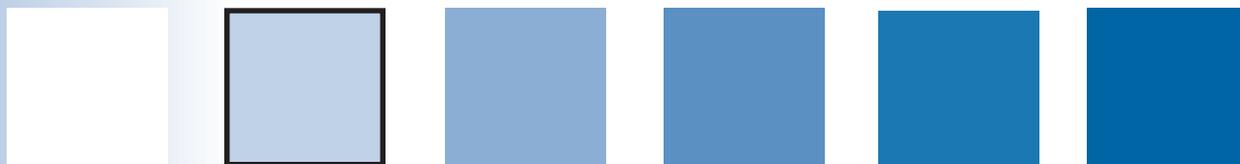


Federal Reserve Bank of St. Louis

REVIEW

MARCH/APRIL 2005

VOLUME 87, NUMBER 2, PART 1



**Communication, Transparency, Accountability:
Monetary Policy in the Twenty-First Century**

Otmar Issing

GSE Risks

William Poole

The FOMC: Preferences, Voting, and Consensus

Ellen E. Meade

**Social Security versus Private Retirement Accounts:
A Historical Analysis**

Thomas A. Garrett and Russell M. Rhine

Does Consumer Sentiment Predict Regional Consumption?

*Thomas A. Garrett, Rubén Hernández-Murillo,
and Michael T. Owyang*

Review is published six times per year by the Research Division of the Federal Reserve Bank of St. Louis and may be accessed through our web site: research.stlouisfed.org/publications/review. All non-proprietary and nonconfidential data and programs for the articles written by Federal Reserve Bank of St. Louis staff and published in *Review* also are available to our readers on this web site. These data and programs are also available through Inter-university Consortium for Political and Social Research (ICPSR) via their FTP site: www.icpsr.umich.edu/prs/index.html. Or contact the ICPSR at P.O. Box 1248, Ann Arbor, MI 48106-1248; 734-647-5000; netmail@icpsr.umich.edu.

Single-copy subscriptions are available free of charge. Send requests to: Federal Reserve Bank of St. Louis, Public Affairs Department, P.O. Box 442, St. Louis, MO 63166-0442, or call (314) 444-8808 or 8809.

General data can be obtained through FRED (Federal Reserve Economic Data), a database providing U.S. economic and financial data and regional data for the Eighth Federal Reserve District. You may access FRED through our web site: research.stlouisfed.org/fred.

Articles may be reprinted, reproduced, published, distributed, displayed, and transmitted in their entirety if copyright notice, author name(s), and full citation are included. Please send a copy of any reprinted, published, or displayed materials to George Fortier, Research Division, Federal Reserve Bank of St. Louis, P.O. Box 442, St. Louis, MO 63166-0442; george.e.fortier@stls.frb.org. Please note: Abstracts, synopses, and other derivative works may be made only with prior written permission of the Federal Reserve Bank of St. Louis. Please contact the Research Division at the above address to request permission.

© 2005, Federal Reserve Bank of St. Louis.

ISSN 0014-9187



Communication, Transparency, Accountability: Monetary Policy in the Twenty-First Century

Otmar Issing

This article is a revised English translation of the Thünen Lecture, given at the Annual Congress of the Verein für Socialpolitik, September 29, 2004, in Dresden, Germany.

Federal Reserve Bank of St. Louis *Review*, March/April 2005, 87(2, Part 1), pp. 65-83.

COMMUNICATION: PAST AND PRESENT

How do agents deal with new information that may be of relevance to others? How do they convey their knowledge to the public? And what are the effects of such communication? Two very different historical examples illustrate the persistent relevance of this question.

In 67 BC, as piracy posed an ever greater threat to the supply of grain, the Roman authorities assigned command of a huge naval force to Gnaeus Pompeius, who then rid the Mediterranean of pirates within 40 days (see Issing, 1985). One year later, in his first political speech, Marcus Tullius Cicero asserted that the mere announcement of Pompeius's nomination for that mission had sent the price of grain in Rome plummeting on the same day.

In 1860, Lady Wilberforce, wife of the Bishop of Worcester, learned of Charles Darwin's new theory. She is said to have exclaimed: "Descended from the apes! Us! How awful! Let us hope that it is not true, but if it is, let us pray that it will not become generally known!"

In the first case, the mere announcement of the measure had the desired effect, fully in line with rational expectations theory. The second scenario highlights the intention to essentially ignore unwelcome information, or at least keep it in check.

In present times, as in the past, the role of information can hardly be overestimated. In our age of new media technology, the increase in the speed, scope, and volume of communication has been dramatic. These days, no significant institution—be it public or private, be it a central bank or a sports club—can survive without a press office. Media advisers are ubiquitous: They thrive on the belief that, if need be, even poor results can be given a positive spin, while incontestable successes will fail to have the desired effect if not communicated in the right way.

Since their beginning, churches have been especially aware of the importance of communication; and at the start of a new religion, the main aim is often to spread the gospel by word and deed, by sermon and miracle.¹ Do something good and talk about it. Be transparent—but only about the good deed?—and be accountable for your actions.

In the language of economists, such maxims quickly translate into complicated formulae and complex models. This should come as no surprise to anyone, as behind nearly every simple wisdom there lies an intricate web of complex relations.

This paper starts off with some general remarks and then moves on to discuss questions

¹ "And the gospel must first be published among all nations" (Mark 13:10, *King James Version*).

Otmar Issing is a member of the Executive Board of the European Central Bank (ECB). The author thanks Philipp Hildebrand and Manfred J.M. Neumann, as well as Klaus Adam, Klaus Masuch, Wolfgang Modery, Wolfgang Schill, and Bernhard Winkler, for their valuable help and Philippine Cour-Thimann and Wolfgang Modery for the compilation of both tables. The author also benefited crucially from discussions with Mervyn King on these issues.

© 2005, The Federal Reserve Bank of St. Louis.

of communication policy and transparency in relation to a central bank. To what extent does a central bank have to be transparent to fulfill the accountability requirements of a democracy? What is the impact of communication and transparency on monetary policy efficiency and, hence, on monetary policy objectives? Finally, what are the implications for the communication policy of the European Central Bank?

THE MIRAGE OF UNLIMITED TRANSPARENCY

Today, there is a general consensus among central bankers that transparency is not only an obligation for a public entity, but also a real benefit to the institution and its policies. For a long time, however, central banks followed quite a different tradition. Sometimes unwittingly, sometimes quite deliberately—and very much in keeping with the prevailing zeitgeist—they evinced an air of discretion, to put it mildly. In the words of a later scathing critic,

Central Banking [has been] traditionally surrounded by a peculiar and protective political mystique. The political mystique of Central Banking was, and still is to some extent, widely expressed by an essentially metaphysical approach to monetary affairs and monetary policy-making...The mystique thrives on a pervasive impression that Central Banking is an esoteric art. Access to this art and its proper execution is confined to the initiated elite. The esoteric nature of the art is moreover revealed by an inherent impossibility to articulate its insights in explicit and intelligible words and sentences. Communication with the uninitiated breaks down. (Brunner, 1981)

There was a time when the Bank of England could almost be classified as the epitome of reticence vis-à-vis the public, and it was for this reason that back in 1928 it was subject to increasing criticism (King, 2004). The Deputy Governor at the time, Sir Ernest Harvey, defended the Bank's posi-

tion before the Macmillan Committee (Committee on Finance and Industry, 1931, p. 27-31):

Committee member Gregory: "I should like to ask you, Sir Ernest, whether you have ever considered the possibility of the Bank issuing an Annual Report on the lines of the Annual Report of the Federal Reserve Board, for instance?"

Deputy Governor Harvey: "I confess I am sometimes nervous at the thought of publication unless it is historical. The question is whether, when it is merely historical it is of any particular value, or whether from the fact that it is issued from the central bank undue importance may be attributed to certain things that are stated, more importance than perhaps they merit..."

Committee member Keynes: "Arising from Professor Gregory's questions, is it a practice of the Bank of England never to explain what its policy is?"

Harvey: "Well, I think it has been our practice to leave our actions to explain our policy."

Keynes: "Or the reasons for its policy?"

Harvey: "It is a dangerous thing to start to give reasons."

Keynes: "Or to defend itself against criticism?"

Harvey: "As regards criticism, I am afraid, though the Committee may not all agree, we do not admit there is need for defence; to defend ourselves is somewhat akin to a lady starting to defend her virtue."

Imagine a central banker or representative of whatever institution trying to use this kind of argument today! Society demands transparency from public institutions, with the result that laws and even constitutions include appropriate provisions.² In the extreme, transparency means that

² See Article I-46 and Article I-49 of the draft version of the "Treaty establishing a Constitution for Europe." Almost 60 countries have legislation on the freedom of information, determining which information is to be made generally accessible by public institutions. Similar legislative proposals are being discussed in 40 additional countries.

absolutely any information available should be published. Any selection of information, any retention of knowledge, would constitute a violation of the principle of transparency and would thus breach the requirement to be accountable to the public.

Particularly in the case of institutions that are granted the legal status of independence, the demands for unlimited, absolute transparency as a necessary counterpart of independence arise almost inevitably. Furthermore, does additional information not in any case have a welfare-enhancing effect? Disregarding the costs of procuring and processing information, does more information not increase the expected utility of decisionmakers (Blackwell, 1953)? Thus, a central bank should be well advised and even be legally obliged to publish all internal documents and data, in particular those that are instrumental in its monetary policy decisions and relate to its status of independence. Such obligations of accountability would then also encompass information regarding the decisionmaking process itself, any differences of opinion, consensus agreements, a majority voting behavior, etc.

Like any other public institution, a central bank in a democratic society must fulfill certain transparency requirements vis-à-vis its citizens. Like any other institution? Just as an aside: Does the call for the publication of minutes also extend to government cabinet meetings or proceedings in the courts of justice? Why not?

Back to central banks and monetary policy: If communication and transparency requirements are understood in this legal and political sense, the extent to which information is transmitted would be determined solely by the level of demand on the part of the public. The central bank would have no justification to limit its supply.

Pursuing this train of thought further, one could easily imagine regular live broadcasts of the meetings of central bank decisionmaking bodies. One could, of course, object that in this case discussions and straw votes would then simply be moved outside public meetings. However, if one accepts the postulate of absolute transparency, then the issue here is simply one of enforceability of a legal obligation.

The further one pushes this postulate of unlimited disclosure of information to its logical conclusion, the more questions and objections arise. Can the television broadcast alone provide all the relevant information about the decision-making process? Does one not also need to know *why* one member voted one way and why another member voted the other way? Is it perhaps due to differences in the underlying economic philosophies—a Keynesian as opposed to a monetarist approach? Or maybe it is simply due to different levels of preparation for the meeting? Would there then not also be a need to televise the preparatory meetings of the policymakers with their staff? And likewise the preparations for these preparatory meetings? Where would the cutoff point be?

The quest for absolute, unlimited transparency about the decisionmaking process thus quickly runs into practical difficulties. By contrast, the case for publishing facts and figures seems to be a fairly straightforward one—or at least at first glance. But, even here, transparency can hardly be tantamount to an obligation to publish everything immediately. What stands in the way of such an approach is the sheer volume of information that would be unleashed, running the risk of blocking the communication channel and overwhelming recipients.³ A strict interpretation of a comprehensive notion of the requirement for disclosure could indeed allow an agent—and this is not just a hypothetical consideration—to use communication to deliberately orchestrate an information overflow in order to act essentially unobserved behind a veil of staged confusion. Mind you, we are talking here only about an overflow of correct information.

The data frequently represent a wide spectrum of conditions, such as how timely they are and how susceptible they are to revision—as well as the frequency and timeliness of those revisions. Moreover, data are often not self-explanatory, as their information content changes depending on the way they are communicated by the sender. For this reason, even if a central bank wanted to, it would not be able to avoid the need to select information, qualify it, and comment on it. This

³ Cf. Shannon's (1948) mathematical theory of communication and its application to macroeconomic and monetary policy issues in Sims (2003) and Adam (2004).

requirement, however, does not free it from its obligation to render this process as transparent as possible (see, e.g., ECB, 2004).

It is not my aim here to make a caricature of the call for transparency in order to justify an arbitrary limitation of information. In a democracy, public institutions are not only obliged to be accountable for their actions, they must also be transparent in their behavior. This applies not least to a central bank that has been granted extensive legal independence and which therefore is not even indirectly subject to electoral accountability. However, any meaningful discussion on the requirement for transparency cannot ignore the question of what this implies in practice.

Demands for absolute, unlimited transparency are met with instinctive approval, and any doubts raised about it are met with emotional resistance. We must therefore explain very carefully why the requirement for absolute, unlimited transparency carries with it insurmountable limits in both theory and practice. Once an agreement on this conclusion has been reached, it becomes clear that the transparency principle requires considerable interpretation.

TRANSPARENCY AND EFFICIENCY IN MONETARY POLICY

A famous legal case provides a good illustration of the issues involved. In March 1975, a student at the Georgetown University Law Center, David R. Merrill, filed an action against the Federal Reserve's Federal Open Market Committee (FOMC) under the 1966 Freedom of Information Act to request that it should publish the policy directive and minutes directly after every meeting (see Goodfriend, 1986). Following a judgment from the District Court in favor of the plaintiff and its confirmation by the Court of Appeal, the case was finally referred to the United States Supreme Court. In the end, the Supreme Court decreed that the FOMC should be bound by an immediate publication obligation unless it "would significantly harm the Government's monetary functions or commercial interests." (The reference to "commercial interests" is based on the FOMC's

argument that the Treasury would face significantly higher borrowing costs.)

Consequently, the FOMC had to base its case for nonpublication primarily on arguments from monetary and financial theory, which is exactly what Fed representatives tried to do in their statements. In June 1981, the District Court, to which the case had been redirected, ruled in favor of the FOMC. Even though the Fed's arguments at the time did not appear to be completely convincing (Poole, 2003), the Court's decision—perhaps surprisingly—was nevertheless in line with some findings in information theory that show that, in a social context, additional information can actually be detrimental (Hirshleifer, 1971, 1975; Morris and Shin, 2002). Even if more information increases the expected utility of the individual (Blackwell, 1953), this does not necessarily improve outcomes for society as a whole.

To the judge it was "apparent, however, upon reviewing the affidavits that the dispute among the experts in this case [was] not one over facts in any objective sense, but rather [was] a dispute over economic theory. It may in fact be finally reducible to a dispute over proper monetary policy." Consequently, the judge ruled that "insofar as judgement pertaining to the validity of a particular economic theory or the wisdom of a particular policy are entrusted to the FOMC under the auspices of Congress, the Court lacks the expertise necessary to substitute its judgement or that of plaintiff's experts for that of the FOMC."

A legal case thus translated into a dispute over issues of economic theory. The dynamics of this legal battle provide us with insights, however, that can also be aimed at through quite a different route.

Any discussion on the communication and transparency of monetary policy that starts off in abstract terms and in isolation of the actual task of a central bank is bound to lead to misunderstandings. Transparency is not an end in itself; a central bank is not established with the primary objective of communicating with the public. Its mandate either stems directly from the monetary system, as was the case with the gold standard, or is specified by the legislator, which became necessary in times of the paper standard. Today,

its task—either alone or in connection with other objectives—is generally to maintain price stability or a low level of inflation. In this regard, central banks act as agents in a principal-agent relationship vis-à-vis society at large and in most cases they have been granted independent status in order to better fulfill their mandate. Central bank accountability is therefore centered on the bank fulfilling its mandate, rendering transparency subordinate to their ultimate tasks and objectives. It is precisely with this in mind that central banks in the past have justified their reluctance to release information to the public and their aura of “mystique,” as criticized by Brunner. This stance puts them in the territory identified by the U.S. courts. Consequently, central banks are obliged to explain their communication policy; they must justify any withholding of information to the public, such as information about the voting behavior of members of the decisionmaking body, for example. Obviously, their reasons must be related to the fulfillment of their monetary policy task.

The aforementioned remarks of Deputy Governor Harvey in the light of modern information theory offer some interesting insights. He justified his reservations about the usefulness of an annual report by saying that “undue importance may be attributed to certain things that are stated, more importance than perhaps they merit.” Recent work on information theory has rediscovered the conflict between public and private information (Morris and Shin, 2002) and, among other things, has shown that public information can result in a crowding out of private information and ultimately a welfare loss. Although no one would question the usefulness of an annual report today, the issue of its content has yet to be resolved.

In addition, Harvey’s reasoning that “it has been our practice to leave our actions to explain our policy” is not as foolish as it may initially seem, since it underlines a key aspect of the communication problem. If a monetary policy decision per se were to already include all relevant information, it would simply suffice to announce it in order to comply with transparent communication requirements. This would be the case if monetary policy reacted entirely mechanically to changes

in key parameters. Such rigid compliance with a stringent rule would indeed rid monetary policy of all discretionary elements and reduce communication, transparency, and accountability to the publication of the respective decision—provided the public were sufficiently well informed of the rule and that strict adherence thereto were in line with the mandate. This claim is precisely the one made by Milton Friedman, for example, in his well-known k-percent rule (Friedman, 1960). Henry Simons used the motto “Rules versus Authorities” to argue that the influence of individuals on monetary policy decisions should be limited; and, as Walter Eucken postulated, a good monetary constitution should function “as automatically as possible” (Eucken, 1955, p. 257).

Strict adherence to rules solves the problem of communication and transparency to the extent that it does not allow for any discretion or personal influence to be brought to bear in the decision and its communication. Conversely, the public’s need for information increases with the level of discretion exercised in the monetary policy decision—the level of personal influence will also rise accordingly—and involves a corresponding need to convey the policy through communication as well as action, thus simultaneously generating a transparency and communication problem.

Interestingly, even apparently simple monetary policy strategies, such as direct inflation targeting, involve considerable communication requirements. In the end, inflation targeting still leaves the central bank a significant amount of discretionary leeway. For example, if inflation deviates from the target rate, the central bank selects the appropriate adjustment path toward the target. The choice of path is left to the central bank and, among other things, depends on the expected impact on real economic activity (Friedman, 2004; McCallum and Nelson, 2004).

Communication and transparency therefore become discretionary issues; that is, they become a balancing act for the central bank, which has to assess the impact of communication on the efficiency of monetary policy. Communication, not least of all, becomes crucial for steering market expectations (Woodford, 2003).

Monetary policy can only fix central bank

interest rates and therefore has control over only the very short end of the interest rate spectrum. The influence of monetary policy on the long end of the spectrum largely depends on market expectations regarding future central bank decisions and future inflation. Developments across the entire yield curve and decisionmaking behavior of economic agents across all markets depend crucially on expectations as to whether and how the central bank will fulfill its mandate.

Steering Market Expectations

Short-Term Signaling. The steering of financial market expectations has two dimensions: First, it involves short-term indications on policy inclinations in the run-up to monetary policy decisions. In the simplest case, certain code words suffice to signal an impending decision to market participants. The search for such “codes” is very popular among many market participants. Code words can be readily identified and taken into account in market operations; they can reduce uncertainty in the run-up to meetings of the decisionmaking body, and they can help to avoid errors in the short-term planning of operations and curb the volatility of interest rates. However, with the use of such code words, the central bank puts itself under pressure to honor a quasi-promise. If, in the meantime, its assessment of the situation has changed, owing to new developments, the central bank will be faced with the dilemma of triggering market disturbances if they “disappoint” expectations, even though they may have convincing arguments to justify their reassessment of the circumstances. For this reason, indications about future decisions must always be seen only as conditional commitments. In practice, however, it is likely to prove extremely difficult to communicate this proviso with sufficient clarity. The more straightforward the “announcement” and the simpler the code, the more difficult it will be to explain its conditionality *ex ante*.

If communication is understood (at least broadly) as the unconditional announcement of future decisions, the financial markets will reflect (or “price in”) these expectations. “Thus, statements and policy actions can serve as effective

substitutes for one another, at least in the short run” (Kohn and Sack, 2003). It is obvious that a strategy in which announcements take the place of concrete action will become more risky the longer the period over which expectations are to be influenced.

Under no circumstances should a central bank deliberately set out to unsettle the markets or even give false information about its true intentions. The world is unstable enough without a central bank intentionally generating additional uncertainty; greater volatility and ultimately higher risk premia would be a high price to pay. At the same time, the central bank must ensure that it does not end up merely executing the expectations developed in the market.

If monetary policy ends up merely following the markets, it runs the risk of losing sight of its ultimate objective. Monetary policy takes effect via the financial markets, whose agents are directly affected by monetary policy decisions. Misperceptions of monetary policy activity can cost them dearly. Consequently, praise and complaints from the markets have understandably become permanent companions of monetary policy. Central banks are therefore exposed to the temptation of attributing an importance to market reactions that goes beyond their “transmission” interest. Alan Blinder concludes his remarkable book entitled “Central Banking in Theory and Practice” (1998, p. 76) with this warning: “Following the markets too closely...may lead the central bank to inherit precisely the short time horizon that central bank independence is meant to prevent. There is no more reason for central bankers to take their marching orders from bond traders than to take their orders from politicians.” In the longer term, however, I believe this conflict will disappear. A central bank can successfully use the markets in the long term only if, in fulfilling its mandate, it gains the confidence not only of the public at large but also of the financial markets.

Longer-Term Consistency. There is, however, a second dimension to the predictability of decisions. In the medium to longer term, it becomes a question of consistency between the sum of individual decisions and the announced longer-term objectives of monetary policy. If such con-

sistency is achieved, monetary policy is predictable and credible in the long term. Reconciling the two different dimensions of predictability is and will remain one of the main requirements of communication and monetary policy *per se*.

Ensuring such consistency in decisions relating to its mandate is the key requirement of a central bank's monetary policy strategy. If a central bank pursues a consistent strategy and succeeds in communicating it convincingly, it will play an important role in successfully steering expectations. One element of such a strategy is to provide some (implicit) indication of how monetary policy is likely to deal with exogenous shocks to supply and demand. Another element relates to the potential reaction to such shocks—gradual versus abrupt measures. Providing indications on the monetary policy reaction function enhances predictability over a more medium-term horizon. If a central bank is reliable in this sense, it is much easier for it to gain credibility and win the trust of the public and the markets alike. In this regard, all efforts must focus on anchoring inflation expectations at a level that is in line with the mandate and, where appropriate, with price stability or an inflation target.

As far as steering medium- to longer-term expectations is concerned, credibility is essential. First and foremost, credibility is won through systematic, coherent actions. “A central bank that consistently performs in a particular way will have credibility even if the market has little or no idea of what the objective is or how the central bank achieves it. The saying that ‘actions speak louder than words’ is particularly true when it comes to credibility. In the final analysis, credibility is earned—there is simply no other way to get it” (Thornton, 2002, p. 11).

A good track record, however, does not eliminate the need for a good communication policy. First, such a track record is not available to a new institution. Second, if the monetary policy strategy is not clearly communicated, there is a tendency for market participants to adjust their longer-term expectations (e.g., their inflation expectations) in line with the current circumstances (i.e., the current inflation rate). If there is no credible strategy in place, economic agents try, by means of

an adaptive learning process, to use the available data to second-guess the current thinking of the central bank. Short-term deviations of the inflation rate from the inflation target then result in adjustments to the expected inflation rate. Under such circumstances, determining and implementing monetary policy will become considerably more difficult (see Orphanides and Williams, 2002). The challenge for communication policy is to provide convincing reasons for any deviations from target and to provide reassurance that these developments are only temporary. Long-term inflation expectations that remain in line with the central bank's objective are a confirmation of credibility, which, in turn, facilitates the conduct of monetary policy.

An appropriate strategy, a convincing track record, and thus a consistent communication policy complement each other and are a sign of an effective monetary policy. A clear strategy can also provide stability to the analytical framework and decisionmaking process for monetary policy. After all, the individuals responsible for monetary policy decisions will change over time and there is a need to convince the public that continuity of good policies is ensured.

An important task of a central bank is also to explain to the public the limits of its mandate and abilities to achieve the associated goals. This approach is necessary to avoid raising false expectations that will not be met, resulting in a loss of credibility for central bank policies overall. For example, monetary policy can control inflation only in the medium-to-long term. Volatile components of the price index (e.g., energy and food prices) can lead to significant fluctuations in inflation rates in the short term. The central bank's reputation could be tarnished if the public believed that the central bank was able, on a sustainable basis, not only to guarantee a low level of inflation but also to use monetary policy measures to boost growth and employment.

This highlights a further communication challenge with the public as well as with governments and parliaments. Politicians time and again try to blame central banks for unfavorable macroeconomic developments such as high unemployment and low growth. Maintaining monetary

stability in the long term, therefore, largely depends on whether or not the central bank wins over public opinion (Issing, 2002).

No doubt, there is significant interest in central bank transparency on both the “supply side,” the central bank, and the “demand side,” the public.

The public’s interest in transparency with regard to monetary policy’s fulfillment of its mandate is essentially in line with the central bank’s interest in using this channel as a means of enhancing monetary policy efficiency. In an ideal world, the optimum amount of information is determined by the point where the supply and demand curves intersect.⁴ However, the question of where this point is remains difficult to answer in practice.

GENERAL REQUIREMENTS FOR GOOD COMMUNICATION

Successful communication is one of the greatest challenges for monetary policy. The more convincingly central banks can explain the reasons for their monetary policy decisions to the public, the more effective their monetary policy will be. For this reason central banks publish extensive information about their strategy, analyses, and decisions.

Experience has shown, however, how difficult it is to communicate to the public all information relevant to the decisionmaking process in a way that is not only exhaustive but also clear and comprehensible. Psychological research has pointed to the limits of human information processing skills (Kahneman, 2003). This research has shown, for example, that the weighting of information greatly depends on its intuitive accessibility. Furthermore, information is generally simplified and categorized before it is collated. A central bank’s communication policy is therefore faced with the task of conveying the necessary information clearly and with the appropriate emphasis and salience.

At the same time, a central bank must also

convey that monetary policy decisions are complex and that the monetary policy environment is uncertain and constantly changing. There is uncertainty about prevailing economic conditions and the nature and extent of economic shocks. There is model and parameter uncertainty and uncertainty regarding the market expectation process.

