearing	259,606.8	253,145.2	2.55
In foreign offices, Edge and Agreement subsidiaries, and IBFs	1,945.1	1,114.1	74.59
Non-interest-bearing	19.9	98.4	(79.78)
Interest-bearing	1,925.1	1,015.7	89.53

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	Dec. 31, 1993	Dec. 31, 1992	Percentage Change
Liabilities (continued)			
Federal funds purchased	19,343.4	15,133.9	27.82
Securities sold under agreements to repurchase	13,547.5	12,146.4	11.54
Demand notes issued to the U.S. Treasury	2,277.6	2,104.0	8.25
Other borrowed money	6,612.5	3,747.9	76.43
Mortgage indebtedness and obligations under capitalized leases	112.2	132.4	(15.26)
Bank's liability on acceptances executed and outstanding	1,177.4	922.8	27.59
Subordinated notes and debentures	846.5	627.1	34.99
Other liabilities	5,435.1	4,557.3	19.26
Total liabilities	374,553.9	354,178.0	5.75
Limited-life preferred stock and related surplus	1.8	0.1	1,740.00
Equity Capital			
Perpetual preferred stock and related surplus	199.1	210.4	(5.37)
Common stock	2,441.9	2,503.5	(2.46)
Surplus	15,043.7	13,591.0	10.69
Undivided profits and capital reserves	15,880.7	13,640.8	16.42
Less net unrealized loss on marketable equity securities	(584.6)	21.0	(2,883.81)
Cumulative foreign currency translation adjustments	0	0	0
Total equity capital	34,150.0	29,924.7	14.12
Total liabilities, limited-life preferred stock, and equity capital	408,705.8	384,102.8	6.41

Source: Data for Tables A and B from "Consolidated Reports of Condition for Insured Commercial Banks," 1992-93, filed with each bank's respective regulator.

Table 1
Adjusted Net Interest Margin as a Percentage of Interest-Earning Assets
(Insured commercial banks by consolidated assets)

Year	All Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	3.13	4.22	4.29	4.35	4.37	4.15	2.61
1990	3.06	4.26	4.23	4.23	4.11	3.95	2.59
1991	3.14	4.31	4.29	4.25	4.14	3.65	2.72
1992	3.80	4.64	4.69	4.64	4.50	4.31	3.48
1993	4.02	4.64	4.69	4.61	4.55	4.47	3.80

Source: Figures in all tables have been computed by the Federal Reserve Bank of Atlanta from data in "Consolidated Reports of Condition for Insured Commercial Banks" and "Consolidated Reports of Income for Insured Commercial Banks," 1989-93, filed with each bank's respective regulator.

Table 2
Loan-Loss Expense as a Percentage of Interest-Earning Assets
(Insured commercial banks by consolidated assets)

Year	All Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	1.10	0.59	0.56	0.50	0.58	0.69	1.33
1990	1.11	0.50	0.53	0.53	0.67	1.00	1.30
1991	1.17	0.42	0.47	0.50	0.65	1.09	1.40
1992	0.88	0.39	0.35	0.40	0.54	0.78	1.04
1993	0.53	0.18	0.22	0.26	0.34	0.50	0.61

Table 3
Tax-Equivalent Interest Revenue as a Percentage of Interest-Earning Assets
(Insured commercial banks by consolidated assets)

Year	All Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	11.62	10.71	10.86	10.89	11.14	11.32	11.87
1990	11.26	10.60	10.72	10.71	10.82	11.18	11.44
1991	10.03	9.97	10.06	10.05	10.07	9.94	10.03
1992	8.81	8.94	8.85	8.85	8.76	8.62	8.82
1993	7.94	7.82	7.91	7.84	7.79	7.76	8.00

Table 4
Interest Expense as a Percentage of Interest-Earning Assets
(Insured commercial banks by consolidated assets)

Year	All Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	7.39	5.91	6.01	6.04	6.19	6.48	7.93
1990	7.09	5.85	5.96	5.96	6.03	6.23	7.55
1991	5.72	5.23	5.30	5.30	5.28	5.18	5.92
1992	4.13	3.90	3.81	3.81	3.73	3.53	4.30
1993	3.39	3.00	2.99	2.97	2.90	2.80	3.58