One approach would be to use precise, unambiguous words to portray complex facts without, at the same time, giving the impression that the world is more straightforward and secure than it actually is.

Striking the balance between the need for clear and simple messages and the need to adequately convey complexity is a constant challenge for central bank communication (Winkler, 2000). An additional difficulty stems from the need to address various target groups, including academics, the markets, politicians, and the general public. Such a broad spectrum may require a variety of communication channels geared to different levels of complexity or different time horizons.

COMMUNICATION IN PRACTICE

In order for this balancing act to be successful, central banks today use a variety of instruments (see Appendix Tables A1 and A2).

The wide array of communication instruments ranges from short press releases after monetary policy decisions to the publication of voting results, regular monthly or quarterly reports to the customary annual reports, as well as speeches and other contributions from central bank representatives.

The ECB has decided to publish neither the minutes of the Governing Council nor information about the voting behavior of its members, but instead holds an extensive monthly press conference directly after the Council meetings. The decision not to publish minutes and voting records has been a criticism frequently leveled at the ECB, casting doubts on its determination to be transparent and accountable (Buiter, 1999; de Haan and Eijffinger, 2000).

The critics often overlook the collegial nature of the ECB’s decisionmaking process and the

⁴ Faust and Svensson (2001) call for the decision regarding the level of transparency to be transferred to society and not left to the central bank. See also Neumann (2002).

specific institutional circumstances under which the ECB operates as a supranational institution.

A decisionmaking body is always more than just the sum of its individual members, just as a decision is more than an act of voting. A decision is the result of collective deliberation and debate and cannot be reduced to a simple exchange of opinions (Issing, 1999). The public will ultimately judge the success of an institution against its mandate. What matters, then, is the collective responsibility of the monetary policy decisionmaking body for the decisions taken.

Any attempt to make individual policymakers personally accountable by publishing information about their voting behavior entails the risk that the public may attach more importance to individual opinions than to the relevant economic arguments. Particularly in a monetary union comprising several countries, the voting behavior of national central bank governors in particular might be interpreted from a “national” perspective—irrespective of how the members cast their votes and their reasons for doing so (see also Eijffinger and Hoerberichts, 2002, and Neumann, 2002, p. 360).

In its communication policy and its choice of medium, form, and content, a central bank needs to take into account particular circumstances. As a new institution, the ECB was faced with high uncertainty when it first took over responsibility for the single monetary policy for a new currency area comprising eleven, later twelve, sovereign countries (see Issing, 2004).

Against this background, the ECB adopted its own approach to communication: From the beginning, it placed a premium on speaking “with one voice” and consensus in decisionmaking, while spelling out the underlying economic arguments clearly and consistently.

By publicly announcing an explicit monetary policy strategy and a quantitative definition of price stability in 1998, the ECB has provided the basis for a high degree of credibility from the very beginning and has also highlighted its commitment to be open and transparent.

The public announcement of a quantitative definition of price stability helps the public to better monitor and assess the performance of the

ECB. Furthermore, the ECB, like many other central banks, describes the analytical framework used for its internal decisionmaking and explains which models, methods, and indicators form the basis of its decisions and assessments. A publicly announced strategy provides guidance for the markets, enabling them to form expectations more efficiently, enabling them to better anticipate interest rate decisions.⁵

The President’s monthly press conference provides a timely and comprehensive summary of the monetary policy–relevant assessment of economic developments. It is structured along the lines of the ECB’s monetary policy strategy and its text is agreed upon by the Governing Council. Questions from journalists are then answered, with the written transcript of the press conference published on the ECB’s website only a few hours later.

The ECB decided to adopt a regular real-time communication tool instead of publishing with some delay.⁶ Immediate communication avoids the risk that a delay in the announcement of the reasons behind the monetary policy decision could affect the markets and increase volatility.

Overall, the ECB’s communication policy is an expression of general principles and it has also been shaped by the particular challenges it faced as a new institution.

⁵ Empirical tests show that, with regard to the predictability of its decisions, the ECB’s communication policy will easily stand up to any comparison (see, for example, Gaspar, Pérez-Quirós, and Sicilia, 2001; Bernoth and von Hagen, 2004; and Bank for International Settlements, 2004, p. 86; also, Poole and Rasche, 2003, provide evidence regarding the Federal Reserve).

⁶ The term “minutes,” per se, directly implies transparency and authenticity regarding the course of a meeting. In this sense, the tradeoff between immediate and delayed publication (whether longer or shorter) is often overlooked. The Federal Open Market Committee discussed this in its January 27–28, 2004, meeting (see FOMC Minutes [sic!], 2004): “In further discussion the members reviewed the potential value and drawbacks of accelerating the publication of Committee minutes. Possible benefits would include the provision of more complete information sooner after meetings on the considerations that led the Committee to adopt the current stance of policy. Some members expressed concern, however, that accelerated release of the minutes might have the potential to feed back adversely on the deliberations of the Committee and on the minutes themselves. The members also emphasized the importance of allowing sufficient time for them to review and comment on the minutes and for reconciling differences of opinion among the members of a large and geographically dispersed committee. On December 14, 2004, the FOMC decided to expedite the release of its minutes to three weeks after the date of the policy decision.

CONCLUSION

If there were any general conclusion to be drawn on the subject of “Communication, Transparency, and Accountability,” then it would be this: None of these elements should be considered in isolation. Their interdependence stems from the monetary policy mandate and the position of the central bank in society. The central bank is not only obliged to fulfill its mandate, it must also provide society with convincing reasons for its actions. Whatever the external perception of the central bank, there must be no doubt that all communications are made to the best of its knowledge and belief.

REFERENCES

- Adam, Klaus. “Optimal Monetary Policy with Imperfect Common Knowledge.” CEPR Discussion Paper No. 4594, Centre for Economic Policy Research, September 2004.
- Bank for International Settlements. 74th Annual Report: 1 April 2003–31 March 2004. Basel, Switzerland: June 28, 2004.
- Bernoth, Kerstin and von Hagen, Jürgen. “The Euribor Futures Market: Efficiency and the Impact of ECB Policy Announcements.” *International Finance*, Spring 2004, 7(1), pp. 1-24.
- Blackwell, David. “Equivalent Comparisons of Experiments.” *Annals of Mathematical Statistics*, June 1953, 24(2), pp. 265-72.
- Blinder, Alan S. *Central Banking in Theory and Practice*. Cambridge, MA: MIT Press, 1998.
- Brunner, Karl. “The Art of Central Banking,” in Hermann Göppel and Rudolf Henn, eds., *Geld, Banken und Versicherungen*. Volume 1. Königstein, 1981.
- Buiter, Willem H. “Alice in Euroland.” *Journal of Common Market Studies*, June 1999, 37(2), pp. 181-209.
- Committee on Finance and Industry, Minutes of Evidence, Volume I, printed and published by His Majesty’s Stationary Office, London, 1931.
- de Haan, Jakob and Eijffinger, Sylvester C.W. “The Democratic Accountability of the European Central Bank: A Comment on Two Fairy-Tales.” *Journal of Common Market Studies*, September 2000, 38(3), pp. 393-407.
- Eijffinger, Sylvester C.W. and Hoeberichts, Marco. “Central Bank Accountability and Transparency: Theory and Some Evidence.” *International Finance*, Spring 2002, 5(1), pp. 73-96.
- Eucken, Walter. *Grundsätze der Wirtschaftspolitik*. Edith Eucken and Karl Paul Hensel, eds. Second Edition. Tübingen: Mohr, 1995.
- European Central Bank. “Monetary Analysis in Real Time.” *Monthly Bulletin*, October 2004, pp. 43-66.
- Faust, Jon and Svensson, Lars E.O. “Transparency and Credibility: Monetary Policy with Unobservable Goals.” *International Economic Review*, May 2001, 42(2), pp. 369-97.
- Federal Open Market Committee. Minutes. Washington, DC: Board of Governors of the Federal Reserve System, January 27-28, 2004.
- Friedman, Benjamin M. “Why the Federal Reserve Should Not Adopt Inflation Targeting,” presented at the 2004 American Economic Association Meeting in San Diego; *International Finance*, March 2004, 7(1), pp. 129-36.
- Friedman, Milton. *A Program for Monetary Stability*. New York: Fordham University Press, 1960.
- Gaspar, Vítor; Pérez-Quirós, Gabriel and Sicilia, Jorge. “The ECB Monetary Policy Strategy and the Money Market.” *International Journal of Finance and Economics*, October 2001, 6(4), pp. 325-42.
- Goodfriend, Marvin. “Monetary Mystique: Secrecy and Central Banking.” *Journal of Monetary Economics*, January 1986, 17(1), pp. 63-92.
- Hirshleifer, Jack. “The Private and Social Value of Information and the Reward to Inventive Activity.” *American Economic Review*, September 1971, 61(4), pp. 561-74.

- Hirshleifer, Jack. "Speculation and Equilibrium: Information, Risk, and Markets." *Quarterly Journal of Economics*, November 1975, 89(4), pp. 519-42.
- Issing, Otmar. "Rationale Erwartungen-im Jahre 67 vor Christus." *Kyklos*, 1985, 38(1), pp. 104-5.
- Issing, Otmar. "The Eurosystem: Transparent and Accountable or 'Willem in Euroland'." *Journal of Common Market Studies*, September 1999, 37(3), pp. 503-19.
- Issing, Otmar. *Should We Have Faith in Central Banks?* London: The Institute of Economic Affairs, 2002.
- Issing, Otmar. "Geldpolitik für den Euroraum," as published in: *Perspektiven der Wirtschaftspolitik*, November 2004, 5(4), pp. 381-404.
- Kahneman, Daniel. "Maps of Bounded Rationality: Psychology for Behavioral Economics." *American Economic Review*, December 2003, 93(5), pp. 1449-75.
- Kohn, Donald L. and Sack, Brian P. "Central Bank Talk: Does it Matter and Why?" Finance and Economics Discussion Series Paper No. 2003-55. Washington, DC: Board of Governors of the Federal Reserve System, 2003.
- King, Mervyn. "The Institutions of Monetary Policy." The Ely Lecture 2004, Lecture at the American Economic Association Annual Meeting, San Diego, January 4, 2004.
- McCallum, Bennett T. and Nelson, Edward. "Targeting vs. Instrument Rules for Monetary Policy." Working Paper No. 2004-011A, Federal Reserve Bank of St. Louis, June 2004.
- Morris, Stephen and Shin, Hyun Song. "Social Value of Public Information." *American Economic Review*, December 2002, 92(5), pp. 1521-34.
- Neumann, Manfred J.M. "Transparency in Monetary Policy." *Atlantic Economic Journal*, December 2002, 30(4), pp. 353-65.
- Orphanides, Athanasios and Williams, John C. "Imperfect Knowledge, Inflation Expectations, and Monetary Policy." Finance and Economics Discussion Series Paper No. 2002-27. Washington, DC: Board of Governors of the Federal Reserve System, May 2002.
- Poole, William. "Fed Transparency: How, Not Whether." Federal Reserve Bank of St. Louis *Review*, November/December 2003, 85(6), pp. 1-8.
- Poole, William and Rasche, Robert H. "The Impact of Changes in FOMC Disclosure Practices on the Transparency of Monetary Policy: Are Markets and the FOMC Better 'Synched'?" Federal Reserve Bank of St. Louis *Review*, January/February 2003, 85(1), pp. 1-10.
- Shannon, Claude E. "A Mathematical Theory of Communication." *Bell System Technical Journal*, July and October 1948, 27, pp. 379-423 and 623-56.
- Sims, Christopher A. "Implications of Rational Inattention." *Journal of Monetary Economics*, April 2003, 50(3), pp. 665-90.
- Thornton, Daniel L. "Monetary Policy Transparency: Transparent About What?" Working Paper 2002-028B, Federal Reserve Bank of St. Louis, November 2002.
- Winkler, Bernhard. "Which Kind of Transparency? On the Need for Clarity in Monetary Policy-Making." ECB Working Paper No. 26, European Central Bank, August 2000.
- Woodford, Michael. *Interest and Prices: Foundations of a Theory of Monetary Policy*, Princeton: Princeton University Press, 2003.

APPENDIX
Table A1**Communication: Instruments, Channels, and Target Groups**

Instruments	Format	Channels	When
Immediate announcement/explanation of monetary policy decisions			
Press releases	Written	Website/hard copy	Immediately after the monetary policy meeting
Press conference	Verbal, with question and answer session, sometimes includes handing out of written background information to media representatives (e.g., opinion of the central bank president, projections, etc.)	Direct communication, TV broadcast (live or report later that day)	Shortly after the monetary policy meeting
Transcript of the press conference	Written	Website/hard copy	Shortly after the press conference has finished
Supplementary information on monetary policy decisions			
Publication of the minutes of meetings	Written	Website/hard copy	Between 13 days and 8 weeks after the monetary policy meeting
Publication of voting behavior	Written	Website/hard copy	Together with the press release and/or minutes of the meeting
Further information on monetary policy and economic developments			
Reports (monthly bulletin, annual report, etc.)	Written	Website/hard copy	
Publication of projections	Written	Website/hard copy	
Publication of statistical data	Written	Website/hard copy	As soon as confirmed
Publication of surveys	Written	Website/hard copy	
Public hearings/report to the legislature	Verbal/written	Live reporting, print media, website/hard copy	
Interviews	Verbal or written	TV, radio, and/or print media	

Frequency	Detail	Content	Target group	ECB
Regularly	Brief, in some cases information is reduced to key words and formulae	Monetary policy decision, sometimes a brief explanation, monetary policy intentions, and announcement of voting behavior	General public, media, markets	Yes
Regularly	Extensive	Explanation of the monetary policy decision, assessment of the current economic situation and its future development, sometimes comments on other policy areas	General public, media, markets	Yes
Regularly	Extensive	Explanation of the monetary policy decision, assessment of the current economic situation and its future development, sometimes comments on other policy areas	General public, media, markets	Yes
Regularly	Extensive	Information on the course of meetings and discussions (presentation of the reasons behind the monetary policy decision, policy options, etc.)	General public, media, markets	No
Regularly	Brief	Presentation of the voting behavior, explanation of dissenting positions	General public, media, markets	No
Monthly/quarterly/ annually	Extensive	Analysis of monetary policy issues and assessment of the current economic environment, special topics, etc.	General public, media, markets	Yes
Quarterly/biannually	Extensive		Analysts, ECB observers, interested members of the public	Yes
Regularly	Extensive	Money and banking statistics, balance of payments statistics, etc.	Analysts, ECB observers, interested members of the public	Yes
Regularly	Extensive		Analysts, interested members of the public	Yes
Regularly	Extensive	Explanation of monetary answering of questions	Politicians, ECB observers, interested members of the public	Yes
Regularly	Brief to extensive	Key monetary policy issues (mandate, strategy, decisions), special topics, current problems regarding economic policy (fiscal policy, structural policy), topics of regional interest, etc.	National or regional public, media, markets	Yes

Table A1 cont'd**Communication: Instruments, Channels, and Target Groups**

Instruments	Format	Channels	When
Further information on monetary policy and economic developments			
Speeches	Verbal	Direct interaction; TV, radio, and/or reporting in the media (in most cases also website/hard copy)	
Briefings	Verbal	Central bank representatives meet with journalists in person	
Monetary policy research			
Research papers	Written	Publications in hard copy/on website	
Conferences	Verbal/written	Direct interaction and open dialogue, sometimes with media presence, subsequently also website/hard copy	
Transfer of monetary policy knowledge			
Presentations/visitor groups	Verbal	Direct interaction	
Information leaflets	Written	Website/hard copy	
Video/video games	Audio-visual	Website/presentation	
School competitions	Verbal and written	Direct interaction	

Frequency	Detail	Content	Target group	ECB
Regularly	Brief to extensive	Key monetary policy issues (mandate, strategy, decisions), special topics, current problems regarding economic policy (fiscal policy, structural policy), topics of regional interest, etc.	Specific	Yes
In most cases irregularly; in some cases also regularly	Extensive	Explanation of reactions, opinions, central bank assessments, in order to make monetary policy decisions more intelligible	Media representatives	Yes
Regularly	Specialized, sometimes highly complicated	Specialized fields, studies on monetary policy from a general and academic point of view	Academics, interested members of the public	Yes
Regularly	Specialized, sometimes highly complicated	Specialized fields, studies on monetary policy from a general and academic point of view	Academics, interested members of the public	Yes
Regularly	Brief to extensive	Range from a simple presentation to a detailed explanation of basic monetary policy issues	School pupils, students, CEOs, interested members of the public	Yes
Regularly	Brief to extensive	Range from a simple presentation to a detailed explanation of basic monetary policy issues	Children, teenagers, teachers, students, interested members of the public	Yes
Regularly	Brief to extensive	Range from a simple presentation to a detailed explanation of basic monetary policy issues	Children, teenagers, teachers, students, interested members of the public	Yes
Regularly	Extensive	Pedagogical introduction to the monetary policy decisionmaking process	Teenagers, teachers	No

Table A2**Communication of Policy Decisions of Selected Central Banks**

Central banks/countries	ECB	Czech Republic	Norway	Poland	Sweden
EARLY COMMUNICATION ON POLICY DECISIONS					
Announcement of policy decision					
Press release	Yes	Yes	Yes	Yes	Yes
Frequency (times per year)	12	12	9	12	8
After all monetary policy meetings?	Yes	Yes	Yes	Yes	Yes
Explanation of policy decisions					
Press release					
More than just the decision?	No	No	Yes	No	Yes
Number of pages	No	No	3	No	1 ^{1/2}
Press conference					
When is there a press conference?					
Frequency (times per year)	11	12	9	12	Quarterly and if rates are changed
After all monetary policy meetings?	Yes (except in August)	Yes	Yes	Yes	No
Since when?	December 1998	2000	June 1999	January 2001	Early 1990s
Delay after announcement	45 minutes	2-3 hours	45 minutes	2-4 hours	90 minutes or 4 hours ³
Practice for all press conferences					
Support used					
Media	"Introductory statement"	Presentation with charts	Summary of the press release itself and presentation with charts	"Information from a meeting of the Monetary Policy Council" and presentation with charts and tables	Presentation with slides
Length	3 pages	5-10 slides	5 slides (more on the Internet)	2-3 pages and around 20 slides	10 slides on average
Published?	Yes	No	Yes	Yes (the statement, but not the slides)	Yes
Q&A					
Is there a Q&A session?	Yes	Yes	Yes	Yes	Yes
Is a transcript published?	Yes	No	No	No	No
In which format?	Internet	No	No	No	No
Broadcasting					
Is the press conference broadcast?	Yes, live	No	Yes, live	Yes, but not always	Yes, live
In which format?	Bloomberg TV	No	Internet	TVNZ	Internet

Switzerland	U.K.	Australia	Canada	Japan	New Zealand	U.S.
Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	12	11	8	15-19	8	8
Yes ¹	Yes	Yes	Yes ¹	Yes	Yes ¹	Yes
Yes	Yes (but at MPC's discretion)	Yes (but only if rates changed)	Yes	Yes	Yes	Yes
3 ²	1/4	1	1/2-1	1/2 ²	1/2-1	1/2
Half-yearly	No	No	No	16 (in 2004)	Quarterly	No
No	No	No	No	Yes	No	No
1974	No	No	No	October 2003	Late 1999	No
No	No	No	No	A few hours	No	No
"Introductory remarks"	No	No	No	"The Bank's view" of the "Monthly Report of Recent Economic and Financial Developments" (after 1st meeting of the month)	Chapter 1 ("Policy assessment") of the "Monetary Policy Statement" (report) ⁴	No
3 pages	No	No	No	2 pages	1/2-1 page and report	No
Yes	No	No	No	Yes	Yes	No
Yes	No	No	No	Yes	Yes	No
No	No	No	No	No ⁵	No	No
No	No	No	No	No ⁵	No	No
Yes, sometimes, live	No	No	No	Yes, just after end of conference	Yes, live	No
Bloomberg TV	No	No	No	Bloomberg TV	Telesky TV	No

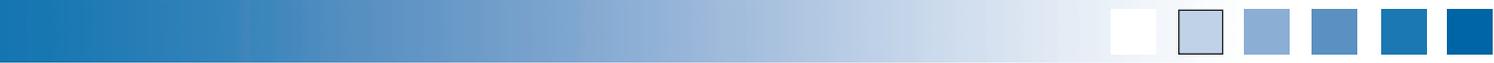
Table A2 cont'd**Communication of Policy Decisions of Selected Central Banks**

Central banks/countries	ECB	Czech Republic	Norway	Poland	Sweden
<i>Support available at some press conferences</i>					
Document	Section on projections		"Inflation Report"		"Inflation Report"
Frequency	Quarterly		3 times a year		Quarterly
Number of pages	5		70		60
When is it available?	At end of conference		When decision is announced		When decision is announced
SUBSEQUENT COMMUNICATION (EXCLUDING SPEECHES)					
Minutes					
Minutes published?	No	Yes	No	No	Yes
Number of pages	No	1-2	No	No	5-9
Delay	No	12 days	No	No	2 weeks
Other publications					
Publication or media	"Monthly Bulletin"	"Inflation Report"		"Inflation Report"	
After all monetary policy meetings?	Yes	No, quarterly		No, 4 times per year	
Timing	1 week after	1 week after		1 week after	

NOTE: The table focuses on *pre-scheduled monetary policy meetings*, unless otherwise specified. *Frequencies and lengths of documents* are approximate (in terms of comparable pages in the ECB's Introductory Statements). Where the documents are reports, their lengths are not indicated (as they depend inter alia on the layout used and are not easily comparable).

Country notes: ¹In the cases of Switzerland, Canada, and New Zealand, dates of policy-decision releases instead of meeting dates are pre-announced. ²Switzerland: Half a page for half-yearly meetings (followed by further explanation at the press conference) and three pages for the other two meetings. Japan: About half a page if the stance of monetary policy is kept unchanged, somewhat longer otherwise (e.g., new measures taken). ³Sweden: Twice a year the Governor appears before the finance committee of the Riksdag. On these occasions, the press release is published at 9 a.m. and the press conference starts at 1 p.m. ⁴New Zealand: Released at the media lock-ups for four of the eight interest rate decisions throughout the year. ⁵Japan: Minutes of the conference are posted on the Internet on the day after the conference. ⁶United States: The Federal Reserve System publishes a number of reports that provide considerable additional background on monetary policy decisions, including the semi-annual monetary policy report to Congress.

Switzerland	U.K.	Australia	Canada	Japan	New Zealand	U.S.
	No	No	No	"The Bank's view" of the "Outlook for Economic Activity and Prices"		No
	No	No	No	Twice a year		No
	No	No	No	3-4		No
	No	No	No	Before press conference starts		No
No	Yes	No	No	Yes	No	Yes
No	20	No	No	15-30	No	7-10
No	13 days	No	No	4-6 weeks	No	5-8 weeks
"Quarterly Bulletin"	"Inflation Report" and press conference	"Statement on Monetary Policy" (report)	"Monetary Policy Report"	a) "Monthly Report of Recent Economic and Financial Developments" b) "Outlook for Economic Activity and Prices"		Report to Congress ⁶
Yes	No, quarterly	No, quarterly	No, biannual and two updates	a) No, monthly b) Twice a year (for 2nd meeting in month: April and October)		No, biannual
Approximately 5 weeks after	6 days after	Between meetings	2 days after announcement	1 working day after a) 1st meeting of month or b) 2nd meeting of month (twice a year)		



GSE Risks

William Poole

This article was originally presented as a speech to the St. Louis Society of Financial Analysts, St. Louis, Missouri, January 13, 2005.

Federal Reserve Bank of St. Louis *Review*, March/April 2005, 87(2, Part 1), pp. 85-91.

Almost two years ago, in a speech at a conference hosted by the Office of Federal Housing Enterprise Oversight (OFHEO), I argued that government-sponsored enterprises (GSEs) specializing in the mortgage market, especially Fannie Mae and Freddie Mac, exposed the U.S. economy to substantial risk, primarily because their capital positions are thin relative to the risks these firms assume (Poole, 2003). I had a number of specific risks in mind, but did not elaborate the nature of these risks. My purpose here is to provide that elaboration. I will concentrate on risks facing Fannie Mae and Freddie Mac, but it should be understood that the Federal Home Loan Banks raise many of the same issues.

An understanding of the risks facing Fannie Mae and Freddie Mac—which I will sometimes refer to as “F-F” to simplify the exposition—is important from two perspectives. First, investors should be aware of these risks. Although many investors assume that F-F obligations are effectively guaranteed by the U.S. government, the fact is that the guarantee is implicit only. I will not attempt to forecast what would happen should either firm face a solvency crisis, because I just do not know. What I do know is that the issue is a political one, and political winds change in unpredictable ways.

A second reason to understand the risks is that sound public policy decisions depend on such understanding. To reduce the potential for a financial crisis, risks need to be mitigated.

Fannie Mae and Freddie Mac face five major sources of business risk: credit risk, prepayment risk, interest rate risk from mismatched duration of assets and liabilities, liquidity risk, and operational risk. A sixth risk, so-called political risk, arises from the possibility of regulatory or statutory revisions that could adversely affect those who hold the firms’ debt or equity. I’ll discuss these risks in turn, devoting much more time to some than others. Along the way, I will also discuss an extremely important point concerning the frequency of occurrence of large interest rate changes. This issue is critical to understanding the risks of any strategy involving incomplete hedging.

CREDIT RISK

Credit risk occurs because homeowners can and do default on mortgage loans. Even though default rates on mortgages in the United States are low, in recent years less than 1 percent, they are not zero and vary considerably across regions. Credit risk on mortgages can be handled, as in fact Fannie and Freddie do very effectively, through a policy of geographic diversification and of not

William Poole is the president of the Federal Reserve Bank of St. Louis. The author appreciates comments provided by colleagues at the Federal Reserve Bank of St. Louis. Robert H. Rasche, senior vice president and director of the Research Division, Hui Guo, senior economist in the Research Division, and William R. Emmons, senior economist in the Bank Supervision Division, provided extensive assistance. The views expressed are the author’s and do not necessarily reflect official positions of the Federal Reserve System.

© 2005, The Federal Reserve Bank of St. Louis.

Poole

buying a significant number of high loan-to-value mortgages, as well as through the use of mortgage insurance and guarantees.

In assessing credit risk, it is important not to focus just on national average conditions. For example, although average house prices in the United States have not declined year to year since the Great Depression,¹ prices have declined in particular significant markets. Some examples would be Boston 1989-92, Los Angeles 1991-96, San Francisco 1991-95, and Texas 1987-88. More formally, the dispersion of changes in house prices and not just the national average is relevant for judging mortgage default risk.

Given that house prices do sometimes decline in particular markets, it is possible that a geographically diversified portfolio of mortgages could suffer significant losses. Therefore, to determine the capital a firm needs to hold against credit risk requires not only analysis of the geographical diversification in the portfolio but also an analysis of risks and likely losses given foreclosure in various housing markets. From everything I know, Fannie and Freddie do a fine job of managing credit risks, but I am not one who believes credit risks can be ignored.

PREPAYMENT RISK

Fannie Mae and Freddie Mac issue mortgage-backed securities (MBS) against pools of conforming mortgages—mortgages with dollar value at or below the conforming limit that qualifies the mortgages for F-F operations. All such mortgages have no prepayment penalties and are therefore subject to prepayment risk.

In finance lingo, these fixed-rate mortgages carry a call option. In the event that interest rates fall during the life of the mortgage, the homeowner can exercise the option to refinance the mortgage, effectively calling the outstanding high interest rate mortgage and replacing it with a new lower

interest rate obligation. Historically, the exercise of this option was constrained by relatively high transaction costs. In recent years, however, transaction costs have fallen considerably so that the call option in the typical fixed rate mortgage instrument comes in-the-money with relatively small declines in mortgage rates. Such refi activity has been substantial in recent years.

When Fannie and Freddie issue MBSs to be held by the investing public, buyers of the bonds assume the prepayment risk. Fannie and Freddie service the MBSs and guarantee them, thus assuming the credit risk.

However, for many years F-F have been accumulating a portfolio of their own MBSs and directly owned individual mortgages. For the two firms together, these portfolios are very large, amounting to over \$1.5 trillion at the end of 2003. Thus, F-F assume prepayment risk by holding these assets.

Under the most conservative financial strategy, Fannie and Freddie could mitigate completely their prepayment risk by issuing long-term callable bonds to finance their holdings of long-term mortgage assets. With such a strategy, the cash inflow from the assets matches exactly the cash outflow required to service the liabilities, and interest rate and prepayment risk are perfectly hedged.

A DIGRESSION ON FINANCIAL ENGINEERING

In practice, both Fannie and Freddie make limited use of long-term callable bonds. Rather, they issue non-callable long-term bonds and a significant amount of short-term debt. Doing so exposes F-F to prepayment risk and interest rate risk from a mismatch of duration of assets and liabilities. They then use various devices to manage the risks created.

Before discussing the ways F-F manage prepayment and interest rate risk, it is worth noting that the more elaborate portfolio policy has nothing whatsoever to do with the mortgage market per se. Consider this analogy: An investment company could own a portfolio of long-term corporate bonds, most of which become callable at

¹ This statement may or may not be strictly accurate. Annual data on national average new home prices from the U.S. Census start in 1963 and show small declines in the late 1960s and early 1990s. Annual data for the median sales price of existing single-family homes from the National Association of Realtors start in 1968 and do not exhibit any annual declines.

some point before maturity. When interest rates fall, corporations call such bonds and refinance with lower-rate bonds. The phenomenon is exactly the same as that observed in the mortgage market, except that corporate bonds have a certain number of years of call protection when issued and pay a call premium when called.

As far as I know, there are no closed-end investment companies that hold a portfolio of corporate bonds, financed by their own issues of short and long debt. The reason, I conjecture, is that there is no implied federal guarantee on such obligations, which means that an investment company could not earn a satisfactory spread from holding a portfolio of marketable corporate bonds financed by its own obligations.

The GSEs, however, have the benefit of the implied federal guarantee, which makes their financial engineering profitable. Because of the implied guarantee, F-F can operate with a small capital position and issue their own obligations at rates that are little above those paid by the U.S. Treasury. The spread over Treasuries is smaller at the short end of the maturity structure than at the long end, which is why F-F issue large amounts of short-term debt. This financial engineering has little to do with the mortgage market, except that F-F are authorized to hold mortgages rather than corporate bonds in their portfolio. The financial engineering has nothing to do with the mortgage market per se and everything to do with the implied federal guarantee.

INTEREST RATE RISK

Fannie and Freddie create interest rate risk for themselves by financing their portfolio through a mixture of long-term non-callable bonds and short-term obligations. Both firms have obligations due within one year in the neighborhood of 50 percent of total liabilities.

Having created prepayment and interest rate risk by not matching the characteristics of their obligations to the characteristics of their mortgage assets, F-F must then pursue sophisticated hedging strategies. They employ debt and interest rate swaps to create synthetic long-term obligations—a short-term obligation plus a fixed-pay swap effec-

tively creates a cash flow obligation that mimics that of a long-term bond. They also use options—in particular, swaptions—to hedge the prepayment risk.

Finally, like many large financial firms, Fannie Mae and Freddie Mac employ a strategy of *imperfect dynamic hedging*, which involves three steps: “(1) Maintain very complete hedges against the likely, near-term, interest rate shocks; (2) Use less complete hedges or even no hedges for longer-term and less likely rate shocks; (3) Implement additional hedges as interest rate levels change, and the unlikely becomes likely” (Jaffee, 2003, pp. 16-17). The term “dynamic hedge” refers to a strategy that involves continuous rebalancing of the firm’s portfolio in an attempt to maintain acceptable risk exposures. A dynamic hedging strategy can be quite successful when prices move continuously, in small steps, but is increasingly ineffective the larger are price discontinuities, or price jumps.

The advantage of using derivatives and imperfect dynamic hedging to manage interest rate risk is that these strategies are less costly than the perfect hedge and perform equally well when the interest rate volatility is moderate. The disadvantage is that potential losses associated with the unlikely risks can be very large.

- Because of imperfect dynamic hedging, F-F may suffer a significant loss whenever there are unexpected and large interest rate movements in either direction. Formal models of dynamic hedging assume price continuity and do not work well when prices jump discretely by large amounts.
- Fannie Mae and Freddie Mac are exposed to the counterparty default risk in their derivative contracts. The counterparty default risk per se may be small because both firms require all counterparties to post collateral on a weekly basis. However, at a time of disrupted financial markets, it would be very costly to replace the swap positions of a defaulting counterparty because the other counterparties are likely to have similar problems.

JUDGING THE SCALE OF INTEREST RATE RISK

Without highly detailed information about the hedging strategies pursued by F-F, it is impossible to offer a quantitative assessment of the scale of interest rate risk to which the firms are exposed. However, the fact that hedging is incomplete raises warning flags. The reason is that standard hedging strategies rely on the assumption that changes in securities prices follow a normal distribution—the familiar bell-shaped curve. The Black-Scholes formula for pricing options assumes, for example, that asset prices follow a normal distribution.

To judge risk, we start by computing the standard deviation from a long history of price changes in some particular market. The normal distribution is the baseline case. What we in fact observe are “fat tails,” by which we mean that there are many more large price changes—changes out in the tails of the distribution—than expected with a normal distribution of the calculated standard deviation. Failure to take adequate account of fat tails is responsible for many failures of financial firms over the years, such as the 1998 failure of Long Term Capital Management.

A key security in the context of the mortgage market is the 10-year on-the-run Treasury bond. Long-term mortgages are priced off the 10-year Treasury, and Treasury bonds themselves, because they are traded in a highly liquid market, are employed extensively in hedging strategies. Price changes for the Treasury bond for about 25 years are shown in Figure 1. The vertical axis measures the daily percentage price change, and the dashed bands define a range plus and minus 3.5 standard deviations from the mean.

The first thing to note in this figure is the frequency of large changes. Roughly 0.75 percent of the Treasury bond price changes in the sample are greater in absolute value than 3.5 standard deviations, more than 16 times the number of such outliers that would be expected from a normal distribution of price changes. Let me repeat—there are 16 times more price changes in excess of 3.5 standard deviations than expected with the normal distribution. Assuming 250 trading days in a year, on average bond price changes of this

or greater magnitude in absolute value occur twice per year instead of once every 8 years. The normal distribution provides a grossly misleading picture of the risk of large price changes. Really large changes of 4.5 or more standard deviations—the ones that can break a highly leveraged company—occur only 7 times in a million under the normal distribution, but there are 11 such changes in the 6,573 daily observations in the figure.

A second point to note from the figure is that large changes tend to cluster together. It appears that markets go through periods of relative volatility and other periods of relative tranquility. Clustering is important because a firm may be rocked several times in quick succession by large, unanticipated price changes. Incomplete hedges against large price changes expose a firm to cascading failure.

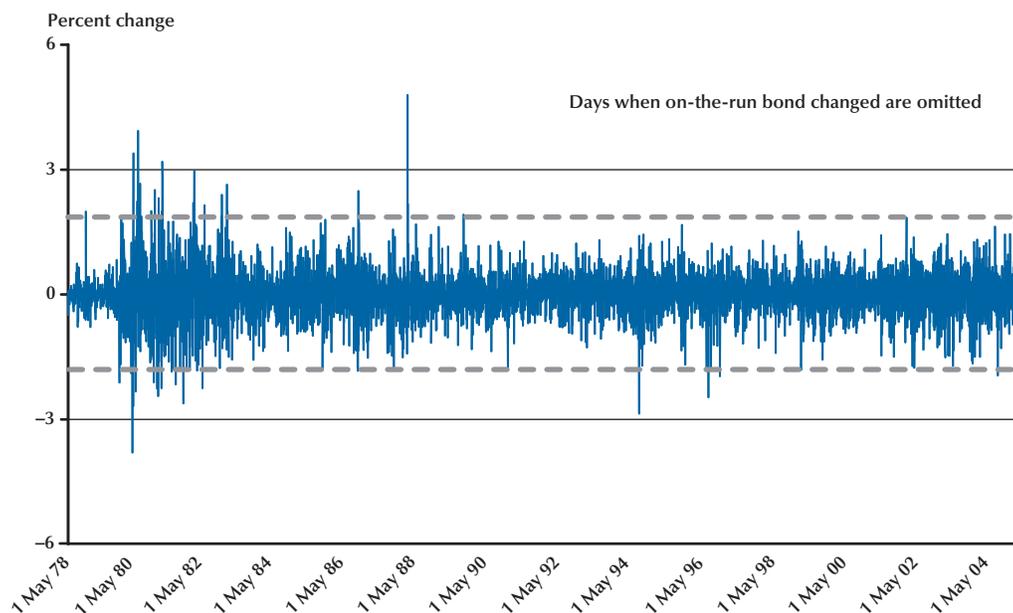
The fat tails phenomenon has been documented for a wide range of financial instruments over many different sample periods. Benoit Mandelbrot and Richard Hudson refer to these features as “wild randomness” (Mandelbrot and Hudson, 2004, p. 32). They conclude:

Extreme price swings are the norm in financial markets—not aberrations that can be ignored. Price movements do not follow the well-mannered bell curve assumed by modern finance; they follow a more violent curve that makes the investor’s ride much bumpier. A sound trading strategy or portfolio metric would build this cold, hard fact into its foundations.

Robert Engle characterizes returns in financial markets this way: “Returns are almost unpredictable, they have surprisingly large numbers of extreme values, and both the extremes and quiet periods are clustered in time. These features are often described as *unpredictability*, *fat tails*, and *volatility clustering*” (Engle, 2004, p. 407).

MANAGING INTEREST RATE RISK

In my speech to the OFHEO conference almost two years ago, I emphasized the risk of systemic, worldwide financial crisis should either

Figure 1**Trading Day Percentage Changes in On-the-Run 10-Year Treasury Note**

NOTE: Dashed lines show a range of ± 3.5 standard deviations.

Fannie Mae or Freddie Mac become insolvent. The argument was the same as that stated so clearly by Richard Posner in his recent *Wall Street Journal* op-ed article (Posner, 2005, p. A12) on the Indian Ocean tsunami. Posner writes:

The Indian Ocean tsunami illustrates a type of disaster to which policy makers pay too little attention—a disaster that has a very low or unknown probability of occurring, but if it does occur creates enormous losses...The fact that a catastrophe is very unlikely to occur is not a rational justification for ignoring the risk of its occurrence.

Of course, the loss of scores of thousands of lives in the tsunami is not to be compared to the losses from a financial crisis. Nevertheless, the two disaster cases illustrate another important point about risk management. In the case of the tsunami, nothing can be done about the probability of occurrence; loss mitigation depends on

installing warning systems. In the case of the risk of financial crisis, the key policy intervention is to reduce the probability of the event, by such methods as increasing the amount of capital firms hold.

I am also arguing that the risk of financial problems at Fannie Mae and/or Freddie Mac are not as remote as it might seem, because of the fat tails of the distribution of price changes in asset markets. These two observations—enormous potential costs and a probability of failure higher than commonly realized—imply that the risks of very large events must be identified and carefully analyzed through extensive “stress testing.” Then, adequate controls must be instituted to mitigate the identified risks.

This is exactly the approach that Mandelbrot and Hudson recommend: “So what is to be done? For starters, portfolio managers can more frequently resort to what is called stress testing. It means letting a computer simulate *everything* that could possibly go wrong, and seeing if any of the

Poole

possible outcomes are so unbearable that you want to rethink the whole strategy” (Mandelbrot and Hudson, 2004, p. 267).

By this criterion, incomplete hedging of longer-term and less likely interest rate shocks is not an adequate risk management strategy for GSEs. Capital ratios that are not tested against extreme events do not adequately mitigate the interest rate risk faced by such institutions.

LIQUIDITY RISK

Fannie Mae and Freddie Mac must roll over roughly \$30 billion of maturing short-term obligations every week. At a time of disrupted financial markets, the credit markets might refuse to accept the F-F paper. “Fannie Mae and Freddie Mac recognize this risk and both firms indicate they maintain sufficient liquidity to survive for some time (3 months or longer) without access to rollover markets...[However,] the U.S. General Accounting Office (1998) has also pointed out that holding securities in their investment portfolios for liquidity purposes represents a highly profitable arbitrage for [both firms], since the return on the assets exceeds the cost of the agency bonds used to fund the positions” (Jaffee, 2003, p. 16). Therefore, if Fannie Mae and Freddie Mac are unable to sell new debt, then they may also be unable to carry out sales of the “liquid” securities from their investment portfolio.

I discussed liquidity risk at some length in a speech last spring (Poole, 2004). I won’t repeat that analysis, but the bottom line is simple: The Federal Reserve has adequate powers to prevent the spread of a liquidity crisis, but cannot prevent a solvency crisis should Fannie or Freddie exhaust their capital. In the event of a solvency crisis, the market would become unreceptive to Fannie and/or Freddie obligations; they would have difficulty rolling over their maturing debt. Moreover, their outstanding obligations would decline in price and their markets would become less liquid. Beyond that, it is hard to say exactly what else might happen.

OPERATIONAL RISK

In the past two years, there have been surprising news reports of accounting irregularities, first at Freddie and more recently at Fannie. In both cases senior executives have left the firms and audit attestations have been questioned. Both firms have been required to restate earnings for a number of years. Investigations by OFHEO, the SEC, and the Department of Justice are ongoing.

Accounting problems were not on my radar screen when I first became concerned about GSE risk. The recent revelations are another example of our inability to predict shocks that will impact our financial system. Even though the assets F-F hold are relatively simple—residential real estate mortgages and mortgage-backed securities—the firms themselves are complex organizations because of their scale and the financial engineering they employ. The accounting problems provide an example of operational risk; other aspects of F-F operations, such as the automated underwriting procedures, are also subject to operational risk. It remains to be seen how the accounting restatements will affect the market’s view of F-F earnings and capital adequacy. Clearly, though, F-F need to hold capital against operational risk.

POLITICAL AND REGULATORY RISK

From a narrow market perspective, a key issue is whether the federal government would bail out Fannie Mae and/or Freddie Mac should the solvency of either firm be threatened. But that is too narrow a perspective, even for a holder of F-F obligations.

If there were a solvency crisis, the outcome would certainly involve extensive changes in the powers and characteristics of the firms. Institutions holding F-F obligations, direct or guaranteed, would most likely have to alter their portfolio practices. Moreover, even if the federal government bailed out F-F, their obligations might be redeemed eventually but cease to trade actively in liquid markets. Finally, there is of course no guarantee that the federal government would in

fact bail out F-F. Many observers, myself included, believe that a bailout would not be a good idea.

The bottom line is that there is substantial uncertainty over the future regulatory structure that will apply to Fannie Mae and Freddie Mac and over the likely behavior of the government should the solvency of either firm come into question.

CONCLUDING REMARKS

My purpose has been to provide an outline of all the risks facing Fannie Mae and Freddie Mac. There are six risks to consider: credit risk, prepayment risk, interest rate risk from mismatched duration of assets and liabilities, liquidity risk, operational risk, and political risk. Much more could be said about each of these risks, but I thought it would be useful to discuss each of them briefly in order to have a complete catalog.

I've particularly emphasized the importance of facing up to the implications of low-probability events. A low probability must not be treated as if it were a zero probability. Moreover, extensive evidence from many different financial markets, reinforced by similar findings in commodity markets, indicates that price changes in asset markets are characterized by fat tails. The probability of large price changes is much higher than suggested by the familiar normal distribution. In the case of the 10-year Treasury bond, changes of 3.5 standard deviations or more are 16 times more frequent than expected under the normal distribution.

More generally, the probability of shocks of many sorts may be higher than one would think. The accounting problems that surfaced at both Fannie and Freddie would surely have been assigned a very low probability two years ago. Unlike the situation in financial markets, where a wealth of data permits some formal probability estimates, the probability of other sorts of events is much more difficult to judge. For this reason, I believe that the capital held by F-F should be at a level determined primarily by the cushion

required should an unlikely event occur rather than by an estimate of the probability itself. It may be that the highly volatile interest rate environment of the early 1980s is extremely unlikely to recur, but I would like to see F-F maintain capital positions that would enable the firms to withstand such an environment anyway.

One thing I think I know for sure is this: An investor who ignores the risks faced by Fannie Mae and Freddie Mac under the assumption that a federal bailout is certain should there be a problem is making a mistake.

REFERENCES

- Engle, Robert. "Risk and Volatility: Econometric Models and Financial Practice." *American Economic Review*, June 2004, 94(3), p. 405-20.
- Jaffee, Dwight. "The Interest Rate Risk of Fannie Mae and Freddie Mac." *Journal of Financial Research*, 2003, 24(1), pp. 5-29.
- Mandelbrot, Benoit and Hudson, Richard L. *The (Mis)Behavior of Markets*. New York: Basic Books, 2004.
- Poole, William. "Housing in the Macroeconomy." *Federal Reserve Bank of St. Louis Review*, May/June 2003, 85(3), pp. 1-8.
- Poole, William. "The Risks of the Federal Housing Enterprises' Uncertain Status." Panel on Government Sponsored Enterprises and Their Future. In *Proceedings: 40th Annual Conference on Bank Structure and Competition*, May 2004, Federal Reserve Bank of Chicago, pp. 464-69.
- Posner, Richard A. "The Probability of a Catastrophe..." *Wall Street Journal*, January 4, 2005, p. A12.
- U.S. General Accounting Office. *Government Sponsored Enterprises: Federal Oversight Need for Nonmortgage Investments*. GAO/GDD-98-48. Washington, DC: 1998.

The FOMC: Preferences, Voting, and Consensus

Ellen E. Meade

In this paper, the author develops and uses an original dataset collected from the internal discussion of the Federal Reserve's monetary policy committee (the Federal Open Market Committee [FOMC] transcripts) to examine questions about the Committee's behavior. The data show that Chairman Alan Greenspan's proposals, after Committee discussion, were nearly always adopted unmodified in the formal vote. Despite the external appearance of consensus with little disagreement over decisions and an official dissent rate of 7.5 percent, the data reveal that the rate of disagreement in internal Committee discussions was quite high—on the order of 30 percent for discussions of the short-term interest rate. And, under the assumption that FOMC voters assigned a higher priority to their preferences for the short-term interest rate than for the bias in the policy directive, it can be shown that this bias was important for achieving consensus, which supports and extends the results of Thornton and Wheelock (2000). Thus, the novel dataset described in this paper helps to shed some light on the internal workings of the FOMC in the Greenspan years.

Federal Reserve Bank of St. Louis *Review*, March/April 2005, 87(2, Part 1), pp. 93-101.

The Federal Reserve's monetary policy committee, the Federal Open Market Committee (FOMC), is generally viewed as a group in which dissent is infrequent and many decisions are taken unanimously. In writing about the transparency practices of the world's major central banks, Blinder et al. have argued (2001, p. 39) that "it is widely known that individual [FOMC] members often do not vote their true preference. Instead, each committee member decides whether to support or oppose the chairman's [Alan Greenspan's] policy recommendation, which is almost always made first. And Fed traditions dictate that a member should 'dissent' only if they find the majority's (that is, the chairman's) opinion unacceptable." In this paper, I construct and examine a dataset of pref-

erences drawn from the transcripts of FOMC meetings during the Greenspan years to investigate the claim that the votes cast by Fed policymakers do not reflect their "true preference."

In FOMC meetings during Alan Greenspan's tenure as Chairman and for which verbatim transcripts have been made available, the structure of the meeting has been more or less fixed with two "rounds" of discussion.^{1,2} During the first round of discussion, participants offered their views on the economic situation and frequently positioned

¹ For more detail, see FOMC transcripts and Meyer (2004).

² Over the period examined, the FOMC set long-run monitoring ranges for the monetary aggregates (as required by the Humphrey-Hawkins Act) at its first and fourth meeting each year; the determination of these ranges was taken up in a separate round of discussion.

Ellen E. Meade is an associate fellow at Chatham House and a guest scholar at the Brookings Institution and thanks Chris Crowe, Bill English, Petra Gerlach-Kristen, Charles Goodhart, Jakob de Haan, Marco Haan, Peter Kenen, Brian Madigan, Bob Rasche, Daniel Seidmann, Nathan Sheets, Paola Subacchi, James Talbott, Dan Thornton, Ted Truman, David Wheelock, and seminar participants at the University of Groningen and Chatham House for comments on an earlier version of this paper. She also thanks Chris Crowe and Cathy Tunis for expert assistance and gratefully acknowledges research support from the American Institute for Contemporary German Studies, Deutsche Akademische Austausch Dienst, and Economic and Social Research Council. The author conducted this research, in part, while visiting the Federal Reserve Bank of St. Louis. The views expressed here do not necessarily reflect official positions of the Federal Reserve Bank of St. Louis, the Federal Reserve System, or the Board of Governors.

© 2005, The Federal Reserve Bank of St. Louis.

themselves with respect to a forecast prepared by the Fed staff. In addition, the presidents of the 12 Federal Reserve Banks provided some specific information about economic developments in their regions. Greenspan typically did not speak during this first round and, although he called on the other participants in no fixed order, it is generally the case that the Reserve Bank presidents spoke prior to the Board members.

The second round of the meeting was devoted to the discussion of policy options and culminated in a formal vote. After a staff presentation on policy options, Greenspan provided an extended discussion of his views before making a policy recommendation. Other participants followed in no fixed order.³ At the end of the second round, Greenspan made a final proposal and a formal vote was taken, with the Chairman casting his vote first.⁴ Although there are only 12 voting members on the FOMC at any given time, it was typical for all 19 policy officials (the seven Board members and the 12 Bank presidents) to participate in both rounds of the discussion. Over the period examined in this study, the minutes of each meeting—including the operational policy directive as well as the votes cast by policymakers—were published about six weeks after each FOMC meeting.

Unlike the minutes, which are brief and report discussion without attribution, the published transcripts provide a relatively complete account of FOMC meetings. The transcripts are, for the most part, verbatim, although they have been lightly edited to provide clarification (when necessary) and to excise discussion of specific sources (when release of this information could undermine the FOMC's access to information⁵). What becomes clear when reading the transcripts is that, during the second round of the discussion, all

participants generally have voiced an explicit policy preference. Thus, collecting these preferences offers the possibility to look at "opinions" rather than votes.

For the 1989-97 period, I examined two "dimensions" to the policy under consideration at each FOMC meeting: the level of the short-term interest rate, or federal funds rate, and the "bias" or "tilt" in the policy directive. Both of these "dimensions" were contained in the policy directive that the FOMC issued internally at the conclusion of each meeting to direct the Open Market Desk at the Federal Reserve Bank of New York in its implementation of monetary policy. Prior to August 1997, the directive did not refer explicitly to the FOMC's objective for the federal funds rate, but was written instead solely in terms of the desired degree of restraint on reserve positions.⁶ The FOMC moved to a borrowed reserves operating procedure in September 1982 and switched at some point later to targeting the federal funds rate. Because the move to a funds target was not announced publicly, the timing of the switch has been the subject of some debate. Greenspan (1997) has stated that the FOMC sets "the funds rate directly in response to a wide variety of factors and forecasts" and that this has been the practice "increasingly since 1982"; this suggests that the move to funds rate targeting was gradual and that there was no precise point at which the switch occurred. Nevertheless, several researchers have attempted to date this change in procedure. Thornton (2004) claims that the move to a funds target occurred relatively soon after 1982, based on an examination of the FOMC transcripts. Bernanke and Mihov (1998), Hamilton and Jorda (2002), and Kalyvitis and Michaelides (2001) use vector autoregressions to date the move and argue that it occurred somewhat later. The findings of all of these studies indicate that the FOMC had

³ It was often the case that the president of the Federal Reserve Bank of New York (who serves as the FOMC's vice chairman) was the second speaker.