Table 5
Securities Gains (Losses) before Taxes as a Percentage of Total Assets*
(Insured commercial banks by consolidated assets)

Year	All Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	0.02	0.00	0.01	0.01	0.01	0.00	0.03
1990	0.01	0.00	0.00	0.00	0.00	0.01	0.02
1991	0.09	0.05	0.05	0.06	0.07	0.07	0.10
1992	0.12	0.11	0.08	0.09	0.09	0.08	0.13
1993	0.08	0.07	0.06	0.06	0.06	0.07	0.09

* *0.00 indicates securities gains (losses) that are less than 0.01 percent of total assets.*

Table 6
Noninterest Income as a Percentage of Total Assets
(Insured commercial banks by consolidated assets)

Year	All Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	1.52	1.08	0.78	0.86	0.97	1.15	1.76
1990	1.63	1.08	0.82	0.83	0.93	1.30	1.91
1991	1.73	1.03	0.84	0.88	1.05	1.29	2.02
1992	1.88	1.23	0.86	0.90	1.14	1.31	2.20
1993	2.02	1.21	1.02	0.93	1.24	1.39	2.34

Table 7
Total Noninterest Expense as a Percentage of Total Assets
(Insured commercial banks by consolidated assets)

Year	All Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	3.39	3.87	3.41	3.31	3.40	3.36	3.39
1990	3.50	3.93	3.46	3.32	3.34	3.56	3.53
1991	3.73	3.95	3.56	3.40	3.49	3.63	3.82
1992	3.91	4.06	3.57	3.44	3.61	3.73	4.03
1993	3.95	3.94	3.64	3.45	3.68	3.80	4.06

Table 8
Percentage Return on Assets
(Insured commercial banks by consolidated assets)

Year	All Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	0.50	0.59	0.73	0.88	0.92	0.89	0.35
1990	0.49	0.58	0.67	0.79	0.78	0.76	0.38
1991	0.54	0.62	0.72	0.83	0.83	0.54	0.44
1992	0.95	0.93	1.02	1.08	1.05	0.94	0.92
1993	1.23	1.09	1.16	1.17	1.20	1.14	1.25

Table 9
Percentage Return on Equity
(Insured commercial banks by consolidated assets)

Year	All Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	7.90	6.10	8.12	10.11	11.93	12.78	6.17
1990	7.64	5.85	7.43	9.01	9.95	10.25	6.68
1991	8.05	6.24	7.86	9.40	10.51	7.50	7.35
1992	13.24	9.25	10.82	11.93	12.61	12.52	13.86
1993	15.78	10.38	11.82	12.40	13.77	14.06	16.98

Table 10
Deposit Classes as a Percentage of Total Domestic Deposits
(Insured commercial banks)

Year	Transactions Accounts	MMDAs	Other Savings	Time Deposits less than $100,000	Time Deposits more than $100,000
1989	30.6	16.2	8.8	27.6	16.7
1990	29.5	16.3	8.6	29.7	15.8
1991	29.4	17.1	9.5	30.7	13.3
1992	31.6	18.7	11.3	28.3	10.2
1993	35.3	19.0	13.0	24.4	8.3

Table 11
Percentage Return on Assets
25th Percentile According to Profitability
(Insured commercial banks by consolidated assets)

Year	All Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	0.58	0.37	0.58	0.70	0.77	0.64	0.50
1990	0.51	0.34	0.52	0.62	0.64	0.48	0.10
1991	0.56	0.45	0.56	0.67	0.64	0.52	0.21
1992	0.78	0.67	0.80	0.86	0.85	0.74	0.62
1993	0.88	0.71	0.88	0.94	0.96	0.92	0.94

Table 12
Percentage Return on Assets
50th Percentile According to Profitability
(Insured commercial banks by consolidated assets)

Year	All Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	0.98	0.84	0.98	1.04	1.07	1.06	0.96
1990	0.92	0.82	0.92	0.98	1.01	0.99	0.74
1991	0.95	0.86	0.94	1.00	1.01	0.94	0.81
1992	1.13	1.02	1.14	1.18	1.19	1.10	1.02
1993	1.19	1.04	1.18	1.23	1.26	1.24	1.24

Table 13
Percentage Return on Assets
75th Percentile According to Profitability
(Insured commercial banks by consolidated assets)