⁴ The FOMC's vice chairman voted second, followed by other voters in alphabetical order.

⁵ Greenspan (1995) has indicated that material is redacted from the transcripts "primarily to protect the confidentiality of foreign and domestic sources of intelligence that would dry up if their information were made public. Included in that category is some information supplied to us by foreign central banks and other government entities."

⁶ The operative sentence in the directive from the August 1997 meeting read: "In the implementation of policy for the immediate future, the Committee seeks conditions in reserve markets consistent with maintaining the federal funds rate at an average of around 5-1/2 percent." Prior to that meeting, there was no explicit reference to the desired level for the federal funds rate. For example, the operative sentence in the directive from the July 1997 meeting was: "In the implementation of policy for the immediate future, the Committee seeks to maintain the existing degree of pressure on reserve positions."

switched to targeting the funds rate by 1989, the first year in my data sample.

The bias in the policy directive, which was introduced in 1983 and discontinued in 2000, was a statement about likely future changes in the stance of monetary policy. If the likelihood of future tightening and easing were equally balanced, the bias was “symmetric.” If the likelihood of future policy was unbalanced, then the bias was asymmetric in the direction of the most likely action. Thornton and Wheelock (2000) discuss three possible interpretations of the bias: that it gave the Chairman the discretion to alter policy between FOMC meetings, that it pointed to the likely course for future policy, and that it was used to build consensus among FOMC voters. Their study finds some evidence for the last of these three interpretations.⁷

In the next section, I discuss the construction of the preference dataset. In the third section, I use the preference data to examine several aspects of the meeting: The data indicate that Greenspan’s policy proposal was almost never amended before being put to a formal vote. In addition, the rate of disagreement based on preferences was higher than the rate of official dissent, and it was higher for those policymakers who did not eventually cast an official vote than for those who did. In the subsequent section, I investigate the role played by the bias in the policy directive and whether it helped to forge consensus by looking at policymakers who changed their opinion between the voiced round and the official vote.

THE PREFERENCE DATA

The preference dataset supplements the dataset constructed by Meade and Sheets (2004) for their study of regional influences on FOMC voting behavior. Policy preferences were determined from reading the second round discussion for 72 FOMC meetings from 1989 through 1997. The dataset excludes the 12 earliest meetings in Greenspan’s term (August 1987 through December

1988) for two reasons: First, the structure of the first several meetings differed somewhat from the structure described above; and, second, it was sometimes difficult to sort out policymaker preferences for the interest rate, owing to some (at times considerable) confusion between the borrowed reserves target and the interest rate objective. To the extent that Greenspan’s stature has risen over his tenure and, with it, the authority of his policy proposals, the exclusion of these early meetings should, *ceteris paribus*, bias agreement with his proposals upward (by ignoring meetings at which participants were more likely to disagree with him).

Information on preferences with respect to the short-term interest rate and the bias in the policy directive permitted the construction of three variables:

1. A multinomial variable indicating whether the policymaker expressed agreement (0), argued for a higher federal funds rate (+1), or argued for a lower federal funds rate (–1) relative to Greenspan’s proposal.
2. A basis-point variable indicating the size of the interest rate move advocated (in basis points) relative to Greenspan’s proposal for the funds rate; for example, if a policymaker wanted an increase of 50 basis points in the funds rate and Greenspan had proposed an increase of 25 basis points, this variable would be set equal to +25. The variable would also equal +25 if a policymaker preferred to leave rates unchanged when Greenspan proposed a 25-basis-point decline. On the other hand, if a policymaker wanted a 25-basis-point increase and Greenspan proposed a 50-basis-point increase, then this variable would be set equal to –25.
3. A multinomial variable recording whether the policymaker expressed agreement (0), argued for greater asymmetry toward tightening (+1), or argued for greater asymmetry toward easing (–1) relative to Greenspan’s proposal for the bias.

There were 35 individual policymakers other than Greenspan who participated in the 72 meetings covered in the dataset. The dataset records

⁷ Most other studies of the bias look at its predictive power for future changes in short-term interest rates. For example, see Lapp and Pearce (2000).

Table 1**Preferences Recorded in Dataset: Total and by Individual Policymaker for FOMC Meetings, 1989-97**

	Variable 1: directional interest rate indicator	Variable 2: basis point indicator	Variable 3: bias indicator
Preferences coded	1,205	1,162	1,017
Percent of total*	98.4	94.9	83.0
Frequency distribution of policymaker response rates:			
Less than 80%	0	1	8
80% to less than 90%	1	3	13
90% to less than 100%	10	14	9
100%	24	17	5
Lowest response rate (%) for an individual policymaker:	84.8	71.7	47.1

*The total number of possible responses was 1,225, reflecting the total number of FOMC meetings attended by 35 policymakers over the sample period.

at most one preference voiced on the interest rate and one preference voiced on the bias in the policy directive for each individual at each meeting.

There is no view recorded if no preference was expressed or if the policymaker's view was not clear. In addition, the dataset does not record a view if the policymaker was absent from a meeting or if the position was vacant at a particular meeting (opinions voiced by first vice presidents sitting in for Reserve Bank presidents were not included, and at no time during the period studied did a first vice president cast an official vote).

As shown in Table 1, policymakers expressed an opinion regarding the direction of the interest rate on 1,205 occasions (98.4 percent of the total), a view about the magnitude of the interest rate move (in basis points) on 1,162 occasions (94.9 percent of the total), and a preference for the bias in the policy directive on 1,017 occasions (83 percent of the total). The table also offers a frequency distribution of the preference data by variable: For each of the 35 policymakers, the table provides the percentage of meetings attended for which it was possible to code a preference. Coding rates were highest for preferences on the short-term interest rate, with 100 percent of meetings coded

for 24 of 35 policymakers. In contrast, the bias was the most difficult to code (many policymakers did not discuss it in their second-round remarks) and only 5 of 35 policymakers have a bias preference recorded 100 percent of the time. That policymakers voiced an opinion about the short-term interest rate with greater frequency than they did about the bias in the policy directive may owe to the fact that the bias played a secondary role because it related to future policy, whereas the short-term interest rate was the immediate policy instrument. Finally, the dataset includes the 732 official votes cast by these 35 policymakers over the sample period.⁸

In constructing this original dataset, I exercised some judgment to ensure consistency across meetings and to remedy problems with interpretation—four examples follow. First, in a few cases, policymakers expressed indifference between Greenspan's proposal and some other alternative; these cases were coded as agreement with Greenspan. Any bias introduced by this would tend to understate the extent of voiced disagreement. Second, if a policymaker indicated that he

⁸ Official votes were cast for an interest rate/policy bias combination.

Table 2**Instances When Greenspan's Proposal Was Not Adopted: FOMC Meetings, 1989-97**

	Date of meeting	Greenspan proposal	Voted outcome
Bias	August 1989	Symmetric	Asymmetric (-1)
	November 1991	No preference	Asymmetric (-1)
	March 1994	Asymmetric (+1)	Symmetric
	November 1995	No preference	Symmetric

could not decide between two different policy alternatives in the Fed staff's Bluebook, his preference was coded by averaging the two Bluebook alternatives. Third, when policymakers discussed their views in terms of the Bluebook alternatives but did not give adequate information to interpret their opinion, the Bluebook was obtained and used to remedy the confusion.⁹ Fourth, a preference for a "small" change in the funds rate was interpreted as equivalent to a change of 25 basis points, as this was the magnitude of the smallest change considered over most of the sample period.¹⁰

The preference dataset does not adequately reflect the complexity of the meeting debate in two circumstances when a change in policy was contingent on the success of some other policy initiative (the passage of the federal budget in October 1990) or linked to some other Fed policy change (a move in the discount rate in November 1991). Finally, as discussed in Thornton and Wheelock (2000), the transcripts reveal some disagreements with respect to the purpose of the bias in the policy directive. At times, policymakers differentiate between a "hard" and "soft" asymmetry in the policy bias, with the former indicating a greater likelihood of subsequent interest rate change than the latter. In constructing the preference dataset, I did not distinguish between these two types of asymmetry.

The dataset examines only face-to-face FOMC meetings and excludes conference calls. From 1989 through 1997, there were 39 conference calls,

most of which took place before 1995. Eighteen of the calls dealt with issues not related to the setting of the federal funds rate, while 12 were discussions of the economic situation; in the remaining 9, Greenspan announced a change in short-term interest rates.¹¹ A formal vote was not taken during these conference calls, although, on two occasions, Greenspan proposed a change in the funds rate and solicited views from participants.

WHAT DO THE PREFERENCE DATA TELL US?

In this section, I use the dataset of voiced preferences to answer three questions:

1. How often was Greenspan's initial proposal the voted outcome of an FOMC meeting?
2. Did policymakers who did not cast an official vote behave the same as the ones who did?
3. How often did voting policymakers change their position after voicing an opinion?

Table 2 provides an answer to the first question. Greenspan's interest rate proposals were adopted by the Committee in all cases.¹² With regard to the bias, on two occasions the outcome voted by the FOMC differed from Greenspan's initial proposal and on another two occasions he expressed no preference. It is not possible from

⁹ Bluebooks from 15 FOMC meetings were used in the construction of the dataset.

¹⁰ Since August 1989, the FOMC has changed its target for the funds rate in multiples of 25 basis points.

¹¹ In three of the nine instances in which Greenspan announced an adjustment to the target for the federal funds rate, the Board had voted for a change in the discount rate just prior to the conference call.

¹² In October 1990, Greenspan's proposal for a 25-basis-point easing was contingent on the passage of the federal budget. Although the official outcome of the meeting yielded no immediate change in the funds rate, the FOMC voted on and agreed to Greenspan's contingency action.

Table 3**Preferences Voiced in Round 2 and Official Votes: FOMC Meetings, 1989-97**

	Non-voters		Voters	
	Total	Disagreement (%)	Total	Disagreement (%)
Voiced rate	477	34.0	728	28.2
Voiced bias	376	44.1	641	49.1
Official vote (rate/bias)			732	7.5

Table 2 to determine whether the success of Greenspan's proposals arose because he accurately anticipated the group's view or whether there existed some internal pressure not to disagree with him.

The answer to question 2 can be seen in Table 3, which breaks down the voiced preferences into those expressed by non-voters and those expressed by policymakers ("voters") who cast an official FOMC vote: 34 percent of non-voters voiced disagreement with Greenspan's interest rate proposal, as compared with only 28 percent of voters. Using binomial proportions, it is possible to test whether 34 percent is significantly different from 28 percent (the alternative hypothesis) against the null hypothesis that the two percentages are equal.¹³ The test statistic is 2.14, and the difference in disagreement rates is statistically significant at the 5 percent level. Non-voters were less likely than voters to express disagreement with Greenspan's bias proposal—44 percent vs. 49 percent, respectively—but this difference is not statistically significant.¹⁴

More striking, however, is the disparity between the disagreement rate based on voiced preferences and the 7.5 percent dissent rate in official votes. In answer to question 3, it is clear that voters frequently advocated one policy but voted for another. Thus, disagreement in the internal discussion cannot be ascertained by look-

ing at the published votes. What explains this? It may well be the case that when a policymaker disagreed with Greenspan, but his disagreement was small, then he would voice disagreement but not cast an official dissent. This would suggest some "threshold" for the difference between the policymaker's preferred interest rate and Greenspan's proposed setting, above which a voting policymaker would dissent, but below which he would not.¹⁵ Such "threshold" behavior might reflect a belief that a large number of official dissents would weaken the Federal Reserve as an institution. It might also reflect a view that, since it is the Fed Chairman who must testify in Congress and justify monetary policy decisions, a policymaker should support the Chairman when possible. Finally, since monetary policy is a dynamic process, policymakers may desire to express their preferences during FOMC deliberations in order to have an influence on future policy, even if they do not cast a dissenting vote at that meeting. Whatever the reason for the discrepancy between voiced disagreement and official dissent, the data confirm the description of FOMC deliberations in Blinder et al. (2001).

Interestingly, a study by Epstein, Segal, and Spaeth (2001) found a very similar discrepancy in the dissent rates of official decisions and internal conference votes (9 percent vs. 40 percent, respectively) for the U.S. Supreme Court in the late 1800s. Monetary policymakers at the Bank of England have been more inclined to dissent in their official votes than FOMC members (the dissent rate averaged 17 percent from mid-1998 to

¹³ The test statistic,

$$Z = (p_1 - p_2) / \sqrt{p^*(1-p)^* [(1/n_1) + (1/n_2)]}$$

where p_1 is the percentage of voters voicing disagreement and p_2 is the percentage of non-voters voicing disagreement, is distributed approximately normally.

¹⁴ The test statistic is 1.54.

¹⁵ Meade and Sheets (2004) formulate this sort of model of FOMC voting behavior.

Table 4**Policymakers Who Voiced Rate Disagreement in Round 2 and Cast an Official Assent: FOMC Meetings, 1989-97**

	Official vote			Total
	-1	0	+1	
Rate preference voiced in round 2				
-1	0	22	0	22
+1	0	26	0	26

mid-2002); but, as no record of internal discussions is publicly available, it is not possible to compare their official dissent rate with their internal disagreement rate. The Bank requires its Monetary Policy Committee members to be “individually accountable” for their votes, and this requirement may tend to counteract pressure to vote as a group.

THE ROLE OF THE BIAS IN THE POLICY DIRECTIVE

Over the 1989-97 period studied in this paper, an official FOMC vote was cast for a short-term interest rate and policy bias combination. My preference dataset records views about these two “dimensions” separately. Although some studies have looked at whether the bias is a good predictor of future short-term interest rates, I am interested to examine another aspect of the bias—that it aided in the formation of consensus. Thornton and Wheelock (2000) have also tested the consensus-formation hypothesis; they found that in 135 meetings from 1983-99 the FOMC was more likely to adopt asymmetric directives when it voted not to change the target for the federal funds rate. All of the prior studies that have examined the role played by the bias (consensus-formation or otherwise) have used data on the federal funds rate and the direction of the bias.

Although it is not clear at first glance how FOMC voters weighed the two “dimensions” of the decision when casting their vote, as stated earlier it seems likely that the level of the short-term interest rate figured more importantly than

the bias in the policy directive.¹⁶ Thus, I assume that an official FOMC vote represents a vote on the interest rate and can be compared to the voiced preference on that rate, and, given that assumption, I investigate the role played by the bias.

The role played by the bias is tested by examining whether voters who voiced disagreement with Greenspan’s proposed interest rate but then cast an official vote in support of that interest rate could have been influenced by the bias. For example, a voter who voiced a preference for reducing short-term rates might have been willing to support Greenspan’s proposal for no change in interest rates if he thought that an asymmetric bias toward easing would increase the probability that future policy would be appropriate.¹⁷ The precise test is as follows: For the voters who voice rate disagreement but cast an official *assent* (see Table 4), I examine whether the policy bias adopted by the FOMC goes in the direction of the original rate preference expressed by the policymaker (the alternative hypothesis) or whether the policy bias adopted appears unrelated to the original rate preference (the null hypothesis). Table 5 shows that, for 19 of 22 cases in which a policymaker voiced a preference for lower interest rates but cast an assenting vote, the adopted bias was asymmetric toward easing; for 13 of 26 cases in which

¹⁶ In addition, transcripts from a number of FOMC meetings include debate among policymakers about the meaning of the bias, indicating that there was no single interpretation of its role.

¹⁷ Lapp and Pearce (2000) find that an asymmetric policy directive increases the probability of a change in the federal funds target in the direction of the asymmetry. However, they do not test whether target changes are more frequent under asymmetric directives. Thornton and Wheelock (2000) do not find evidence for this latter hypothesis.

Table 5**Voiced Rate Disagreement and Adopted Bias for Policymakers Who Voiced Rate Disagreement in Round 2 and Cast an Official Assent: FOMC Meetings, 1989-97**

	Bias adopted by FOMC			Total
	-1	0	+1	
Rate preference voiced in round 2				
-1	19	3	0	22
+1	4	9	13	26
Total	23	12	13	48

Table 6**Instances When Policymakers Voiced Rate Agreement in Round 2 and Cast an Official Dissent: FOMC Meetings, 1989-97**

Meeting date	Official	Rate proposal	Desired bias	Actual bias
March 1989	Seger	Agree	Symmetric	Tightening
August 1989	Guffey	Agree	Symmetric	Easing
October 1989	Guffey	Agree	Symmetric	Easing
December 1991	LaWare	Agree	Symmetric	Easing
	Melzer	Agree	Symmetric	Easing
June 1992	LaWare	Agree	Symmetric	Easing
	Melzer	Agree	Symmetric	Easing
August 1992	LaWare	Agree	Symmetric	Easing
	Melzer	Agree	Symmetric	Easing
October 1992	LaWare	Agree	Symmetric	Easing
	Melzer	Agree	Symmetric	Easing
November 1992	LaWare	Agree	Symmetric	Easing
	Melzer	Agree	Symmetric	Easing
May 1993	Boehne	Agree	Symmetric	Tightening

a policymaker voiced a preference for higher interest rates but cast an assenting vote, the adopted bias was asymmetric toward tightening. A test of the hypothesis that the switch was related to the direction of the bias (32 of 48 cases) against the null hypothesis that the voiced rate preference and bias were independent results in a test statistic of 4.96¹⁸; the null hypothesis is rejected at the 1 percent level of significance.

¹⁸ Using the normal approximation to the binomial distribution, the test statistic is normally distributed with mean equal to np and variance equal to $np(1-p)$, where n is the total number of observations and p is the probability of occurrence under the null hypothesis.

This test ignores instances in which a policymaker voiced agreement with the rate proposal but subsequently voted against it. There are 14 such instances, individually documented in Table 6, and in all of these cases the voter voiced agreement with the rate proposal but cast an official dissent expressly *because* of the bias. Nine of these cases occurred during 1991-92, and involved two individuals—Board member LaWare and St. Louis Bank president Melzer. The FOMC transcripts indicate that LaWare and Melzer supported Greenspan's proposal for no change in the level of the funds target, but disagreed strongly with the

asymmetric policy directive toward ease (both officials called for a symmetric bias). Greenspan made six intermeeting adjustments to the federal funds target during 1991-92, and it could be that the LaWare and Melzer dissents were a reaction to these intermeeting adjustments. It is likely that Greenspan would have had less latitude for intermeeting adjustments to the funds target under the symmetric directive favored by LaWare and Melzer.¹⁹

CONCLUSION

This paper develops and uses an original dataset collected from the internal discussion of the Fed's monetary policy committee (the FOMC transcripts) to examine questions about the Committee's behavior. The data show that Greenspan's proposals, after Committee discussion, were nearly always adopted unmodified in the formal vote. Despite the external appearance of consensus with little disagreement over decisions and an official dissent rate of 7.5 percent, the data reveal that the rate of disagreement in internal Committee discussions was quite high—on the order of 30 percent for discussions of the short-term interest rate. And, under the assumption that FOMC voters assigned a higher priority to their preferences for the short-term interest rate than the bias in the policy directive, it can be shown that this bias was important for achieving consensus, which supports and extends the results of Thornton and Wheelock (2000). Thus, the novel dataset described in this paper helps to shed some light on the internal workings of the FOMC in the Greenspan years.

REFERENCES

- Bernanke, Ben S. and Mihov, Ilian. "Measuring Monetary Policy." *Quarterly Journal of Economics*, August 1998, 113(3), pp. 869-901.
- Blinder, Alan; Goodhart, Charles; Hildebrand, Philipp; Lipton, David and Wyplosz, Charles. *How Do Central*

Banks Talk? Geneva Reports on the World Economy, Number 3, London: Centre for Economic Policy Research, 2001.

- Board of Governors of the Federal Reserve System. Federal Open Market Committee Transcripts. Washington, DC: various years.
- Epstein, Lee; Segal, Jeffrey and Spaeth, Harold. "The Norm of Consensus on the U.S. Supreme Court." *American Journal of Political Science*, April 2001, 45(2), pp. 362-77.
- Greenspan, Alan. "Rules vs. Discretionary Monetary Policy." Speech delivered at Stanford University. Washington, DC: Board of Governors of the Federal Reserve System, September 1997. www.federalreserve.gov/newsevents.htm.
- Greenspan, Alan. Letter to Alfonse D'Amato, Chairman of the Committee on Banking, Housing and Urban Affairs, February 21, 1995.
- Hamilton, James D. and Jorda, Oscar. "A Model for the Federal Funds Rate Target." *Journal of Political Economy*, October 2002, 110(5), pp. 1135-67.
- Kalyvitis, Sarantis and Michaelides, Alexander. "New Evidence on the Effects of US Monetary Policy on Exchange Rates." *Economics Letters*, May 2001, 71(2), pp. 255-63.
- Lapp, John S. and Pearce, Douglas K. "Does a Bias in FOMC Policy Directives Help Predict Intermeeting Policy Changes?" *Journal of Money, Credit, and Banking*, August 2000, 32(3), pp. 435-41.
- Meade, Ellen and Sheets, Nathan. "Regional Influences on FOMC Voting Patterns." *Journal of Money, Credit and Banking*, 2005 (forthcoming).
- Meyer, Lawrence. *A Term at the Fed*. New York: Harper Collins, 2004.
- Thornton, Daniel L. "When Did the FOMC Begin Targeting the Federal Funds Rate? What the Verbatim Transcripts Tell Us." Working Paper 2004-015a, Federal Reserve Bank of St. Louis, March 2004.
- Thornton, Daniel L. and Wheelock, David C. "A History of the Asymmetric Policy Directive." Federal Reserve Bank of St. Louis *Review*, September/October 2000, 82(5), pp. 1-16.

¹⁹ Thornton and Wheelock (2000) suggest that the Chairman has more leeway to adjust interest rates during the intermeeting period under an asymmetric directive than under a symmetric directive.



Social Security versus Private Retirement Accounts: A Historical Analysis

Thomas A. Garrett and Russell M. Rhine

This paper compares Social Security benefits relative to those paid from private investments: specifically, whether 2003 retirees would gain more retirement income if they had invested their payroll taxes in private accounts during their working years. Three different retirement ages and four possible earnings levels are considered for two private investments—6-month CDs or the S&P 500. On average, the results suggest less than 5 percent of current retirees would receive a higher monthly benefit with Social Security. Several Social Security reform proposals are described.

Federal Reserve Bank of St. Louis *Review*, March/April 2005, 87(2, Part 1), pp. 103-21.

INTRODUCTION

The Social Security Act of 1935 remains one of the largest and most enduring mandates of federal government activity.¹ Although the term Social Security is commonly used to refer to retirement benefits, the Social Security system has evolved over time to include other social welfare programs as well. Initially, the Act provided for only old-age retirement benefits (also called Old Age Insurance, or OAI). Benefits for survivors were added in 1939, and the system became known as OASI. Disability benefits were added in 1954 (OASDI). The final addition came in 1965, when Medicare was enacted, giving the present-day program the name OASDHI. As seen in Figure 1, Social Security, disability, and Medicare benefits are the largest expenditures of the federal government, with nearly \$725 billion (7 percent of gross domestic product, 34 percent of total federal spending) spent on OASDHI in 2003.² We focus specifically on OASDI and sim-

ply refer to this as Social Security throughout the remainder of the paper, unless noted otherwise.

Social Security (OASDI) is commonly referred to as a pay-as-you-go pension system.³ Rather than paying an individual benefits from a fund that they have built up over time (called a fully funded pension system), a pay-as-you-go system relies on tax revenue from current workers to fund the benefits of current recipients. Over 47 million Americans received benefits through the OASDI system in 2003 (roughly 16 percent of the U.S. population).⁴ Considering only retirees and their dependents, nearly 33 million Americans received OASDI benefits in 2003 (roughly 11 percent of the U.S. population and 91 percent of the U.S. population over age 65). The system is funded by payroll taxes levied equally on employees and their employer up to a maximum income level (\$90,000 in 2005).⁵ The current tax rate for each employee and his employer is 6.2 percent (for a total rate

¹ Extensive academic research has addressed the economics of Social Security. For a discussion of Social Security's rate of return relative to private investments and the impact of Social Security on private savings, see Feldstein, Poterba, and Dicks-Mireaux (1981), Boskin (1977, 1978), Campbell and Campbell (1976), and Boskin and Hurd (1978).

² Transfer payments are not included in gross domestic product.

³ A true pay-as-you-go system takes in revenues only in the amount it disperses them to recipients. Social Security, however, has run surpluses and deficits over its history.

⁴ Based on Social Security data.

⁵ Income subject to OASDI payroll taxes was capped at \$3,000 in 1950, \$25,900 in 1980, and \$51,300 in 1990. See www.ssa.gov/OACT/COLA/cbb.html#Series for a complete history of all income limits.

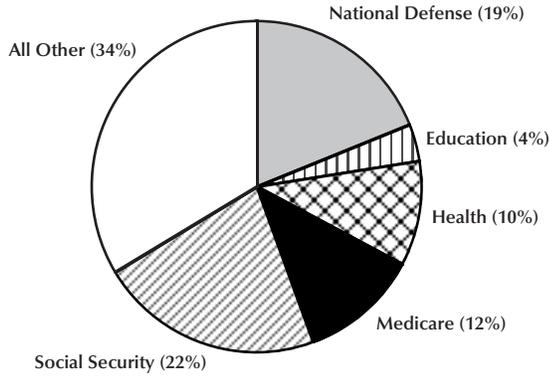
Thomas A. Garrett is a senior economist at the Federal Reserve Bank of St. Louis. Russell M. Rhine is an assistant professor at St. Mary's College of Maryland. Molly Dunn-Castelazo provided research assistance.

© 2005, The Federal Reserve Bank of St. Louis.