Year	All Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	1.29	1.20	1.28	1.34	1.36	1.30	1.20
1990	1.23	1.15	1.23	1.26	1.28	1.30	1.12
1991	1.24	1.18	1.24	1.27	1.28	1.25	1.16
1992	1.43	1.34	1.44	1.48	1.46	1.37	1.33
1993	1.50	1.38	1.49	1.52	1.56	1.51	1.55

Table 14
Adjusted Net Interest Margin as a Percentage of Interest-Earning Assets
(Insured commercial banks in the Southeast by consolidated assets)

Year	All SE Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	3.91	4.16	4.34	4.29	4.32	3.59	3.71
1990	3.56	4.13	4.29	4.11	4.17	4.07	3.15
1991	3.78	4.04	4.18	4.18	4.20	3.89	3.53
1992	4.45	4.58	4.73	4.69	4.56	4.50	4.34
1993	4.53	4.80	4.81	4.75	4.64	4.53	4.45

Table 15
Loan-Loss Expense as a Percentage of Interest-Earning Assets
(Insured commercial banks in the Southeast by consolidated assets)

Year	All SE Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	0.79	0.85	0.63	0.53	0.60	0.95	0.88
1990	1.07	0.80	0.59	0.69	0.65	1.05	1.30
1991	0.90	0.67	0.63	0.65	0.63	0.76	1.07
1992	0.59	0.66	0.46	0.50	0.51	0.55	0.65
1993	0.32	0.34	0.34	0.28	0.30	0.41	0.31

Table 16
Tax-Equivalent Interest Revenue as a Percentage of Interest-Earning Assets
(Insured commercial banks in the Southeast by consolidated assets)

Year	All SE Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	11.18	11.24	11.31	11.14	11.11	11.08	11.20
1990	10.90	11.00	11.09	10.97	10.88	11.46	10.82
1991	9.91	10.16	10.33	10.25	10.10	9.86	9.75
1992	8.57	9.20	9.08	9.00	8.70	8.46	8.42
1993	7.61	8.20	8.16	8.05	7.80	7.40	7.46

Table 17

Interest Expense as a Percentage of Interest-Earning Assets

(Insured commercial banks in the Southeast by consolidated assets)

Year	All SE Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	6.48	6.23	6.34	6.32	6.19	6.53	6.62
1990	6.28	6.07	6.21	6.17	6.07	6.34	6.36
1991	5.23	5.45	5.52	5.42	5.27	5.22	5.16
1992	3.53	3.96	3.89	3.81	3.62	3.41	3.43
1993	2.76	3.05	3.01	3.01	2.87	2.48	2.70

Table 18

Securities Gains (Losses) before Taxes as a Percentage of Total Assets*

(Insured commercial banks in the Southeast by consolidated assets)

Year	All SE Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	0.02	0.00	0.01	0.01	0.00	0.00	0.04
1990	0.02	0.00	0.00	(0.01)	(0.01)	0.01	0.04
1991	0.11	0.09	0.07	0.05	0.06	0.04	0.14
1992	0.09	0.09	0.10	0.08	0.08	0.03	0.09
1993	0.04	0.07	0.08	0.07	0.05	0.09	0.02

** 0.00 indicates securities gains (losses) that are less than 0.01 percent of total assets.*

Table 19

Noninterest Income as a Percentage of Total Assets

(Insured commercial banks in the Southeast by consolidated assets)

Year	All SE Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	1.17	1.54	0.85	1.05	1.06	1.35	1.23
1990	1.26	1.23	0.91	1.06	1.08	1.12	1.39
1991	1.35	1.67	0.90	1.15	1.17	1.19	1.48
1992	1.42	1.83	0.95	1.00	1.15	1.21	1.62
1993	1.45	2.44	1.42	0.91	1.26	1.21	1.60

Table 20
Total Noninterest Expense as a Percentage of Total Assets
(Insured commercial banks in the Southeast by consolidated assets)

Year	All SE Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	3.48	4.72	3.64	3.46	3.51	3.62	3.41
1990	3.54	4.54	3.69	3.60	3.45	3.71	3.49
1991	3.72	4.97	3.75	3.72	3.58	3.60	3.74
1992	3.82	4.82	3.82	3.63	3.57	3.71	3.92
1993	3.68	5.25	4.21	3.52	3.64	3.57	3.68

Table 21
Percentage Return on Assets
(Insured commercial banks in the Southeast by consolidated assets)

Year	All SE Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	0.68	0.20	0.64	0.89	0.87	0.55	0.62
1990	0.52	0.03	0.60	0.64	0.82	0.65	0.41
1991	0.66	0.14	0.58	0.75	0.88	0.67	0.60
1992	1.05	0.73	0.98	1.06	1.13	0.97	1.05
1993	1.26	1.06	1.17	1.23	1.30	1.23	1.27

Table 22
Percentage Return on Equity
(Insured commercial banks in the Southeast by consolidated assets)

Year	All SE Banks	$0-$25 million	$25-$50 million	$50-$100 million	$100-$500 million	$500 million-$1 billion	$1 billion+
1989	9.50	1.69	6.63	9.97	11.05	8.29	9.71
1990	7.14	0.13	6.33	7.22	10.34	7.65	6.28
1991	8.96	1.26	6.08	8.39	11.10	9.70	8.79
1992	13.72	6.52	10.00	11.79	13.76	13.10	14.73
1993	15.56	9.23	11.49	13.17	15.00	15.43	16.62

Table 23
Adjusted Net Interest Margin as a Percentage of Interest-Earning Assets
(Insured commercial banks in the Southeast by state)

Year	All SE Banks	Alabama	Florida	Georgia	Louisiana	Mississippi	Tennessee
1989	3.91	4.14	3.83	4.71	2.87	3.95	3.64
1990	3.56	4.11	3.18	4.30	3.08	3.84	3.33
1991	3.78	4.20	3.51	4.18	3.08	4.21	3.91
1992	4.45	4.59	4.42	4.47	4.51	4.55	4.26
1993	4.53	4.50	4.52	4.31	5.14	4.61	4.44

Table 24
Loan-Loss Expense as a Percentage of Interest-Earning Assets
(Insured commercial banks in the Southeast by state)

Year	All SE Banks	Alabama	Florida	Georgia	Louisiana	Mississippi	Tennessee
1989	0.79	0.42	0.78	0.58	1.48	0.51	0.95
1990	1.06	0.47	1.22	1.00	1.23	0.62	1.34
1991	0.90	0.55	1.03	0.96	1.11	0.49	0.78
1992	0.59	0.50	0.59	0.75	0.51	0.48	0.57
1993	0.32	0.32	0.36	0.57	−0.19	0.29	0.19

Table 25
Tax-Equivalent Interest Revenue as a Percentage of Interest-Earning Assets
(Insured commercial banks in the Southeast by state)

Year	All SE Banks	Alabama	Florida	Georgia	Louisiana	Mississippi	Tennessee
1989	11.18	11.17	10.96	11.90	10.71	10.91	11.22
1990	10.90	10.84	10.66	11.47	10.56	10.67	11.24
1991	9.91	10.04	9.68	10.48	9.33	9.98	9.98
1992	8.57	8.75	8.44	8.91	8.28	8.70	8.42
1993	7.61	7.84	7.45	7.81	7.42	7.82	7.55

Table 26
Interest Expense as a Percentage of Interest-Earning Assets
(Insured commercial banks in the Southeast by state)

Year	All SE Banks	Alabama	Florida	Georgia	Louisiana	Mississippi	Tennessee
1989	6.48	6.62	6.35	6.61	6.42	6.44	6.63
1990	6.28	6.25	6.27	6.16	6.24	6.21	6.57
1991	5.23	5.29	5.15	5.34	5.14	5.28	5.28
1992	3.53	3.66	3.42	3.69	3.26	3.66	3.59
1993	2.76	3.02	2.58	2.92	2.47	2.92	2.91

Table 27
Percentage Return on Assets
(Insured commercial banks in the Southeast by state)

Year	All SE Banks	Alabama	Florida	Georgia	Louisiana	Mississippi	Tennessee
1989	0.68	1.01	0.61	1.10	−0.13	0.79	0.61
1990	0.52	1.02	0.28	0.89	0.18	0.72	0.42
1991	0.66	1.02	0.48	0.87	0.22	0.91	0.77
1992	1.05	1.24	0.86	1.26	1.13	1.11	1.03
1993	1.26	1.36	1.15	1.19	1.73	1.27	1.26