Figure 1

Major Federal Outlays

Percentage of Total Expenditures, 2003



SOURCE: Office of Management and Budget.

of 12.4 percent). Payroll tax rates have increased since the 1930s, as seen in Table 1.⁶

Since the inception of Social Security in 1937, for most years revenues coming in have been greater than expenditures going out. In 2003, for example, OASI trust fund revenues from payroll taxes totaled \$544 billion, while benefits summed to \$406 billion.⁷ By law, any surplus revenue must be credited to the Social Security trust fund. Trust fund monies are invested in federal government securities (Treasury securities) to earn a rate of return. There are no actual funds held in the trust fund; the federal government regularly uses these monies for both mandatory and discretionary purposes. The size of the Social Security trust fund was roughly \$1.4 trillion at the end of 2003.

⁶ Statistics on the Social Security system can be found at www.ssa.gov/OACT/STATS/index.html.

⁷ In addition to the direct contributions obtained from the payroll tax, there is an additional payment into the system. This payment is interest paid on Treasury securities that are held by the Social Security trust fund. The portfolio of Treasury securities earns interest income that is an expense to the federal government and subsequently to the taxpayer. This is a relatively small indirect Social Security income tax, less than 1 percent, but it is worth mentioning to accurately explain the source of funds to the system. The indirect Social Security tax rate is generated by finding the product of the percent of worker's income paid in federal income taxes and the percent of federal government expenditures paid as interest on the federal government debt held by the Social Security trust fund.

Table 1

Payroll Tax Rates

Calendar year	OASDI tax rate for employees and employers (each)
1937-49	1.000
1950	1.500
1951-53	1.500
1954-56	2.000
1957-58	2.250
1959	2.500
1960-61	3.000
1962	3.125
1963-65	3.625
1966	3.850
1967	3.900
1968	3.800
1969-70	4.200
1971-72	4.600
1973	4.850
1974-77	4.950
1978	5.050
1979-80	5.080
1981	5.350
1982-83	5.400
1984	5.700
1985	5.700
1986-87	5.700
1988-89	6.060
1990 and later	6.200

SOURCE: Social Security Administration: www.ssa.gov/OACT/ProgData/taxRates.html.

Revenues, expenditures, and the trust fund balances for selected years are shown in Table 2.

Prelude to a Crisis

The Social Security system remains quite solvent today, despite an increase in the number of benefit recipients and increasing expenditures as a percentage of total federal spending. As seen in Figure 2, the number of OASDI beneficiaries has increased from nearly 26 million in 1970 to over 47 million in 2003, which is an average

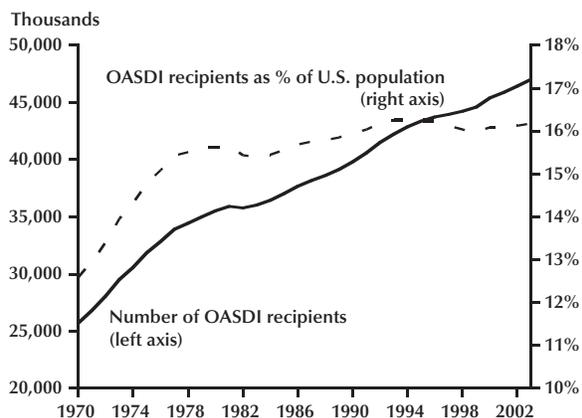
Table 2**OASI Trust Fund Data**

Calendar year	Total receipts (\$ thousands)	Total expenditures (\$ thousands)	Trust fund (\$ thousands)
1937	\$767,000	\$1,000	\$766
1940	368,000	62,000	2,031,000
1950	2,928,000	1,022,000	13,721,000
1960	11,382,000	11,198,000	20,324,000
1970	32,220,000	29,848,000	32,454,000
1980	105,841,000	107,678,000	22,823,000
1990	286,653,000	227,519,000	214,197,000
2000	490,513,000	358,339,000	930,836,000
2003	543,811,000	405,978,000	1,355,330,000

NOTE: The trust fund is the cumulating surpluses from all prior years. Trust funds for Medicare (HI) and Disability (DI) are not included.
SOURCE: Social Security Administration: www.ssa.gov/OACT/STATS/table4a1.html.

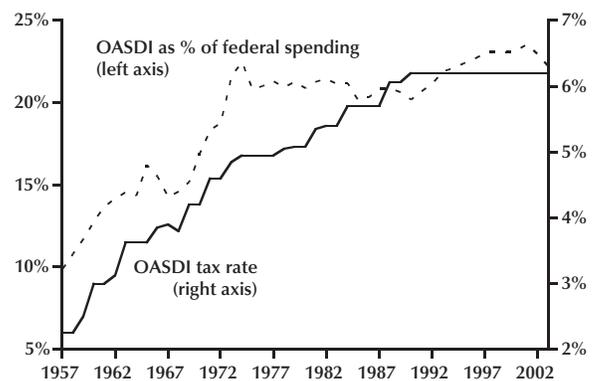
Figure 2**OASDI Recipients**

Total as a Percentage of the U.S. Population



SOURCE: www.ssa.gov/OACT/STATS/OASDIbenies.html and U.S. Bureau of the Census.

annual increase of 1.86 percent. In terms of the entire U.S. population, 12.6 percent received some OASDI benefit in 1970, compared with 16.2 percent in 2003. OASDI expenditures as a percentage of total federal spending rose from roughly 10 percent in 1957 to 22 percent in 2003, as seen in Figure 3.

Figure 3**OASDI Expenditures as Percent of Federal Spending and OASDI Payroll Tax Rate**

SOURCE: www.ssa.gov/OACT/ProgData/taxRates.html, www.ssa.gov/OACT/STATS/table4a3.html, and Office of Management and Budget.

Reasons for the rapid rise in Social Security expenditures include increases in the payroll tax rate (see Figure 3), an increase in the scope of coverage, the increasing longevity of the U.S. population, and an increase in the share of the elderly relative to the overall population. In 1950, there were 16.5 workers paying Social Security taxes for every retired person receiving benefits.

Table 3

Important Trust Fund Dates

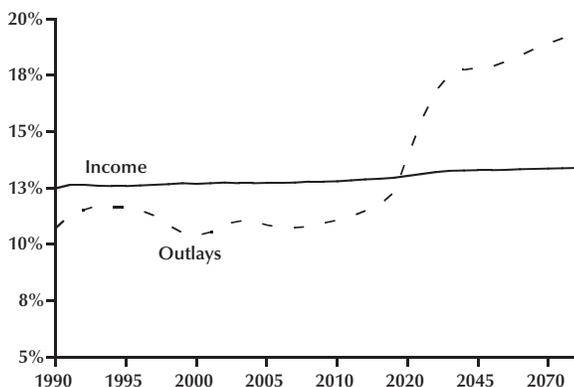
	OASI	DI	OASDI
First year outgo exceeds income, excluding interest	2018	2008	2018
First year outgo exceeds income, including interest	2029	2017	2028
Year trust fund assets are exhausted	2044	2029	2042

SOURCE: Board of Trustees, Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds (2004, Tables IV.B1, IV.B3, and VI.F1).

Figure 4

OASDI Income and Outlays

Percentage of Taxable Payroll



SOURCE: www.ssa.gov/OACT/TR/TR04/IV_LRest.html#wp257923.

Today the number is 3.31, and by 2030 there will be 2.17 workers paying taxes for every recipient.⁸ By 2030, there will be 70 million Americans of retirement age, compared with about 35 million today.⁹ Preserving the current Social Security system for the next 75 years would require an immediate increase in the payroll tax to 14.3 percent (from its current level of 12.4 percent) or a 13 percent reduction in all current and future benefits.¹⁰

⁸ Board of Trustees, Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds (2004, pp. 47-48).

⁹ Social Security Administration: www.ssa.gov.

¹⁰ Board of Trustees, Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds (2004, p. 56).

Forecasts for the continued solvency of the Social Security system are quite bleak. The Social Security and Medicare Boards of Trustees (2004) estimates that OASI inflows from payroll taxes will be less than projected benefits by 2018, and by 2044 the trust fund (which is currently \$1.4 trillion) will be exhausted (see Table 3). If disability insurance is also considered, the trust fund will be depleted in 2042. These projections assume no increase in the payroll tax. As seen in Figure 4, Social Security costs (expenditures to recipients) are expected to exceed payroll tax revenues by 2020, and deficit financing of Social Security will continue until the trust fund is “exhausted” around 2040.

Various solutions to preserving Social Security for America’s retirees have been proposed, such as raising payroll tax rates and cutting benefits. These are steps that would more or less preserve the current system and improve its solvency into the future. Another option would allow individuals to invest some of their payroll taxes in private retirement accounts. Unlike cutting benefits or raising payroll taxes, a move in this direction would produce a social retirement system quite different from the current Social Security system.

Our Objective

Social Security reform proposals range from maintaining the current system to a complete revamping of social insurance in the United States by allowing individuals to invest their payroll tax contributions in private retirement accounts.¹¹

¹¹ Many of these proposals will be discussed later in the paper.

Table 4

Summary of Assumptions

- All contributions (both employee and employer) to the Social Security system are invested into the private investment.
- The investments increase at the actual rate of return for each year.
- Investments are tax deferred—taxed at the time of distribution at the rate of 15 percent.
- The balance of the private investments continues to grow at the average real rate of return (average nominal rate of return minus the average inflation rate) after retirement in 2003.
- Individuals remain in their same earnings level their entire life.
- An individual is considered to be better off during retirement by privately investing as opposed to participating in Social Security if the amortized private investment balance at retirement is greater than the Social Security benefit payment.

NOTE: Our data and programs are available on the web site of the Research Division of the Federal Reserve Bank of St. Louis: research.stlouisfed.org/. The above assumptions can be altered within the programs to accommodate alternative analyses.

We argue that a crucial factor of any Social Security reform proposal is an analysis of the actual benefits received from Social Security compared with the benefits that would have been gained with a system of private retirement accounts during retirees' working years. Assessing the benefits of Social Security, in its current form, is an important policy question because it can guide the direction of Social Security reform. If a large percentage of the population has received a rate of return from Social Security that is greater than that which could have been obtained by investing in financial markets, then proposals that maintain or build on the current system would be preferable to a private investment approach to providing retirement benefits.

This paper provides a historical look at the benefits of Social Security relative to private investments. We conduct an analysis—according to various factors, such as income level and age at retirement—to determine who has benefited from the current system and who would have been better off had they been allowed to invest their Social Security contributions (payroll taxes) in a private retirement account throughout their working years. We ask, for people retiring in 2003, if their lifetime Social Security contributions were alternatively fully invested in a private account, would they have had a higher monthly income during retirement than they are receiving from Social Security.

WHO HAS BENEFITED?

Assumptions

We make several assumptions to easily compare individuals at a more aggregate level. The assumptions are four average levels of annual income, years of contributions to the Social Security system, the opportunity cost of Social Security contributions, and retirement age. The analysis also considers two different private investments. These assumptions will allow us to focus on a few age and income groups to investigate who has borne the costs of the current system and whether the benefits of the current system would have been exceeded by the use of private retirement accounts. Other assumptions used in our analysis are listed in Table 4.

Methods and Stipulations

To analyze the impact of the Social Security system on different types of individuals, it is necessary to determine the opportunity cost of the contribution (to what amount those contributions would have accumulated if they had been privately invested) and the disbursements from both Social Security and the alternative private investment. We calculate the exact amount of the contributions to the Social Security system and apply them to a market rate of return to obtain the opportunity cost of Social Security. Thus, we get the value of

Table 5**Private Portfolio Balance at Retirement in 2003 Based on an Alternative Investment in the S&P 500**

Retirement age/years working	Earnings level			
	Low	Average	High	Maximum
62/40 years	\$130,642	\$290,315	\$447,032	\$591,113
65/43 years	\$136,517	\$303,371	\$461,740	\$605,821
70/48 years	\$144,796	\$321,768	\$483,589	\$627,670

NOTE: Actual employee and employer contributions to the Social Security system are increased annually by the actual return of the S&P 500 Composite Index. See text for a description of earnings levels.

Table 6**Private Portfolio Balance at Retirement in 2003 Based on an Alternative Investment in 6-Month CDs**

Retirement age/years working	Earnings level			
	Low	Average	High	Maximum
62/40 years	\$94,775	\$210,611	\$319,148	\$416,787
65/43 years	\$100,771	\$223,934	\$334,159	\$431,798
70/48 years	\$109,201	\$242,668	\$356,394	\$454,033

NOTE: Actual employee and employer contributions to the Social Security system are increased annually by the 6-month CD rate. For the years 1961-63 and 1956-63 for those retiring at age 65 and 70, respectively, the 40-year average of 6-month CD rates is used. See text for a description of earnings levels.

the contributions to the Social Security system had the individual used those funds to make an alternative private investment.

To calculate the contributions into the Social Security system, we use four different levels of earnings and multiply those earnings by the corresponding OASDI tax rate for each year (see Table 1). We then multiply the contribution by 2 so that we capture both the employee and the employer contribution. A breakdown of the contributions is shown in the appendix. The earning groups we use are low earners (45 percent of the national average wage), average earners (national average wage), high earners (160 percent of the national average wage), and maximum earners (maximum wage subject to payroll tax).¹² In addition

¹² The national average wage is a time series of annual wage data that is generated by the Social Security Administration. See www.ssa.gov.

to considering different earnings, we also consider three different retirement ages: 62 years, 65 years, and 70 years.

The two market rates of return that we use in the analysis are the average monthly Standard and Poor's 500 Composite Index and the interest rate on 6-month certificates of deposits (CDs).¹³ These were chosen to account for different risk preferences of individual investors, realizing that some people would prefer to have their retirement investments in a relatively safe investment, such as CDs, rather than the stock market. We assume that CDs are rolled-over when they mature. The

¹³ The S&P 500 data is from the *Wall Street Journal* and the 6-month CD rate of return is from the Board of Governors of the Federal Reserve System. The composite index consists of 500 widely held common stocks of leading companies. Unlike the total return index, the composite index is the more conservative measure of market performance, in that it does not assume the reinvestment of dividends.

Table 7**Social Security Monthly Benefits in 2003**

Retirement age/years working	Earnings level			
	Low	Average	High	Maximum
62/40 years	\$575	\$947	\$1,242	\$1,412
65/43 years	\$701	\$1,157	\$1,512	\$1,721
70/48 years	\$832	\$1,386	\$1,785	\$2,045

NOTE: Monthly benefit payments are based on the 35 highest income years of work (income not to exceed the maximum level of taxable income) and are adjusted based on age at retirement. See text for a description of earnings levels.

SOURCE: Social Security Administration: www.ssa.gov/OACT/COLA/examples.html.

S&P 500 has an average annual return of about 8.5 percent over the past 56 years. The rate of return on 6-month CDs is lower than the S&P 500, at an average of about 6.9 percent over 40 years, and is much less volatile. Since CDs did not exist prior to 1964, the 40-year average is used for the earlier years.

The balance of an individual's investment at the time of retirement can be calculated by combining employee and employer contributions to the Social Security system and applying the market rate of return for each of the two private investments. A nominal rate of return is used because wages, and the corresponding contribution to the private investments, are in nominal terms.

There is no comparable rate of return for Social Security because the majority of contributions into the system are immediately paid out to beneficiaries. However, the trust fund rate of return is the interest earned on Treasury securities. This interest rate is lower than both the S&P 500 and the 6-month CD rate, about 5.9 percent, and applies only to a small portion of the payments into the system.¹⁴ Tables 5 and 6 show the balance of the two private portfolios, assuming retirement in the year 2003.¹⁵

¹⁴ This figure, 5.9 percent, is the 44-year average (1960-2003) for 6-month Treasury securities sold on the secondary market. Source: Board of Governors of the Federal Reserve System.

¹⁵ We assume that all four groups have the same labor productivity growth over time and that each group's factor endowments remain unchanged.

Calculation of Benefits

The Social Security Administration adjusts the level of monthly benefit payments depending on an individual's age at retirement. For individuals that choose early retirement, their monthly Social Security benefits are reduced, whereas benefits are increased for individuals that choose to delay retirement. The Social Security Administration considers normal retirement age to be 65 to 67 years old, early retirement to be 62 to 64 years old, and delayed retirement age to be greater than 67 years old. Table 7 shows the monthly Social Security benefits that an individual will receive in 2003 based on various retirement ages and earning levels. We assume that individuals do not change their level of earnings throughout their life.¹⁶

The private investment balance at the time of retirement is amortized over a range of 1 to 30 years to determine the level of monthly benefit payments. That is, assuming a constant real growth rate of the portfolio during retirement and a given number of life years, a fixed monthly payment is calculated.¹⁷ The portion of the S&P 500 portfolio that is not distributed continues to grow at a real rate of 4.61 percent during retirement. This real growth rate is the difference in the average rate of return of the S&P 500 and the average inflation rate

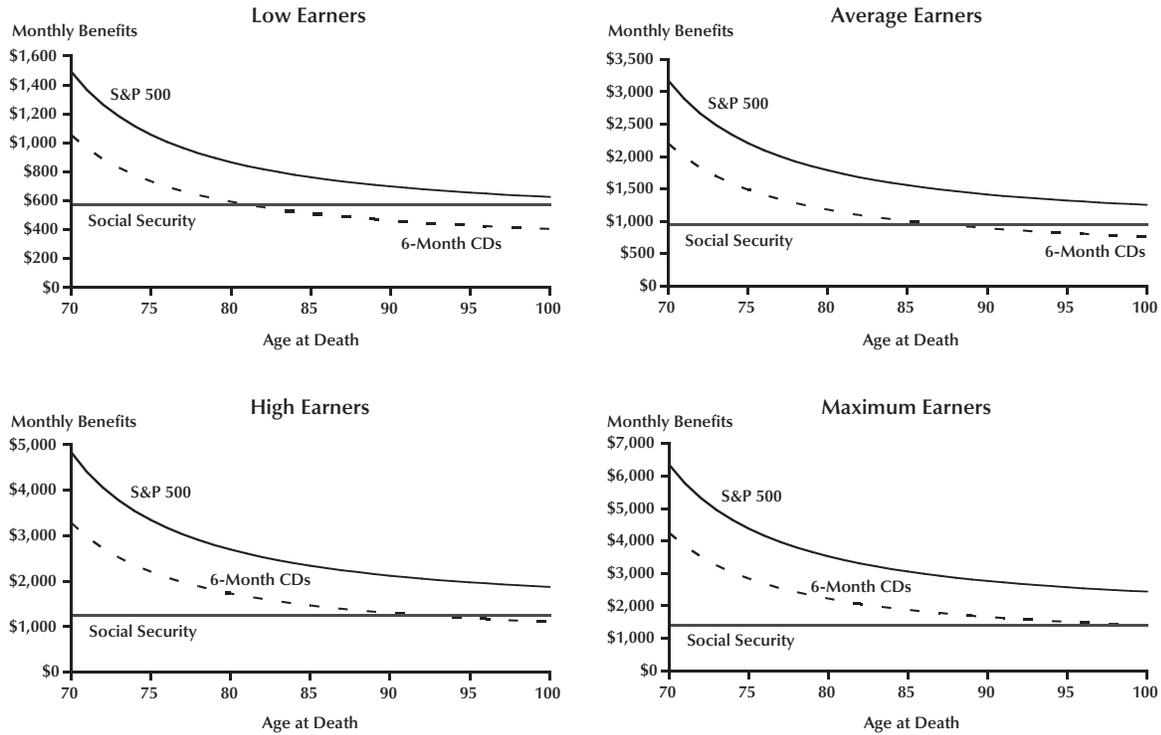
¹⁶ Earning estimates and monthly benefits are from the Social Security Administration, "Retirement Benefit Examples." See www.ssa.gov/OACT/COLA/examples.html.

¹⁷ The Excel PMT function is used to generate the monthly payment amount.

Figure 5

Monthly Benefits from Social Security, S&P 500, and 6-Month CDs

Retirement Age: 62



SOURCE: See the appendix for source information.

for the years 1948-2003 (8.49 percent – 3.88 percent). Similarly, the portion of the 6-month CD portfolio that is not distributed continues to grow at a real rate of 3.0 percent. This real growth rate is the difference in the average rate of return of the 6-month CDs (1964-2003) and the average inflation rate for the years 1948-2003 (6.88 percent – 3.88 percent). The Social Security benefit is constant because the annual increase in the Social Security benefit is simply a cost of living adjustment and does not increase in real terms. The private benefit decreases as the age at death increases because the portfolio balance is amortized over a longer period.

Results

Figures 5 through 7 show the real monthly benefit paid by Social Security and the real

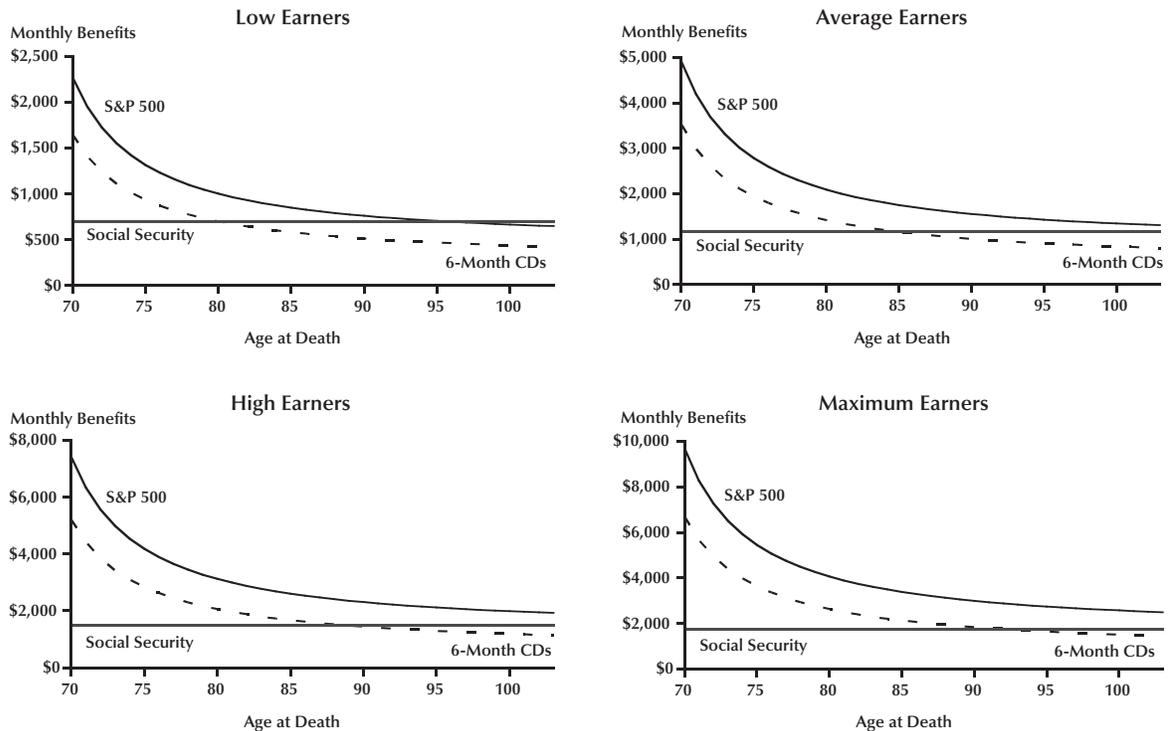
monthly benefit from the two amortized private portfolios for each of three different retirement ages. In reality, people do not know when they are going to die. However, it is clear that in most cases it does not matter how long people choose to amortize their savings—they will still receive a higher monthly payment from the private portfolio than the Social Security benefit. If people die early in retirement, or prior to retirement, their families receive a small death benefit (\$255) and survivor benefits (up to 100 percent) of the deceased spouse’s benefits. As long as a widowed spouse does not live beyond the age shown in Tables 8 and 9, he or she will receive a private investment benefit that is greater than the Social Security benefit.

Regarding taxes, we assume that the private investment accounts were tax deferred—that is, taxes are only paid on distributions during retire-

Figure 6

Monthly Benefits from Social Security, S&P 500, and 6-Month CDs

Retirement Age: 65



SOURCE: See the appendix for source information.

ment years. We assume a tax rate of 15 percent on distributions from private investment accounts.¹⁸ Tax law treats Social Security payments and disbursements from private accounts differently in terms of tax liability—100 percent of private account disbursements is considered as income, whereas only a portion of Social Security benefits is considered income.¹⁹ We assume no taxes are paid on Social Security benefits because annual Social Security disbursements fall below the minimum level of taxable income.

¹⁸ For 2003, the 15 percent tax bracket applied to a taxable income (total income less deductions and exemptions) of \$14,000 to \$56,800 (married filing jointly). We use a 15 percent tax bracket because most annual incomes at the time of death are within this range.

¹⁹ See <http://taxguide2002.completetax.com/text/c60s10d573.asp?style=8> or the instruction booklet for the 2003 Form 1040 at www.irs.gov for a discussion on the taxation of Social Security benefits.