Table 28
Percentage Return on Equity
(Insured commercial banks in the Southeast by state)

Year	All SE Banks	Alabama	Florida	Georgia	Louisiana	Mississippi	Tennessee
1989	9.50	12.53	9.53	14.38	−1.89	9.95	8.29
1990	7.14	12.99	4.16	10.87	2.73	9.27	5.75
1991	8.96	13.29	7.12	9.99	3.35	11.77	10.63
1992	13.72	15.83	12.12	14.08	15.73	13.77	13.83
1993	15.56	16.58	15.41	13.05	20.88	14.97	15.76

Notes

1. A loan-loss provision is a noncash expense item charged against a bank's earnings; it is used to increase the reserves a bank has set aside for future bad loans. An increase in loan-loss provisions decreases net income and therefore decreases the amount available for banks to add to capital as retained earnings. For a discussion of banks' loan-loss accounting, see Wall (1988, 39-41). Adjusted net interest margin is calculated by subtracting interest expense from tax-adjusted interest revenue (net of loan-loss provisions) and dividing by net interest-earning assets and is roughly equivalent to a business's gross profit margin. For this calculation, interest revenue from tax-exempt securities is adjusted upward by the bank's marginal tax rate to avoid penalizing institutions that hold substantial state and local securities portfolios, which earn less interest but reduce tax burdens.

   It should be noted that there are restrictions on which securities qualify for tax-exempt status for particular institutions. Because a profit-maximizing institution would not invest in a tax-exempt bond if it were not eligible for the tax benefits provided by these securities' lower yield, it was assumed in adjusting tax-exempt securities income that a bank could claim the exemption on all of its tax-exempt securities holdings. In addition, loan-loss provisions are subtracted from interest revenue to place banks that make lower-risk loans at lower interest rates on a more equal footing with banks that make higher-risk loans at higher rates.
2. Both noncurrent loans and inventories of foreclosed properties at commercial banks declined in every quarter of 1993.
3. In connection with safety and soundness concerns, this increase in capital is beneficial because it provides a thicker cushion for banks against future losses. However, higher capital ratios decrease the cost competitiveness of banks with respect to nonbank financial institutions because capital requires a higher rate of return than lower-cost deposits.
4. From 1992 to 1993, net loans outstanding at insured commercial banks increased by 6.07 percent. Because revenue is dependent on both price and quantity, this increase in loans, coupled with a decrease in loan earnings, implies that the average rate banks earned on their interest-bearing assets in 1993 was lower. Since the volume of both commercial and industrial loans and government securities was up, rates earned on these assets also averaged lower in 1993.
5. There is disagreement about the causes of this increase in securities holdings. For a discussion see Keeton (1994).
6. Capital gains occur when security prices rise above the price paid for the security. On debt securities, capital gains occur in a falling rate environment because, as interest rates fall, the value of fixed interest payments rise, and therefore prices are bid up. Such a falling rate environment existed for several years prior to 1994.
7. Banks had a net unrealized gain on marketable equity securities of approximately $2.9 billion as of December 31, 1993, representing 0.35 percent of their total securities portfolio.
8. As an example, banks have drastically increased the amount of mortgage loans packaged and sold in the secondary market (mortgage-backed securities). Mortgage-backed securities allow banks to earn fee income from loan originations and servicing fees while insulating themselves from interest rate fluctuations. In effect, banks are transferring the interest rate risk to market participants who are willing to hold such risk.
9. For the purposes of this article, the Southeast is defined as Alabama, Florida, Georgia, Louisiana, Mississippi, and Tennessee. The Sixth Federal Reserve District comprises these six states less portions of Louisiana, Mississippi, and Tennessee.
10. Other fee income describes revenues from a variety of activities including safe deposit boxes, credit insurance, loan servicing, the purchase and sale of securities, and credit cards. Other noninterest income includes revenues from performing data processing for second parties and various types of asset disposal.
11. Noninterest expenses are composed of three categories: salaries and employee benefits, expenses of premises and fixed assets, and other noninterest expenses.
12. For a complete discussion see Goudreau and King (1991).
13. King (1993) also noted the vast improvement in the region's smallest institutions (those under $25 million in assets) in 1992.
14. The 1993 sample of small Florida banks includes those that have remained in this category since 1989 plus any de novo institutions established since that time.

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