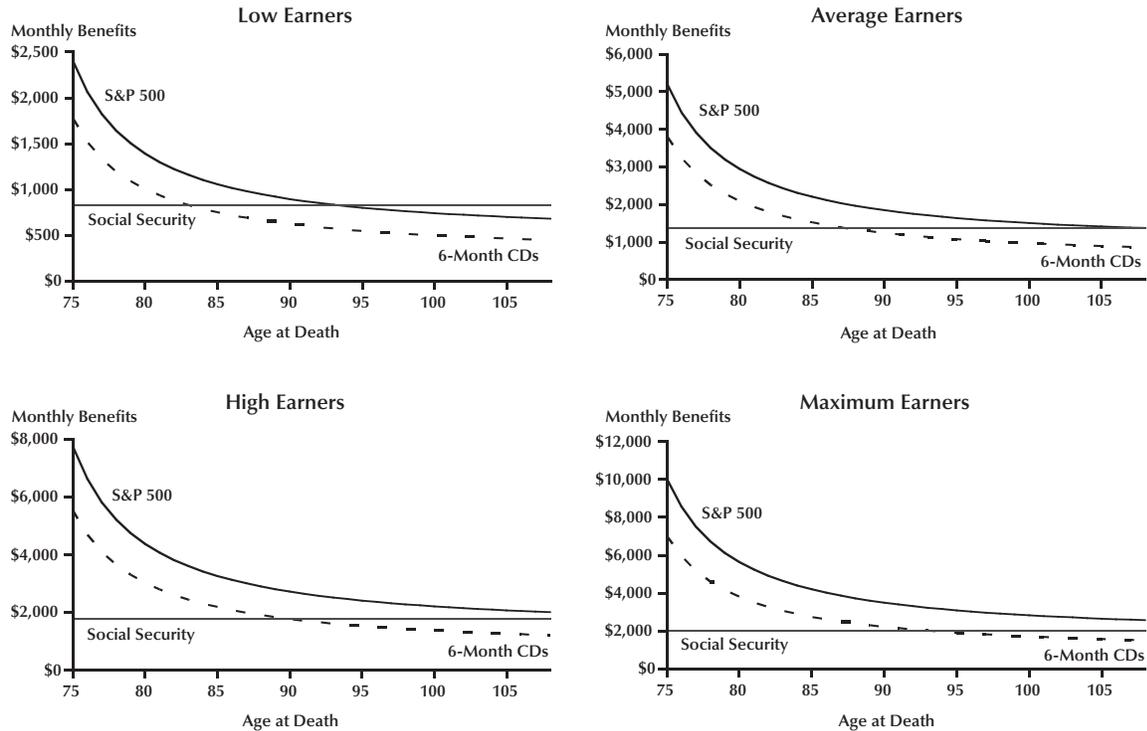
A comparison of the monthly private investment benefit with the Social Security benefit, for a given age at death, provides evidence on whether various age and income groups received a greater retirement benefit from Social Security than they would have from private investments. Using Figures 5 through 7, if either of the private investment benefits is greater than the Social Security benefit, then individuals in the specific age and income cohort received a lower monthly benefit from Social Security than if they had invested in a private retirement account during their working years.

Figures 5 through 7 provide the following conclusions: For those people retiring at age 62, none would benefit more from the current Social Security system relative to private investments in the S&P 500 (Figure 5). A person retiring at age 65

Figure 7

Monthly Benefits from Social Security, S&P 500, and 6-Month CDs

Retirement Age: 70



SOURCE: See the appendix for source information.

will only benefit more from Social Security relative to a private investment in the S&P 500 if he is a low earner and lives to be at least 96 years old (Figure 6). Finally, for those retiring at age 70, the only individuals that benefit more from Social Security are low earners who live to be at least 94 years old and average earners who live to be at least 108 years old, assuming an investment in the S&P 500 (Figure 7). Tables 8 and 9 provide a summary of which age and income groups benefit more from the Social Security system relative to the S&P 500 (Table 8) and the 6-month CDs (Table 9).²⁰

²⁰ We ignore the role of spousal benefits. Under current law, a spouse is guaranteed a benefit equal to half the monthly benefit of the higher earning spouse. As long as the monthly benefit from a private retirement account is less than 50 percent higher than the monthly Social Security benefits, the latter is preferred by single-earner couples.

We can now address the question of who has benefited more from the current Social Security system relative to a situation in which they had been allowed to invest their Social Security contributions in private retirement accounts throughout their working years.

First consider the S&P 500 (Table 8). The U.S. Census estimates that there are 415,000 people in the U.S. over the age of 94 and that the total U.S. population is 290,809,777 (as of 2003). Thus, the percentage of the population that is 95 years old or older is 0.14 percent of the U.S. population. If we assume that this age group is evenly distributed over the four income groups, then roughly 0.04 percent (4 of every 10,000) of the current total U.S. population would benefit more from Social Security than from a retirement investment in the S&P 500.

Table 8**Those Who Would Benefit More from the Social Security System (by Age) Compared with an Alternative Investment in the S&P 500**

Retirement age/years working	Earnings level			
	Low	Average	High	Maximum
62/40 years	None	None	None	None
65/43 years	96 or older	None	None	None
70/48 years	94 or older	108 or older	None	None

NOTE: These beneficiaries are based on Figures 5 through 7 and the corresponding tables. See text for a description of earnings levels.

Table 9**Those Who Would Benefit More from the Social Security System (by Age) Compared with an Alternative Investment in 6-Month CDs**

Retirement age/years working	Earnings level			
	Low	Average	High	Maximum
62/40 years	81 or older	88 or older	93 or older	100 or older
65/43 years	81 or older	86 or older	89 or older	94 or older
70/48 years	83 or older	88 or older	91 or older	93 or older

NOTE: These beneficiaries are based on Figures 5 through 7 and the corresponding tables. See text for a description of earnings levels.

A similar analysis can be done for an investment in 6-month CDs (Table 9). The number of people in the U.S. that are 80 years old or older is 10,130,000, or 3.5 percent of the total U.S. population. Because certain age and income groups would benefit more from Social Security relative to 6-month CD investments if they lived long enough, 3.5 percent is an upper bound on the percentage of the U.S. population that would benefit more from Social Security relative to a retirement investment in 6-month CDs.

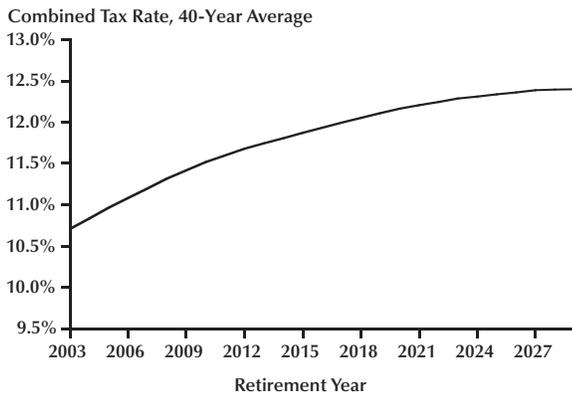
It is also interesting that the number of people who benefit overall from the current system will decrease in the future as the average annual tax rate increases and benefit calculations remain unchanged. Since those people retiring in 2003 have not always paid into the system at the current high rate of 12.4 percent, their average tax rate is only 10.7 percent, assuming 40 years of work. This average tax rate will increase in later years as

future retirees have fewer years paid in at lower tax rates and more years paid in at a higher rate (assuming 40 years of work). Figure 8 illustrates how future retirees will be paying a higher average tax rate over their working life, even if the current tax rate is unchanged. This will further reduce the number of people that benefit from the current Social Security system.

It can be argued that some individuals will not realize the importance of investing for retirement and, therefore, the government should provide a means of income for retirees. While this is an interesting argument, it is a debatable question that we are leaving for the politicians and voters. From our numerical analysis, we find that over 99 percent of the U.S. population would have earned a greater return by investing in the S&P 500, and over 95 percent would have earned a greater return by investing in 6-month CDs relative to the current Social Security system. Although a common criti-

Figure 8

Average Annual Combined Employee and Employer Social Security Tax Rate



NOTE: Average tax rate paid over 40 years of work assuming no payroll tax increase from the current rate of 12.4 percent.
SOURCE: www.ssa.gov/OACT/ProgData/taxRates.html.

cism of investing future retirement funds in the stock market is the risk of a significant downturn in the market at the time of retirement, our analysis considered the recent market downturn and all other downturns over the past 56 years. Despite these market fluctuations, a long-term investment in the S&P 500 for a 2003 retiree would have yielded a greater monthly income than is provided under the current Social Security system.²¹

THE FUTURE OF SOCIAL SECURITY

There is overwhelming evidence that the current Social Security system will become insolvent within the next several decades. As such, there is an extensive academic literature on the subject.²² Policymakers are becoming more aware of the problem, and numerous proposals to improve the solvency of Social Security have been raised.

²¹ For the years 2001, 2002, and 2003, the S&P 500 index had returns of -16.45 percent, -16.48 percent, and -3.20 percent, respectively.

²² See Geanakoplos, Mitchell, and Zeldes (1998a,b), Kotlikoff, Smetter, and Walliser (1999), Fuster (1999), and Cooley and Soares (1999).

These proposals consist of one or more of four basic elements: (i) increasing payroll taxes, (ii) decreasing benefits, (iii) using revenues from the general fund, and (iv) allowing individuals or the government to invest some or all of an individual's payroll tax in financial markets, which typically have a higher rate of return than Social Security.²³

Several proposals to reform Social Security are overviewed below, each containing one or more of the four elements described above²⁴:

- **Social Security Guarantee Plan.** This plan relies on revenues from the general fund to finance private accounts for individuals. These private accounts have a rate of return higher than that of government securities. The government's contribution to a private account would be equal to 2 percent of the individual's wage (up to the Social Security wage cap). An individual's total benefit (Social Security + market return) would be guaranteed to never fall below the Social Security defined benefit obtained without market investment. Payroll taxes would be reduced under this plan, and Social Security benefits would not be reduced.
- **Trust Fund Investment Plans.** Up to 15 percent of the Social Security trust fund would be invested in equities, and additional monies would be transferred from the general fund to the Social Security trust fund. Unlike the Social Security Guarantee Plan, which invests payroll taxes in private accounts, this plan directly invests a portion of the trust fund in equities. No change in payroll taxes would be required under this plan, but a reduction in Social Security benefits would occur.
- **Social Security Solvency Act of 1999.** This plan would initially cut payroll taxes by 2 percentage points and allow voluntary contributions in private accounts in the

²³ Numerous Social Security reform proposals are discussed in Lyon and Stell (2000), Pecchenino and Pollard (1998), Auerbach and Kotlikoff (1985), Feldstein (1975), Gramlich (1996), Diamond and Orszag (2003), and the Concord Coalition at www.concordcoalition.org/entitlements/ss_summaries.html, and the Social Security Reform Center at www.socialsecurityreform.org.

²⁴ See Lyon and Stell (2000) for a detailed discussion of each plan.

amount of 1 percent of wages (1 percent also matched by employer). Social Security benefits would be cut, and the payroll tax would be increased 3.3 percentage points in 2029.

- **Bipartisan Social Security Reform Plan.**

Two percentage points of the payroll tax would be transferred into private accounts. The reduction in payroll tax revenue would be replaced with monies from the general fund. No payroll tax changes would occur under this plan, and Social Security benefits would be reduced depending upon the return from private accounts.

Currently, no plan for Social Security reform has moved beyond the proposal stage because of the highly political nature of each of the reform elements. Certainly, current retirees and those individuals approaching retirement would not favor a cut in benefits. However, current workers would probably not favor an increase in payroll taxes. These workers, however, are likely to be more amenable to private investment accounts than current retirees. Different age cohorts will favor different alternatives. When (or if) a Social Security reform plan is passed, it is likely to be the one favored by the age cohort wielding the greatest political influence.

Given the political nature of Social Security reform, it is unlikely that any initial reform would allow individuals to invest all of their payroll tax contributions in private retirement accounts. Our findings suggest that an initial Social Security reform plan could include at least some investment in private retirement accounts. However, cost and subsequent coverage may be an obstacle in the transition toward private investment retirement accounts. Over time, if some or all of payroll tax revenue was diverted to private funds, the federal government would have to increase debt issuance, raise taxes, or reduce benefits to continue providing traditional Social Security for America's seniors. Higher payroll taxes may restore the solvency of the system, but large increases in this tax are likely to have distortionary effects on labor supply and productivity. Decreased benefits, too, may continue the solvency of Social Security, but this reduction could be detrimental to individuals

relying solely on Social Security as their means of income. Furthermore, transferring revenues from the general fund to the trust fund may require an increase in other taxes in order to maintain the size of the general fund. In short, the general equilibrium effects of any Social Security reform plan should be fully understood when evaluating any change to the system.

The three plans discussed earlier that provide for private investment accounts would have significant costs, as measured by transfers from the general fund or other nonpayroll sources for the period 2000-73: Social Security Guarantee Plan, \$41 trillion; Social Security Solvency Act, \$2 trillion; and the Bipartisan Plan, \$31 trillion. Although a move to private investments is costly, both the public and elected officials must decide whether the cost of doing nothing to the current Social Security system is more than the cost of fixing it.

As mentioned, another concern over private retirement accounts is volatility. Relative to Social Security, investment in private accounts will generate a higher return at the expense of greater volatility. The fear of many opponents of private retirement accounts is that a large drop in the stock market occurring months before an individual's planned retirement would significantly reduce their retirement income. However, our analysis considered the most recent market downturn, as well as all other downturns occurring in the past 56 years, and revealed that investment in private retirement accounts would have yielded a monthly retirement benefit greater than that received from the current Social Security system.

What the future Social Security system may look like is unclear, but it is clear that the future solvency of the current system is in jeopardy. Policymakers and the public are slowly realizing the impending crisis, and numerous plans to restore the solvency of Social Security or provide adequate benefits to retirees have been proposed. However, the highly political nature of Social Security means that final adoption of any proposal will be the result of a tough fight among competing political interest groups. Hopefully, this paper can provide a direction for discussion on Social Security reform through its analysis of rates of

Garrett and Rhine

return under Social Security versus private retirement accounts. While we are not advocating for one system over another, our evidence suggests that a great majority of current retirees would have had a higher retirement income under private accounts than they do now with the current Social Security system.

REFERENCES

- Auerbach, Alan J. and Kotlikoff, Laurence J. "Simulating Alternative Social Security Responses to the Demographic Transition." *National Tax Journal*, June 1985, 38(2), pp. 153-68.
- Board of Trustees, Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds. "The 2004 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds." March 23, 2004. Available at www.socialsecurity.gov/OACT/TR/TR04/index.html.
- Boskin, Michael J. "Social Security and Retirement Decisions." *Economic Inquiry*, January 1977, 15(1), pp. 1-25.
- Boskin, Michael J. "Taxation, Saving, and the Rate of Interest." *Journal of Political Economy*, April 1978, 86(2, Part 2), pp. S3-27.
- Boskin, Michael J. and Hurd, Michael D. "The Effect of Social Security on Early Retirement." *Journal of Public Economics*, December 1978, 10(3), pp. 361-77.
- Campbell, Colin D. and Campbell, Rosemary G. "Conflicting Views on the Effect of Old-Age and Survivors Insurance on Retirement." *Economic Inquiry*, September 1976, 14(3), pp. 369-88.
- Cooley, Thomas F. and Soares, Jorge. "Privatizing Social Security." *Review of Economic Dynamics*, July 1999, 2(3), pp. 731-55.
- Diamond, Peter A. and Orszag, Peter R. *Saving Social Security*. Washington, DC: Brookings Institution Press, 2003.
- Feldstein, Martin. "Toward a Reform of Social Security." *Public Interest*, Summer 1975, No. 40, pp. 75-95.
- Feldstein, Martin; Poterba, James M. and Dicks-Mireaux, Louis. "The Effective Tax Rate and the Pretax Rate of Return." NBER Working Paper No. 740, National Bureau of Economic Research, September 1981.
- Fuster, Luisa. "Is Altruism Important for Understanding the Long-Run Effects of Social Security?" *Review of Economic Dynamics*, July 1999, 2(3), pp. 616-37.
- Geanakoplos, John; Mitchell, Olivia S. and Zeldes, Stephen P. "Would a Privatized Social Security System Really Pay a Higher Rate of Return?" NBER Working Paper No. 6713, National Bureau of Economic Research, August 1998a.
- Geanakoplos, John; Mitchell, Olivia S. and Zeldes, Stephen P. "Social Security Money's Worth." NBER Working Paper No. 6722, National Bureau of Economic Research, September 1998b.
- Gramlich, Edward M. "Different Approaches for Dealing with Social Security." *Journal of Economic Perspectives*, Summer 1996, 10(3), pp. 55-66.
- Kotlikoff, Laurence J.; Smetters, Kent and Walliser, Jan. "Privatizing Social Security in the United States—Comparing the Options." *Review of Economic Dynamics*, July 1999, 2(3), pp. 532-74.
- Lyon, Andrew B. and Stell, John L. "Analysis of Current Social Security Reform Proposals." *National Tax Journal*, September 2000, 53(3, Part 1), pp. 473-514.
- Pecchenino, Rowena A. and Pollard, Patricia S. "Reforming Social Security: A Welfare Analysis." Federal Reserve Bank of St. Louis *Review*, March/April 1998, 80(2), pp. 19-30.

Appendix Table A1

Low Earners

Year	Low earnings (45% of AWI)*	Tax rate (employer and employee)	6-Month CD rate of return	S&P 500 rate of return	Low contribution [†]	Low fund balance (6- month CD) [‡]	Low fund balance (S&P 500 account) [‡]
1956	\$1,590	4.00%	6.88%**	15.14%	\$64	\$68	\$73
1957	\$1,639	4.50%	6.88%**	-4.81%	\$74	\$151	\$140
1958	\$1,653	4.50%	6.88%**	4.19%	\$74	\$241	\$223
1959	\$1,735	5.00%	6.88%**	24.09%	\$87	\$351	\$385
1960	\$1,803	6.00%	6.88%**	-2.66%	\$108	\$490	\$480
1961	\$1,839	6.00%	6.88%**	18.66%	\$110	\$642	\$700
1962	\$1,931	6.25%	6.88%**	-5.87%	\$121	\$815	\$773
1963	\$1,978	7.25%	6.88%**	11.99%	\$143	\$1,025	\$1,026
1964	\$2,059	7.25%	3.82%	16.47%	\$149	\$1,219	\$1,369
1965	\$2,096	7.25%	4.43%	8.36%	\$152	\$1,432	\$1,648
1966	\$2,222	7.70%	5.63%	-3.30%	\$171	\$1,693	\$1,759
1967	\$2,346	7.80%	5.21%	7.83%	\$183	\$1,974	\$2,094
1968	\$2,507	7.60%	6.00%	7.36%	\$191	\$2,294	\$2,453
1969	\$2,652	8.40%	7.89%	-0.87%	\$223	\$2,716	\$2,652
1970	\$2,784	8.40%	7.66%	-14.94%	\$234	\$3,175	\$2,455
1971	\$2,924	9.20%	5.22%	18.11%	\$269	\$3,624	\$3,217
1972	\$3,210	9.20%	5.02%	11.10%	\$295	\$4,116	\$3,902
1973	\$3,411	9.70%	8.31%	-1.62%	\$331	\$4,816	\$4,164
1974	\$3,614	9.90%	9.98%	-22.88%	\$358	\$5,690	\$3,487
1975	\$3,884	9.90%	6.89%	4.00%	\$385	\$6,493	\$4,027
1976	\$4,152	9.90%	5.62%	18.40%	\$411	\$7,292	\$5,254
1977	\$4,401	9.90%	5.92%	-3.73%	\$436	\$8,185	\$5,478
1978	\$4,750	10.10%	8.61%	-2.23%	\$480	\$9,412	\$5,825
1979	\$5,166	10.16%	11.44%	7.29%	\$525	\$11,073	\$6,812
1980	\$5,631	10.16%	12.99%	15.30%	\$572	\$13,158	\$8,514
1981	\$6,198	10.70%	15.77%	7.80%	\$663	\$16,001	\$9,894
1982	\$6,539	10.80%	12.57%	-6.51%	\$706	\$18,808	\$9,910
1983	\$6,858	10.80%	9.27%	33.99%	\$741	\$21,361	\$14,272
1984	\$7,261	11.40%	10.68%	0.03%	\$828	\$24,558	\$15,104
1985	\$7,570	11.40%	8.25%	16.44%	\$863	\$27,517	\$18,592
1986	\$7,795	11.40%	6.51%	26.49%	\$889	\$30,254	\$24,642
1987	\$8,292	11.40%	7.00%	21.36%	\$945	\$33,382	\$31,053
1988	\$8,700	12.12%	7.90%	-7.34%	\$1,054	\$37,158	\$29,752
1989	\$9,045	12.12%	9.08%	21.48%	\$1,096	\$41,728	\$37,474
1990	\$9,463	12.40%	8.17%	3.63%	\$1,173	\$46,407	\$40,051
1991	\$9,815	12.40%	5.91%	12.44%	\$1,217	\$50,438	\$46,403
1992	\$10,321	12.40%	3.76%	10.50%	\$1,280	\$53,665	\$52,690
1993	\$10,410	12.40%	3.28%	8.58%	\$1,291	\$56,758	\$58,612
1994	\$10,689	12.40%	4.96%	1.98%	\$1,325	\$60,962	\$61,122
1995	\$11,118	12.40%	5.98%	17.66%	\$1,379	\$66,069	\$73,540
1996	\$11,661	12.40%	5.47%	23.85%	\$1,446	\$71,205	\$92,871
1997	\$12,342	12.40%	5.72%	30.10%	\$1,530	\$76,899	\$122,812
1998	\$12,988	12.40%	5.44%	24.25%	\$1,610	\$82,784	\$154,590
1999	\$13,711	12.40%	5.46%	22.30%	\$1,700	\$89,095	\$191,135
2000	\$14,470	12.40%	6.58%	7.59%	\$1,794	\$96,872	\$207,580
2001	\$14,815	12.40%	3.64%	-16.45%	\$1,837	\$102,303	\$174,971
2002	\$14,963	12.40%	1.81%	-16.48%	\$1,855	\$106,040	\$147,688
2003	\$15,329	12.40%	1.17%	-3.20%	\$1,901	\$109,201	\$144,796

Appendix Table A2

Average Earners

Year	Average earnings (AWI)*	Tax rate (employer and employee)	6-Month CD rate of return	S&P 500 rate of return	Average contribution†	Average fund balance (6-month CD)‡	Average fund balance (S&P 500 account)‡
1956	\$3,532	4.00%	6.88%**	15.14%	\$141	\$151	\$163
1957	\$3,642	4.50%	6.88%**	-4.81%	\$164	\$337	\$311
1958	\$3,674	4.50%	6.88%**	4.19%	\$165	\$536	\$496
1959	\$3,856	5.00%	6.88%**	24.09%	\$193	\$779	\$855
1960	\$4,007	6.00%	6.88%**	-2.66%	\$240	\$1,090	\$1,066
1961	\$4,087	6.00%	6.88%**	18.66%	\$245	\$1,427	\$1,556
1962	\$4,291	6.25%	6.88%**	-5.87%	\$268	\$1,812	\$1,717
1963	\$4,397	7.25%	6.88%**	11.99%	\$319	\$2,277	\$2,280
1964	\$4,576	7.25%	3.82%	16.47%	\$332	\$2,709	\$3,042
1965	\$4,659	7.25%	4.43%	8.36%	\$338	\$3,181	\$3,662
1966	\$4,938	7.70%	5.63%	-3.30%	\$380	\$3,762	\$3,909
1967	\$5,213	7.80%	5.21%	7.83%	\$407	\$4,386	\$4,653
1968	\$5,572	7.60%	6.00%	7.36%	\$423	\$5,098	\$5,450
1969	\$5,894	8.40%	7.89%	-0.87%	\$495	\$6,034	\$5,894
1970	\$6,186	8.40%	7.66%	-14.94%	\$520	\$7,056	\$5,455
1971	\$6,497	9.20%	5.22%	18.11%	\$598	\$8,053	\$7,149
1972	\$7,134	9.20%	5.02%	11.10%	\$656	\$9,146	\$8,672
1973	\$7,580	9.70%	8.31%	-1.62%	\$735	\$10,703	\$9,254
1974	\$8,031	9.90%	9.98%	-22.88%	\$795	\$12,645	\$7,750
1975	\$8,631	9.90%	6.89%	4.00%	\$854	\$14,429	\$8,948
1976	\$9,226	9.90%	5.62%	18.40%	\$913	\$16,205	\$11,676
1977	\$9,779	9.90%	5.92%	-3.73%	\$968	\$18,190	\$12,173
1978	\$10,556	10.10%	8.61%	-2.23%	\$1,066	\$20,915	\$12,944
1979	\$11,479	10.16%	11.44%	7.29%	\$1,166	\$24,607	\$15,138
1980	\$12,513	10.16%	12.99%	15.30%	\$1,271	\$29,240	\$18,921
1981	\$13,773	10.70%	15.77%	7.80%	\$1,474	\$35,559	\$21,986
1982	\$14,531	10.80%	12.57%	-6.51%	\$1,569	\$41,796	\$22,023
1983	\$15,239	10.80%	9.27%	33.99%	\$1,646	\$47,469	\$31,715
1984	\$16,135	11.40%	10.68%	0.03%	\$1,839	\$54,572	\$33,565
1985	\$16,823	11.40%	8.25%	16.44%	\$1,918	\$61,148	\$41,317
1986	\$17,322	11.40%	6.51%	26.49%	\$1,975	\$67,230	\$54,761
1987	\$18,427	11.40%	7.00%	21.36%	\$2,101	\$74,183	\$69,007
1988	\$19,334	12.12%	7.90%	-7.34%	\$2,343	\$82,573	\$66,116
1989	\$20,100	12.12%	9.08%	21.48%	\$2,436	\$92,729	\$83,275
1990	\$21,028	12.40%	8.17%	3.63%	\$2,607	\$103,126	\$89,003
1991	\$21,812	12.40%	5.91%	12.44%	\$2,705	\$112,085	\$103,119
1992	\$22,935	12.40%	3.76%	10.50%	\$2,844	\$119,256	\$117,090
1993	\$23,133	12.40%	3.28%	8.58%	\$2,868	\$126,130	\$130,248
1994	\$23,754	12.40%	4.96%	1.98%	\$2,945	\$135,472	\$135,826
1995	\$24,706	12.40%	5.98%	17.66%	\$3,064	\$146,821	\$163,422
1996	\$25,914	12.40%	5.47%	23.85%	\$3,213	\$158,234	\$206,381
1997	\$27,426	12.40%	5.72%	30.10%	\$3,401	\$170,887	\$272,916
1998	\$28,861	12.40%	5.44%	24.25%	\$3,579	\$183,964	\$343,533
1999	\$30,470	12.40%	5.46%	22.30%	\$3,778	\$197,988	\$424,745
2000	\$32,155	12.40%	6.58%	7.59%	\$3,987	\$215,272	\$461,289
2001	\$32,922	12.40%	3.64%	-16.45%	\$4,082	\$227,340	\$388,825
2002	\$33,252	12.40%	1.81%	-16.48%	\$4,123	\$235,644	\$328,197
2003	\$34,065	12.40%	1.17%	-3.20%	\$4,224	\$242,668	\$321,768

Appendix Table A3

High Earners

Year	High earnings (160% of AWI)*	Tax rate (employer and employee)	6-Month CD rate of return	S&P 500 rate of return	High contribution [†]	High fund balance (6-month CD) [‡]	High fund balance (S&P 500 account) [‡]
1956	\$5,652	4.00%	6.88%**	15.14%	\$168 ^{††}	\$180	\$193
1957	\$5,827	4.50%	6.88%**	-4.81%	\$189 ^{††}	\$394	\$364
1958	\$5,878	4.50%	6.88%**	4.19%	\$189 ^{††}	\$623	\$576
1959	\$6,169	5.00%	6.88%**	24.09%	\$240 ^{††}	\$922	\$1,013
1960	\$6,411	6.00%	6.88%**	-2.66%	\$288 ^{††}	\$1,294	\$1,266
1961	\$6,539	6.00%	6.88%**	18.66%	\$288 ^{††}	\$1,690	\$1,844
1962	\$6,866	6.25%	6.88%**	-5.87%	\$300 ^{††}	\$2,127	\$2,018
1963	\$7,035	7.25%	6.88%**	11.99%	\$348 ^{††}	\$2,646	\$2,650
1964	\$7,322	7.25%	3.82%	16.47%	\$348 ^{††}	\$3,108	\$3,492
1965	\$7,454	7.25%	4.43%	8.36%	\$348 ^{††}	\$3,609	\$4,161
1966	\$7,901	7.70%	5.63%	-3.30%	\$508 ^{††}	\$4,349	\$4,515
1967	\$8,342	7.80%	5.21%	7.83%	\$515 ^{††}	\$5,117	\$5,423
1968	\$8,915	7.60%	6.00%	7.36%	\$593 ^{††}	\$6,053	\$6,459
1969	\$9,430	8.40%	7.89%	-0.87%	\$655 ^{††}	\$7,237	\$7,052
1970	\$9,898	8.40%	7.66%	-14.94%	\$655 ^{††}	\$8,497	\$6,556
1971	\$10,395	9.20%	5.22%	18.11%	\$718 ^{††}	\$9,695	\$8,591
1972	\$11,414	9.20%	5.02%	11.10%	\$828 ^{††}	\$11,051	\$10,464
1973	\$12,128	9.70%	8.31%	-1.62%	\$1,048 ^{††}	\$13,104	\$11,325
1974	\$12,849	9.90%	9.98%	-22.88%	\$1,272	\$15,810	\$9,714
1975	\$13,809	9.90%	6.89%	4.00%	\$1,367	\$18,361	\$11,524
1976	\$14,762	9.90%	5.62%	18.40%	\$1,461	\$20,937	\$15,375
1977	\$15,647	9.90%	5.92%	-3.73%	\$1,549	\$23,817	\$16,293
1978	\$16,890	10.10%	8.61%	-2.23%	\$1,706	\$27,722	\$17,598
1979	\$18,367	10.16%	11.44%	7.29%	\$1,866	\$32,972	\$20,882
1980	\$20,022	10.16%	12.99%	15.30%	\$2,034	\$39,554	\$26,423
1981	\$22,037	10.70%	15.77%	7.80%	\$2,358	\$48,523	\$31,027
1982	\$23,250	10.80%	12.57%	-6.51%	\$2,511	\$57,450	\$31,356
1983	\$24,383	10.80%	9.27%	33.99%	\$2,633	\$65,653	\$45,544
1984	\$25,816	11.40%	10.68%	0.03%	\$2,943	\$75,920	\$48,502
1985	\$26,916	11.40%	8.25%	16.44%	\$3,068	\$85,501	\$60,050
1986	\$27,715	11.40%	6.51%	26.49%	\$3,159	\$94,430	\$79,956
1987	\$29,482	11.40%	7.00%	21.36%	\$3,361	\$104,634	\$101,114
1988	\$30,934	12.12%	7.90%	-7.34%	\$3,749	\$116,949	\$97,170
1989	\$32,159	12.12%	9.08%	21.48%	\$3,898	\$131,820	\$122,773
1990	\$33,645	12.40%	8.17%	3.63%	\$4,172	\$147,104	\$131,559
1991	\$34,899	12.40%	5.91%	12.44%	\$4,327	\$160,381	\$152,794
1992	\$36,697	12.40%	3.76%	10.50%	\$4,550	\$171,140	\$173,867
1993	\$37,012	12.40%	3.28%	8.58%	\$4,590	\$181,493	\$193,764
1994	\$38,006	12.40%	4.96%	1.98%	\$4,713	\$195,434	\$202,400
1995	\$39,529	12.40%	5.98%	17.66%	\$4,902	\$212,317	\$243,918
1996	\$41,462	12.40%	5.47%	23.85%	\$5,141	\$229,343	\$308,464
1997	\$43,882	12.40%	5.72%	30.10%	\$5,441	\$248,223	\$408,376
1998	\$46,178	12.40%	5.44%	24.25%	\$5,726	\$267,775	\$514,504
1999	\$48,752	12.40%	5.46%	22.30%	\$6,045	\$288,764	\$636,607
2000	\$51,448	12.40%	6.58%	7.59%	\$6,380	\$314,573	\$691,813
2001	\$52,675	12.40%	3.64%	-16.45%	\$6,532	\$332,796	\$583,478
2002	\$53,203	12.40%	1.81%	-16.48%	\$6,597	\$345,522	\$492,840
2003	\$54,504	12.40%	1.17%	-3.20%	\$6,758	\$356,394	\$483,589

Appendix Table A4

Maximum Earners

Year	Maximum earnings ^{##}	Tax rate (employer and employee)	6-Month CD rate of return	S&P 500 rate of return	Maximum contribution [†]	Maximum fund balance (6-month CD) [‡]	Maximum fund balance (S&P 500 account) [‡]
1956	\$4,200	4.00%	6.88%**	15.14%	\$168	\$180	\$193
1957	\$4,200	4.50%	6.88%**	-4.81%	\$189	\$394	\$364
1958	\$4,200	4.50%	6.88%**	4.19%	\$189	\$623	\$576
1959	\$4,800	5.00%	6.88%**	24.09%	\$240	\$922	\$1,013
1960	\$4,800	6.00%	6.88%**	-2.66%	\$288	\$1,294	\$1,266
1961	\$4,800	6.00%	6.88%**	18.66%	\$288	\$1,690	\$1,844
1962	\$4,800	6.25%	6.88%**	-5.87%	\$300	\$2,127	\$2,018
1963	\$4,800	7.25%	6.88%**	11.99%	\$348	\$2,646	\$2,650
1964	\$4,800	7.25%	3.82%	16.47%	\$348	\$3,108	\$3,492
1965	\$4,800	7.25%	4.43%	8.36%	\$348	\$3,609	\$4,161
1966	\$6,600	7.70%	5.63%	-3.30%	\$508	\$4,349	\$4,515
1967	\$6,600	7.80%	5.21%	7.83%	\$515	\$5,117	\$5,423
1968	\$7,800	7.60%	6.00%	7.36%	\$593	\$6,053	\$6,459
1969	\$7,800	8.40%	7.89%	-0.87%	\$655	\$7,237	\$7,052
1970	\$7,800	8.40%	7.66%	-14.94%	\$655	\$8,497	\$6,556
1971	\$7,800	9.20%	5.22%	18.11%	\$718	\$9,695	\$8,591
1972	\$9,000	9.20%	5.02%	11.10%	\$828	\$11,051	\$10,464
1973	\$10,800	9.70%	8.31%	-1.62%	\$1,048	\$13,104	\$11,325
1974	\$13,200	9.90%	9.98%	-22.88%	\$1,307	\$15,848	\$9,741
1975	\$14,100	9.90%	6.89%	4.00%	\$1,396	\$18,432	\$11,582
1976	\$15,300	9.90%	5.62%	18.40%	\$1,515	\$21,069	\$15,507
1977	\$16,500	9.90%	5.92%	-3.73%	\$1,634	\$24,046	\$16,501
1978	\$17,700	10.10%	8.61%	-2.23%	\$1,788	\$28,059	\$17,881
1979	\$22,900	10.16%	11.44%	7.29%	\$2,327	\$33,862	\$21,680
1980	\$25,900	10.16%	12.99%	15.30%	\$2,631	\$41,234	\$28,032
1981	\$29,700	10.70%	15.77%	7.80%	\$3,178	\$51,417	\$33,645
1982	\$32,400	10.80%	12.57%	-6.51%	\$3,499	\$61,820	\$34,728
1983	\$35,700	10.80%	9.27%	33.99%	\$3,856	\$71,765	\$51,700
1984	\$37,800	11.40%	10.68%	0.03%	\$4,309	\$84,195	\$56,026
1985	\$39,600	11.40%	8.25%	16.44%	\$4,514	\$96,025	\$70,495
1986	\$42,000	11.40%	6.51%	26.49%	\$4,788	\$107,373	\$95,229
1987	\$43,800	11.40%	7.00%	21.36%	\$4,993	\$120,229	\$121,629
1988	\$45,000	12.12%	7.90%	-7.34%	\$5,454	\$135,615	\$117,760
1989	\$48,000	12.12%	9.08%	21.48%	\$5,818	\$154,276	\$150,118
1990	\$51,300	12.40%	8.17%	3.63%	\$6,361	\$173,763	\$162,165
1991	\$53,400	12.40%	5.91%	12.44%	\$6,622	\$191,045	\$189,788
1992	\$55,500	12.40%	3.76%	10.50%	\$6,882	\$205,377	\$217,323
1993	\$57,600	12.40%	3.28%	8.58%	\$7,142	\$219,490	\$243,720
1994	\$60,600	12.40%	4.96%	1.98%	\$7,514	\$238,255	\$256,200
1995	\$61,200	12.40%	5.98%	17.66%	\$7,589	\$260,547	\$310,383
1996	\$62,700	12.40%	5.47%	23.85%	\$7,775	\$282,985	\$394,043
1997	\$65,400	12.40%	5.72%	30.10%	\$8,110	\$307,758	\$523,181
1998	\$68,400	12.40%	5.44%	24.25%	\$8,482	\$333,456	\$660,568
1999	\$72,600	12.40%	5.46%	22.30%	\$9,002	\$361,148	\$818,853
2000	\$76,200	12.40%	6.58%	7.59%	\$9,449	\$394,994	\$891,201
2001	\$80,400	12.40%	3.64%	-16.45%	\$9,970	\$419,708	\$752,942
2002	\$84,900	12.40%	1.81%	-16.48%	\$10,528	\$438,005	\$637,662
2003	\$87,000	12.40%	1.17%	-3.20%	\$10,788	\$454,033	\$627,670

NOTE: *Average wage (AWI) is the national average wage index for individuals.

†Contribution equals the earnings multiplied by the tax rate of the employee and employer.

‡Fund balance = (current year's contributions + previous year's fund balance) × (1 + rate of return).

**Average 6-month CD rate (1964-2003).

††For the years prior to 1974, the high earnings are greater than the maximum earnings, so the contribution will be equal to the contribution for the maximum earnings.

‡‡Maximum earnings represents the maximum amount of wages subject to Social Security taxes.

SOURCE: AWI: www.ssa.gov/OACT/COLA/awiseries.html.

Social Security tax rates: www.ssa.gov/OACT/ProgData/taxRates.html.

S&P 500 rates of return: *Wall Street Journal*.

6-Month CD rates of return: Federal Reserve Board.

Maximum earnings: www.ssa.gov/OACT/COLA/cbb.html#Series.



Does Consumer Sentiment Predict Regional Consumption?

Thomas A. Garrett, Rubén Hernández-Murillo, and Michael T. Owyang

This paper tests the ability of consumer sentiment to predict retail spending at the state level. The results here suggest that, although there is a significant relationship between consumer sentiment measures and retail sales growth in several states, consumer sentiment exhibits only modest predictive power for future changes in retail spending. Measures of consumer sentiment, however, contain additional explanatory power beyond the information available in other indicators. By restricting attention to fluctuations in retail sales that occur at the business cycle frequency, the authors uncover a significant relationship between consumer sentiment and retail sales growth in many additional states. In light of these results, the authors conclude that the practical value of sentiment indices to forecast consumer spending at the state level is, at best, limited.

Federal Reserve Bank of St. Louis *Review*, March/April 2004, 87(2, Part 1), pp. 123-35.

Consumer sentiment is arguably the most cited indicator of current economic conditions, as it appears to be correlated with the strength of the economy. Following September 11, 2001, the two most common consumer sentiment indices—the University of Michigan’s Index of Consumer Sentiment (ICS) and the Conference Board’s Consumer Confidence Index (CCI)—fell an average of 20.9 percent through March 2003, reaching their lowest levels in nearly a decade. During the same period, real personal consumption expenditures grew by only 4.9 percent, compared with a 6.6 percent rate of growth over the two previous years when consumer sentiment was higher.

In fact, there is little argument in the academic literature that contemporaneous consumer sentiment and national consumption expenditure growth are related, as illustrated in Figure 1. Quarterly data since 1970 reveal an average correlation of 0.43 between real personal consumption expenditures and both sentiment indices. What has been an important and controversial issue in

the literature is the ability of consumer sentiment to *forecast* future consumption expenditures. Given that consumption expenditures directly correspond with economic growth, the issue is, then, whether consumer sentiment can predict economic growth. If consumer sentiment does predict economic growth, a further question is whether consumer sentiment captures the perceptions of individuals directly or whether it encompasses the forecasting information contained in other variables. The answer to this question is of interest, given the timeliness with which the sentiment indices are released, often ahead of other indicators.¹

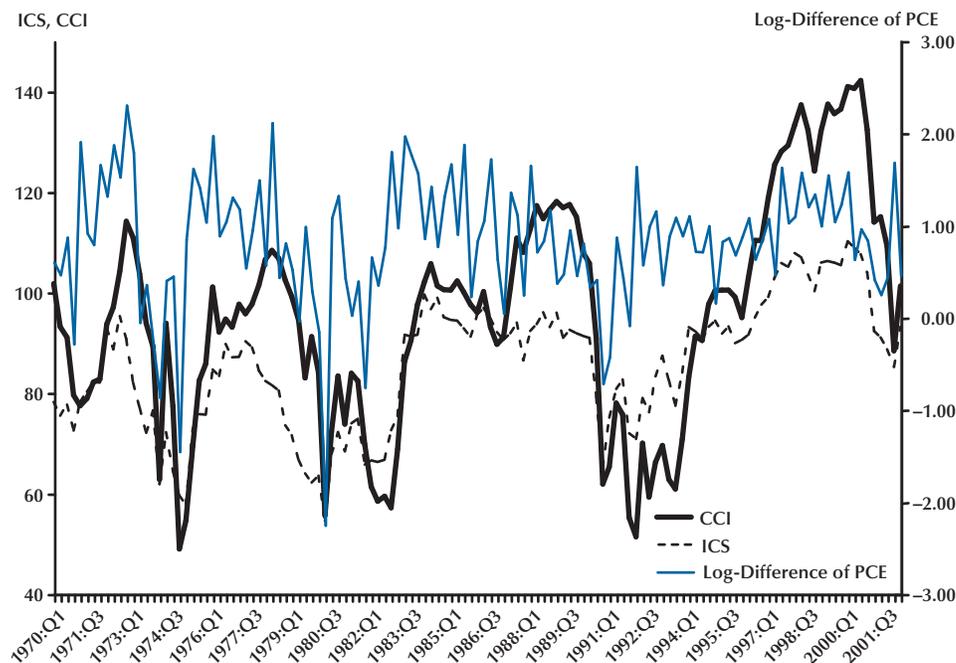
Carroll, Fuhrer, and Wilcox (1994) find that lagged values of the ICS significantly explain nearly 14 percent of growth in real personal consumption expenditures. However, after including other forecasting variables in their models, the incremental impact of lagged sentiment falls to 3 percent. Bram and Ludvigson (1998) extend the

¹ The sentiment indices are some of the earliest economic indicators available at the quarterly frequency.

Rubén Hernández-Murillo is an economist and Thomas A. Garrett and Michael T. Owyang are senior economists at the Federal Reserve Bank of St. Louis. The authors thank Marianne Baxter for the use of the Baxter-King bandpass filter software and Jeremy Piger for helpful discussions. Molly Jo Dunn-Castelazo, Kristie M. Engemann, and Deborah Roisman provided research assistance.

© 2005, The Federal Reserve Bank of St. Louis.

Figure 1
Consumer Sentiment and Personal Consumption Expenditures



models of Carroll, Fuhrer, and Wilcox (1994) by considering additional forecasting variables and the CCI in addition to the ICS. They find that the ICS is no longer a significant predictor of consumption expenditures when interest rate and equity price changes are included in the models. The CCI, however, did significantly improve the explanatory power of their forecasting models. This suggests that the CCI and the ICS do not provide the same forecasting information.

These mixed results are echoed in the ability of each sentiment index to forecast production and employment. Batchelor and Dua (1998) show that, in their model, the CCI is useful in predicting the 1991 recession, but their results cannot be generalized to other years. Matsusaka and Sbordone (1995) find that the ICS significantly improves their forecasting model for gross national product after considering other factors such as money growth, interest rates, and government spending. Howrey (2001) obtains a similar result for forecasts of gross domestic product. Leeper

(1992) finds that, while the ICS alone is a significant predictor of industrial production, the inclusion of additional variables eliminates any predictive power of the ICS.

In contrast with most of the earlier studies, which have explored whether consumer sentiment predicts *national* measures of consumption expenditures, in this paper we examine (i) how well consumer sentiment indices predict retail sales growth at the *state* level and (ii) whether consumer sentiment measures contain any incremental predictive power about future changes in consumer spending relative to other indicators of retail sales growth.² But why attempt to predict state-level measures at all when suitable aggregate measures are readily available?

A recent paper by Owyang, Piger, and Wall (2004) found that state-level business cycles are not necessarily synchronous with national cycles.

² Allenby, Jen, and Leone (1996) find that consumer sentiment forecasts retail fashion sales. The authors used sales data from five specialty divisions of a Fortune 500 retailer.

Thus, it is of interest to determine whether and to what extent consumer sentiment reflects idiosyncratic regional activity versus aggregate conditions. Further, uncovering a significant state-level relationship between consumer sentiment and retail spending may allow policymakers to extract timely information about regional economic conditions from consumer sentiment measures. Therefore, we examine whether this relationship is reflected in the national data and whether the statistical significance, if any, is driven by a few isolated states.

METHODOLOGY AND DATA

Model

The regression model we use to judge the predictive ability of consumer sentiment on state retail sales growth is

$$R_t = \alpha + \sum_{i=1}^K \beta_i S_{t-i} + \gamma' Z_{t-1} + \varepsilon_t,$$

where R_t is the log-difference in seasonally adjusted real state retail sales in year t ; α is a constant term; S_{t-i} for $i = 1, 2, \dots, K$ denote lagged values of consumer sentiment, with corresponding coefficients β_i ; Z is a vector of additional explanatory variables used to control for other factors affecting retail sales growth and to determine whether consumer sentiment is capturing omitted economic conditions; and γ is the corresponding vector of coefficients. This model is used in Carroll, Fuhrer, and Wilcox (1994) and Bram and Ludvigson (1998).

We run this regression for (i) each of 43 states, (ii) the District of Columbia, and (iii) the aggregate separately. We first judge the forecasting power of consumer sentiment by testing the null hypothesis that $\beta_i = 0$, for all $i = 1, 2, \dots, K$, in a specification that does not include the vector Z . If the null hypothesis is rejected in this model, we analyze the incremental improvement in the forecasting power of consumer sentiment relative to using only the variables in Z as predictors. For this, we compute the increase in the model's adjusted R^2 from including lagged consumer sentiment in addition to Z and we test again for the joint significance of the consumer sentiment lags.

Data

We use quarterly data over the period 1971:Q2 to 2002:Q1 for the analysis. The choice of sample length and frequency is based on data availability and was made to ensure adequate variations in the business cycle. The analysis uses the two most common measures of consumer sentiment—the ICS and the CCI. Each index is calculated using respondents' answers to five questions dealing with current economic conditions and future economic expectations. The ICS began as an annual survey in the 1940s and was converted to a quarterly survey in 1952 and to a monthly survey in 1978. The CCI began in 1967 as a bimonthly survey and was converted to a monthly survey in 1977. While both indices are highly correlated, the series do differ in terms of the survey questions asked, sample size, and construction.³ The ICS report also provides sentiment indices by geographic regions. There are four regions: North East, North Central, South, and West.

We chose retail sales as the measure of state-level consumption because quarterly personal consumption expenditure data are not available at the state level. Although data on national retail sales are available from the U.S. Census, retail sales at the state level are not directly available. Thus, to compute actual retail sales, we obtained quarterly state retail sales tax collections over the period 1973:Q2 to 2002:Q1 for each of the 43 states with state sales tax records and the District of Columbia.⁴ Retail sales were computed by dividing state sales tax collections by the state sales tax

³ See Bram and Ludvigson (1998) and Piger (2003) for a discussion of the two consumer sentiment indices. Information on the calculation of the CCI is found at www.consumerresearchcenter.org/consumer_confidence/methodology.htm, and information on the construction of the ICS is found at www.sca.isr.umich.edu/main.php. While the ICS and CCI are each based on five questions, both also compute an index of current conditions that is based on two of the five questions and an index of expectations based on the remaining three questions. Thus, the expectations component is 60 percent of the ICS and CCI and the current conditions component is 40 percent of each index.

⁴ Delaware, Montana, Oregon, New Hampshire, and Alaska do not have state sales taxes. Utah and Nevada were not included due to incomplete reporting of sales tax collections. Quarterly state sales tax collections are from the U.S. Census Bureau's *State Government Tax Collections* (various years).

rate in the corresponding quarter.⁵ A national series was computed by summing over the individual states and the District of Columbia. The nominal series were deflated by the national CPI and seasonally adjusted using the Census X-12 adjustment method. The resulting measure of real national retail sales has a correlation of 97.5 percent with a measure constructed with U.S. Census survey data on aggregate nominal retail sales. The correlation between the two series expressed in log-differences is 18.6 percent.

Retail sales are a subset of personal consumption expenditures. Retail sales include only goods and services that are subject to state sales tax. Personal consumption expenditures include other forms of consumption of goods and services that are not usually subject to state sales tax. On average, state sales taxes apply to roughly 60 percent of personal consumption expenditures, with certain variation across states. The sales tax exemptions on food, prescription drugs, clothing, utilities, and certain services also create differences across states.⁶

Following the specification of Carroll, Fuhrer, and Wilcox (1994) and Bram and Ludvigson (1998), we include as explanatory variables in the vector Z lagged values of real state-level personal income growth as well as lagged retail sales growth to account for any autocorrelation. Quarterly dummy variables are also included to capture any remaining seasonal differences in retail sales growth.⁷

ESTIMATION AND RESULTS

Estimation

The model is estimated by ordinary least squares for each of the 43 states and the District

of Columbia using the national ICS and CCI, as well as the regional ICS, matching each state to one of the four ICS regions. We do not conduct a panel estimation, because we are interested in the predictive power of the consumer sentiment measures for each individual state. We estimate a national retail sales growth model to compare with the results of past studies that used a national measure of spending such as personal consumption expenditures. Following Carroll, Fuhrer, and Wilcox (1994), all the models are estimated with four lags of the consumer sentiment indices and four lags of the control variables. Additionally, the tests for joint statistical significance are based on the Newey-West heteroskedasticity- and autocorrelation-consistent estimate of the covariance matrix of the regression parameters using a window of four lags. Lag selection tests reported in previous studies indicate that four lags seem to be adequate for quarterly data.

Consumer Sentiment and Retail Sales Growth

The impact of consumer sentiment on retail sales growth is shown in Table 1. This table presents the adjusted R^2 from the regressions with the national and regional ICS, as well as the Wald statistic for the joint significance test on the lags of the consumer sentiment measure, which is distributed asymptotically as a χ^2 distribution function with K degrees of freedom. K represents the number of lags of the sentiment variable and, therefore, the number of linear restrictions in the test; in our case $K = 4$. The table presents the significance tests, where columns 1, 2, 5, and 6 do not include the vector of control variables Z . We also conduct the joint significance tests, conditioning on the vector Z . In this case, the incremental adjusted R^2 represents the difference in explained variation in a specification that includes lags of the sentiment index and the control variables and a specification that includes only the control variables.

⁵ State sales tax rates over the sample period were obtained from the U.S. Census Bureau's *State Government Tax Collections* (various years); the Advisory Commission on Intergovernmental Relations' *Significant Features of Fiscal Federalism: Budget Processes and Tax Systems*, Vol. 1, September 1995; The Council of State Governments' *The Book of the States*, 1996; and The Tax Foundation's *Facts and Figures on Government Finances* (various years).

⁶ A comparison of retail sales and personal consumption expenditures is found in Rodgers and Temple (1996). The correlation between the growth rates of national retail sales and personal consumption is 0.35 over the sample period.

⁷ Other variables, such as employment and wages, were also considered. The inclusion of these variables made no difference in the explanatory power of the final models.

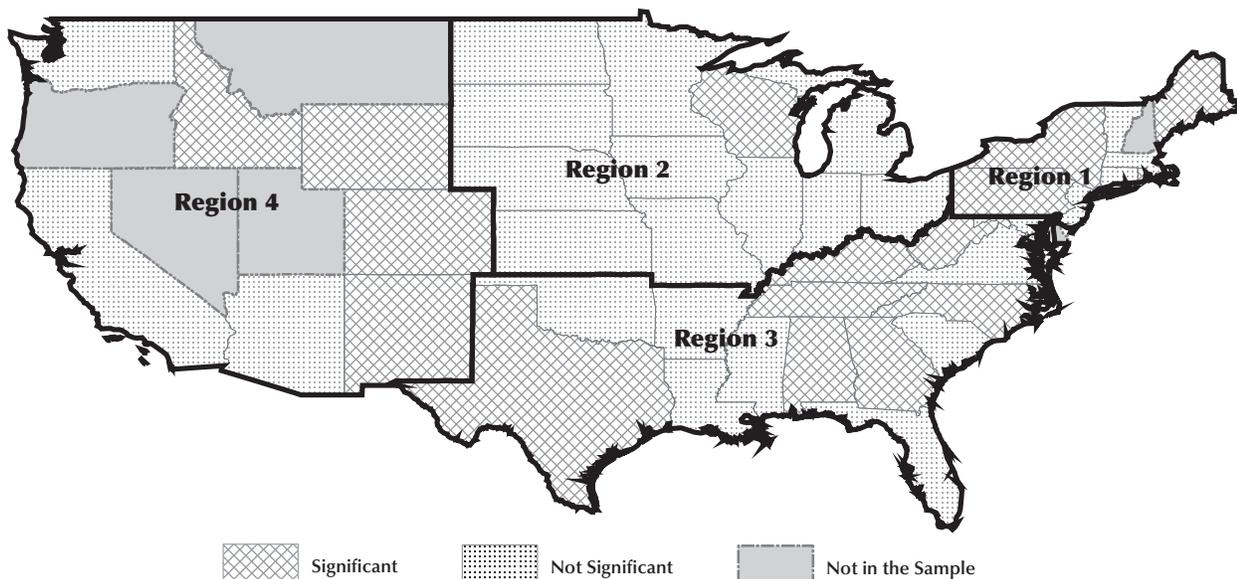
Table 1
The Impact of ICS on Retail Sales Growth

State	National ICS				Regional ICS			
	Without Z		With Z		Without Z		With Z	
	\bar{R}^2	Wald	Incremental \bar{R}^2	Wald	\bar{R}^2	Wald	Incremental \bar{R}^2	Wald
United States	0.0194	***16.3703	0.0190	**9.9559				
Alabama	0.0442	***27.1993	0.0815	***27.7168	0.0345	***23.5608	0.0623	***23.2495
Arkansas	-0.0330	3.9717	0.0497	**13.1049	-0.0349	2.6993	0.0348	**10.1214
Arizona	-0.0124	3.5221	0.0154	3.2555	-0.0211	3.4728	0.0036	3.1669
California	-0.0223	1.7748	-0.0049	4.7685	-0.0274	1.9554	0.0024	5.6199
Colorado	0.1697	***24.1463	0.1176	***18.1498	0.1226	***16.8004	0.0684	**10.7723
Connecticut	-0.0161	2.0039	-0.0053	5.6662	-0.0212	1.2923	-0.0102	2.851
District of Columbia	-0.0081	*8.2721	0.0174	***16.3165	-0.0112	6.977	0.0024	**12.5779
Florida	-0.0012	2.7424	-0.0109	7.5171	-0.0021	2.5166	-0.0139	*8.4344
Georgia	0.0095	***19.7664	0.0183	***14.6034	0.0205	***17.3759	0.0201	***14.1595
Hawaii	-0.0337	3.9011	-0.0024	5.2851	-0.0256	6.3148	0.0023	*8.5978
Idaho	0.0423	**12.7544	0.0506	*8.0419	0.0448	*9.1047	0.0595	6.9867
Illinois	-0.0368	4.1341	-0.0161	3.6903	-0.0439	2.9488	-0.0267	1.6327
Indiana	-0.0503	2.6864	-0.0123	4.3965	-0.0393	4.3864	0.0005	5.2363
Iowa	-0.0402	5.5709	-0.0096	4.1646	-0.0391	3.632	-0.0110	4.2824
Kansas	-0.0504	1.0586	-0.0235	1.6308	-0.0420	1.6929	-0.0088	4.1489
Kentucky	-0.0008	**10.4088	0.0387	***17.6416	-0.0116	7.2481	0.0326	***15.7179
Louisiana	-0.0443	1.7738	-0.0031	3.889	-0.0452	1.5643	-0.0056	3.7553
Maine	0.0426	**11.5192	0.0841	**11.4593	0.0154	7.1007	0.0682	**10.3919
Maryland	-0.0251	1.6831	0.0084	6.9994	-0.0108	1.7462	0.0194	7.1703
Massachusetts	-0.0438	0.9663	-0.0174	2.1183	-0.0141	2.8906	-0.0127	3.2662
Michigan	-0.0247	5.7867	0.0279	*8.9368	-0.0292	4.8937	0.0258	7.359
Minnesota	0.0140	3.5756	0.0045	3.7805	0.0197	2.957	0.0040	3.0212
Mississippi	-0.0350	5.9557	0.0006	***13.7579	-0.0320	4.948	0.0094	**11.5056
Missouri	0.0073	7.3192	0.0014	4.9464	0.0340	***18.3779	0.0336	***13.3948
Nebraska	0.0538	6.1571	0.0213	5.0933	0.1497	***34.3810	0.0886	***23.0285
New Jersey	-0.0492	0.4235	-0.0177	3.1765	-0.0478	0.5994	-0.0160	4.001
New Mexico	-0.0087	*9.1504	-0.0167	3.234	0.0052	**10.5201	0.0030	**9.7119
New York	-0.0024	*9.2457	0.0219	**10.9356	0.0038	**10.4192	0.0350	***14.0319
North Carolina	0.0922	***14.3595	0.1148	***14.7460	0.0858	*8.9512	0.1004	*7.8614
North Dakota	-0.0201	2.8979	-0.0061	3.1262	-0.0272	2.7048	-0.0104	2.9829
Ohio	-0.0046	5.4121	0.0484	**11.4363	-0.0127	5.9861	0.0350	**11.2356
Oklahoma	-0.0132	1.0523	-0.0187	1.2005	-0.0066	2.6948	-0.0102	1.6628
Pennsylvania	0.0100	***20.8126	0.0720	***20.7860	0.0120	***15.7343	0.0899	***14.5139
Rhode Island	-0.0306	*8.5597	0.0073	**9.6595	-0.0372	7.2832	0.0083	*8.6687
South Carolina	-0.0368	0.9584	-0.0094	3.9242	-0.0369	0.606	-0.0076	5.2506
South Dakota	0.0399	3.8455	0.0244	4.0524	0.0716	6.7661	0.0319	3.8502
Tennessee	0.0963	***22.7503	0.0884	***27.7922	0.0444	***16.0358	0.0560	***17.5668
Texas	-0.0059	*9.0368	0.0111	5.7727	0.0013	**10.4029	0.0166	6.3835
Vermont	0.0010	5.6392	0.0148	***13.6221	0.0030	4.7773	0.0168	**12.6896
Virginia	-0.0134	3.074	-0.0113	6.1991	0.0095	3.4795	-0.0180	4.1992
Washington	-0.0390	2.3579	-0.0075	3.7253	-0.0223	3.3019	0.0047	5.1338
West Virginia	0.0111	*8.7151	0.0249	***13.2782	0.0380	6.2564	0.0405	**10.3601
Wisconsin	0.0085	**12.0078	0.0045	**10.0209	0.0387	*8.9474	0.0155	**12.0821
Wyoming	0.0136	*7.9847	0.0107	5.5896	-0.0091	5.9534	0.0002	4.9953
No. of significant states		17		19		13		22
Share of significant states		0.3864		0.4318		0.2955		0.5
No. of observations		124		124		124		124

NOTE: The baseline regression equation is $R_t = \alpha + \sum_{i=1}^K \beta_i S_{t-i} + \gamma' Z_{t-1} + \varepsilon_t$, where Z includes four lags of real retail sales and four lags of real personal income growth. The Wald statistic is from the joint significance test on the lags of the consumer sentiment measure, which is distributed asymptotically as a χ^2 with $K = 4$ degrees of freedom. The incremental \bar{R}^2 is the difference in explained variation in a specification that includes lags of the sentiment index and the control variables and a specification that includes only the control variables. All regressions include quarterly dummy variables. */**/** denote significance at the 10/5/1 percent levels, respectively.

Figure 2

Significance of the Sentiment/Sales Relationships Using the National ICS



NOTE: Alaska is not in the sample, and Hawaii’s level was not significant. ICS regions are outlined.

The results obtained with the national and regional ICS are very similar, although the same states do not present significant relationships in both cases. The ICS predicts retail sales growth in about 39 percent of the states in the sample when no additional variables are included. The percentage of explained variation in retail sales growth, measured by the adjusted R^2 , in the states with a significant relationship varies from 0 to about 17 percent, with an average of 2.8 percent using the national ICS and an average of 4.6 percent using the regional ICS.⁸ The geographic pattern of the significance results when using the national ICS can be observed in Figure 2, where we have also outlined the ICS regions.

When additional control variables are included, the consumer sentiment/retail sales growth relationship is significant in 19 of the 44 sample states when using the national ICS; this is true in 22 states when using the regional ICS.

⁸ Negative values of the adjusted R^2 were set to 0 to compute the averages.

The incremental variation explained by the lagged consumer sentiment in the states with a significant relationship varies from 0 to about 12 percent when using the national ICS, with an average of 4.6 percent; the incremental explained variation varies from 0 to about 10 percent when using the regional ICS, with an average of 3.7 percent.

The results with the national CCI are summarized in Table 2. With no additional control variables, the consumer sentiment/retail sales relationship is significant in about 27 percent of the sample states, and the adjusted R^2 varies from 0 to about 15 percent, with an average of 3.5 percent among the states with a significant relationship. When additional control variables are included, the relationship is significant in about 43 percent of the sample states. The incremental adjusted R^2 varies from 0 to about 12 percent, with an average of 4.3 percent among the states with a significant relationship.

We learn from these tables that consumer sentiment lags predict retail sales growth in as much as 39 percent of the states analyzed, when

Table 2
The Impact of CCI on Retail Sales Growth

State	National CCI			
	Without Z		With Z	
	\bar{R}^2	Wald	Incremental \bar{R}^2	Wald
United States	0.0395	***16.2407	0.0470	**9.5723
Alabama	0.0267	***29.5784	0.0423	***18.1061
Arkansas	-0.0299	3.1322	0.0445	***15.3454
Arizona	0.0163	**10.6010	0.0583	*9.0056
California	-0.0185	5.0044	-0.0020	4.942
Colorado	0.1512	***25.8783	0.0941	***20.9290
Connecticut	-0.0308	0.2611	-0.0179	1.5915
District of Columbia	-0.0195	5.4149	0.0109	*8.6949
Florida	-0.0079	3.2429	-0.0016	6.5437
Georgia	0.0008	***23.6877	0.0407	***23.0608
Hawaii	-0.0195	5.813	0.0242	*8.2153
Idaho	0.0206	***15.3374	0.0466	**11.9457
Illinois	-0.0308	2.7776	0.0040	6.4904
Indiana	-0.0551	1.0435	-0.0200	3.0961
Iowa	-0.0534	0.6954	-0.0125	2.2808
Kansas	-0.0327	5.9747	-0.0031	6.063
Kentucky	-0.0176	6.4156	0.0297	***13.5088
Louisiana	-0.0311	4.5513	-0.0097	3.6195
Maine	0.0406	***16.0393	0.0792	**12.2705
Maryland	-0.0256	0.9191	-0.0015	1.7196
Massachusetts	-0.0452	5.3728	0.0071	***15.4617
Michigan	-0.0165	5.7469	0.0291	**9.9917
Minnesota	0.0087	3.3834	-0.0030	2.7751
Mississippi	-0.0390	7.235	0.0008	**13.1303
Missouri	0.0016	**9.8358	0.0050	6.2007
Nebraska	0.0185	5.1149	0.0067	4.3593
New Jersey	-0.0348	1.7404	-0.0159	3.0367
New Mexico	-0.0161	4.2911	-0.0236	1.202
New York	-0.0285	2.0339	-0.0143	2.689
North Carolina	0.0963	**10.7041	0.1182	***16.2520
North Dakota	-0.0196	3.4301	-0.0046	4.0016
Ohio	-0.0141	1.5769	0.0514	*8.6690
Oklahoma	-0.0214	0.5755	-0.0238	0.8261
Pennsylvania	0.0064	***19.0759	0.0697	***13.6032
Rhode Island	-0.0101	5.3615	-0.0188	3.206
South Carolina	-0.0378	0.6484	-0.0093	3.4403
South Dakota	0.0032	3.0572	0.0309	4.8005
Tennessee	-0.0022	5.3644	0.0260	***16.2701
Texas	0.0040	**10.2062	0.0015	6.4641
Vermont	0.0007	*8.2720	0.0200	***16.4255
Virginia	-0.0213	1.1928	-0.0092	3.8202
Washington	-0.0456	0.5312	-0.0097	3.1324
West Virginia	0.0507	***14.1404	0.0233	*9.1675
Wisconsin	-0.0133	4.2399	0.0049	4.6503
Wyoming	-0.0007	5.4429	0.0078	4.4185
No. of significant states		12		19
Share of significant states		0.2727		0.4318
No. of observations		124		124

NOTE: The baseline regression equation is $R_t = \alpha + \sum_{i=1}^K \beta_i S_{t-i} + \gamma' Z_{t-1} + \varepsilon_t$, where Z includes four lags of real retail sales and four lags of real personal income growth. The Wald statistic is from the joint significance test on the lags of the consumer sentiment measure, which is distributed asymptotically as a χ^2 with $K = 4$ degrees of freedom. The incremental \bar{R}^2 is the difference in explained variation in a specification that includes lags of the sentiment index and the control variables and a specification that includes only the control variables. All regressions include quarterly dummy variables. */**/** denote significance at the 10/5/1 percent levels, respectively.

Table 3**National Model: Iterative Subtraction of Top Significant States**

State regression	Subtracted states*
National ICS	20
National ICS with Z	6
Regional ICS	19
Regional ICS with Z	6
National CCI	14
National CCI with Z	43

NOTE: *Number of states that have to be removed from the calculation of national retail sales before lags of consumer sentiment lose significance in the national regression.

used as the only regressors, and in as much as half of the sample states when other control variables are added. The percentage of explained retail sales growth variation, however, rarely exceeds 5 percent among the sample states. In contrast, about 14 percent of the variation in consumer expenditure growth is explained by consumer sentiment lags in the results reported by Carroll, Fuhrer, and Wilcox (1994). Nevertheless, the incremental variation, with respect to including additional controls, often exceeds 2 percent, which is in line with the 3 percent of incremental variation of consumer spending growth explained by consumer sentiment as reported by Carroll, Fuhrer, and Wilcox. These results indicate that, although the relationship between consumer sentiment and state retail sales growth appears to be significant in many states, consumer sentiment has limited predictive power for future changes in retail spending, as measured by the percentage of explained variation in the regression. Measures of consumer sentiment, however, contain additional explanatory power beyond the information available from other indicators.

Regarding the national retail sales model, we find that the consumer sentiment/retail sales growth relationship is significant in both the national ICS and the national CCI. The CCI, when used without additional control variables, explains about 4 percent of the retail sales growth variation,

whereas the ICS explains only about 2 percent. The predictive power of the CCI over the ICS is consistent with Bram and Ludvigson (1998). The incremental increase in adjusted R^2 , when including additional control variables, is 1.9 percent with the ICS and 4.7 percent with the CCI.

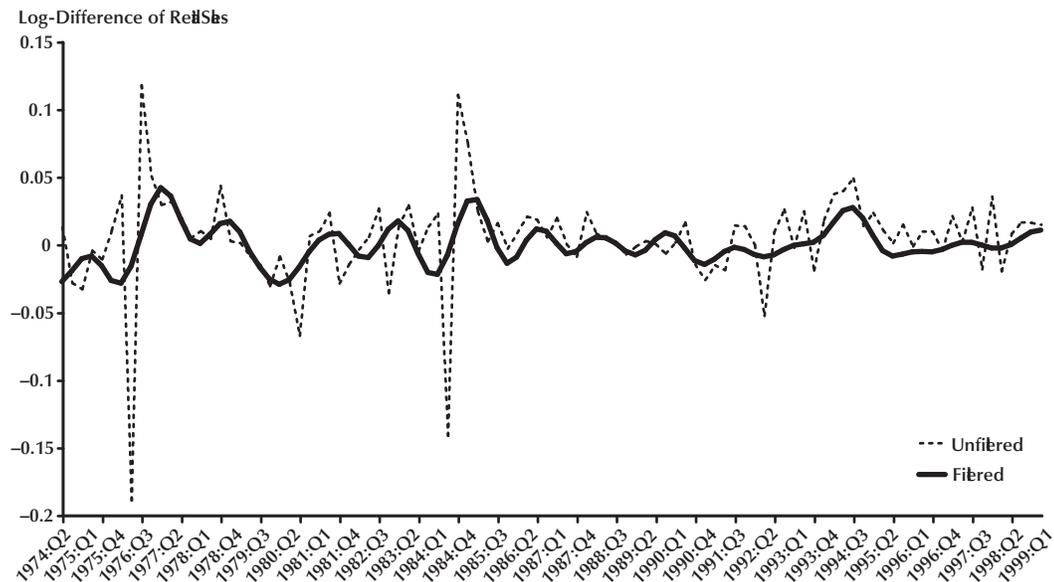
DISCUSSION

The empirical results suggest that consumer sentiment measures are relatively poor predictors of state-level retail sales growth. We find that consumer sentiment appears to perform at the national level as well as it does in the average state with a significant relationship between consumer sentiment and retail sales growth. This raises two questions: (i) Are the national results driven by a few states with a highly significant relationship between sentiment and retail sales growth, and (ii) Does the use of aggregated data mitigate large variations in state-level retail sales growth?

Are the National Results Driven by a Few States?

To answer the first question, we conducted the following exercise. We ranked the individual state regressions in decreasing order of adjusted R^2 , then iteratively subtracted the level of that state's retail sales from the national aggregate, re-computing the growth rate of national retail sales. At each step, we ran the national regression using the new dependent variable and tested again for the joint significance of the consumer sentiment measures. If the national results are driven by the top significant states, then one would expect the significance of the sentiment coefficients in the national regression to drop quickly once retail sales from the significant states are subtracted out. Table 3 presents a summary of this exercise; it lists, for each case of the state regressions, the number of states that have to be removed before the national regression loses significance. Each row in the table indicates a regression at the state level from which we ordered the states in terms of the adjusted R^2 coefficient.

Table 3 provides evidence that the impact of sentiment on national retail sales does not appear

Figure 3**Comparison of B-K Filtered and Unfiltered Sales Data for Texas**

to be the result of a strong relationship between sentiment and retail sales growth in only a few states. Using the national and then the regional ICS as the sentiment measure in the state regressions, we find that we have to remove 20 and 19 states, respectively, to render the national regression insignificant (with the ICS as the dependent variable and no additional explanatory variables). However, when including additional explanatory variables in the national and state regressions, we have to remove only 6 states before the national regression loses significance. This indicates that the predictive power of this sentiment measure when additional explanatory variables are included in the national regression is somewhat less robust. In contrast, we find that the predictive power of CCI is robust in the national regression when additional explanatory variables are also included. In the specification with no additional variables we have to remove 14 states before the national regression loses significance. The CCI measure in the specification with additional variables remains significant even when we iteratively subtract every state in the sample.

Does the Use of National-Level Data Mitigate Large Variations in State-Level Data?

With regard to the second question, it is possible that idiosyncratic state-level variation in retail sales is sufficiently large to confound prediction of disaggregated retail sales but it washes out in aggregation. The sum of squared residuals for the national- and state-level regressions can provide insight into this scenario. It turns out that for each of the state-level specifications, with the exception of Alabama, the sum of squared residuals for a state-level regression is equal or larger than the sum of squared residuals for the corresponding national regression. Large variations in retail sales growth at the state level appear to be mitigated by aggregating states to the national level, thus providing a more predictable data series.

If these idiosyncratic state-level fluctuations in retail sales are indeed responsible for confounding the state regressions, restricting our attention to the variations in retail sales that occur at the business cycle frequency might increase the indices' explanatory power. We accomplish this

Table 4
The Impact of ICS on B-K Filtered Retail Sales Growth

State	National ICS				Regional ICS			
	Without Z		With Z		Without Z		With Z	
	\bar{R}^2	Wald	Incremental \bar{R}^2	Wald	\bar{R}^2	Wald	Incremental \bar{R}^2	Wald
United States	0.3337	***45.2977	0.0006	**13.0699				
Alabama	0.4461	***67.7667	0.0020	***30.0992	0.4479	***62.8791	0.0018	***30.7239
Arkansas	0.2375	***37.9923	0.0003	4.5625	0.1596	***24.6486	0.0010	*8.1242
Arizona	0.0171	4.9411	0.0005	6.7998	0.0136	6.6199	0.0001	5.35
California	0.1503	7.0782	0.0016	***13.5792	0.1571	**11.9313	0.0024	**12.1052
Colorado	0.3463	***26.7764	0.0004	**10.9229	0.2763	***25.3171	0.0001	*8.7513
Connecticut	0.1705	**9.6350	0.0013	***16.2784	0.0737	6.6263	0.0016	***16.6780
District of Columbia	0.0098	***14.2995	0.0014	**11.4549	-0.0229	**10.1608	0.0014	**12.0484
Florida	-0.0316	3.6356	0.0059	***13.9820	0.0433	2.8036	0.0054	**10.5561
Georgia	0.1717	***17.3047	0.0000	*8.5662	0.1321	***14.0626	-0.0003	6.4041
Hawaii	0.0018	4.5091	-0.0003	6.2346	-0.0060	5.0868	-0.0003	*8.4027
Idaho	0.1543	*8.5366	-0.0001	1.9097	0.1070	*8.0150	-0.0002	1.7068
Illinois	0.1326	***16.8109	0.0000	6.389	0.1734	***21.3654	0.0002	***13.3735
Indiana	0.0922	***17.0641	0.0018	***26.6683	0.1911	***20.8963	0.0018	***27.0175
Iowa	0.1378	**11.4569	-0.0007	2.0571	0.1582	***14.8744	-0.0007	2.5608
Kansas	0.0035	***16.0447	-0.0006	2.1206	0.0258	***21.0589	-0.0007	2.1018
Kentucky	0.0038	**11.3802	-0.0007	5.0612	0.0191	***13.5870	-0.0009	3.5954
Louisiana	0.0318	**11.9219	-0.0004	5.2552	0.0570	***17.8756	-0.0004	5.8511
Maine	0.2946	***33.6198	0.0023	***20.5371	0.2490	***26.9085	0.0025	***23.3702
Maryland	-0.0151	4.8609	-0.0023	3.9027	-0.0007	3.5998	-0.0024	3.7002
Massachusetts	0.1506	***14.1654	0.0010	7.2287	0.1792	***21.6907	0.0001	4.3149
Michigan	0.1019	*8.2941	-0.0006	4.5142	0.1179	**12.2485	0.0001	7.228
Minnesota	0.0039	6.7072	-0.0011	3.8667	0.0593	**12.2624	-0.0011	4.0118
Mississippi	0.0443	**12.7706	0.0017	*8.5699	0.1088	***16.4688	0.0021	**10.5523
Missouri	0.1763	**12.4560	0.0002	3.2518	0.2020	***16.4107	0.0003	4.3417
Nebraska	0.0579	6.3143	0.0005	**9.9377	0.0818	*8.6343	0.0007	**11.9757
New Jersey	-0.0144	2.7231	-0.0010	1.4506	-0.0443	1.0448	-0.0011	0.803
New Mexico	0.0663	**12.0026	0.0003	*8.2425	0.0365	**11.1883	-0.0001	6.6917
New York	0.1601	***18.7195	0.0057	***13.6368	0.1859	***19.2699	0.0080	***19.1539
North Carolina	0.2089	***14.2964	0.0038	***28.6966	0.1205	**9.9927	0.0034	***31.5400
North Dakota	0.0253	4.584	-0.0006	6.3773	-0.0142	3.138	-0.0006	6.2748
Ohio	0.2910	***21.4710	0.0010	7.0026	0.3099	***22.8270	0.0005	6.6274
Oklahoma	0.0019	**9.5713	-0.0005	3.7905	0.0001	*8.1625	-0.0007	1.8234
Pennsylvania	0.3371	***42.8525	0.0022	***13.7554	0.3399	***46.7987	0.0028	***15.4966
Rhode Island	0.1539	**11.9046	0.0008	**9.7213	0.1439	**12.3703	0.0006	**11.2415
South Carolina	0.0250	5.5716	0.0005	**10.4328	0.0180	5.219	-0.0005	5.4714
South Dakota	0.0466	**10.0845	0.0004	*8.8026	0.0208	*8.1881	-0.0001	5.4646
Tennessee	0.3684	***43.2376	0.0007	**11.4612	0.3287	***31.8020	0.0007	***15.8775
Texas	0.0363	***19.5994	-0.0006	0.3641	0.0639	***26.0904	-0.0006	0.4355
Vermont	0.0189	6.121	0.0023	***17.4817	0.0147	6.0123	0.0018	***16.2494
Virginia	0.2915	***52.5277	0.0013	***13.5755	0.2034	***44.2381	0.0007	**9.9447
Washington	0.0693	7.6779	-0.0002	6.0483	0.0115	3.7351	-0.0004	6.3913
West Virginia	-0.0168	3.1777	0.0011	***19.1226	-0.0355	1.7039	0.0006	***13.8610
Wisconsin	-0.0002	*9.3039	0.0004	*8.3219	0.0189	**13.2683	0.0005	*8.6497
Wyoming	-0.0591	1.3146	-0.0003	**11.7378	-0.057	1.1186	-0.0004	**9.6988
No. of significant states		30		24		32		23
Share of significant states		0.6818		0.5455		0.7273		0.5227
No. of observations		100		100		100		100

NOTE: The baseline regression equation is $R_t = \alpha + \sum_{i=1}^K \beta_i S_{t-i} + \gamma' Z_{t-1} + \epsilon_t$, where Z includes four lags of real retail sales and four lags

of real personal income growth. The Wald statistic is from the joint significance test on the lags of the consumer sentiment measure, which is distributed asymptotically as a χ^2 with $K = 4$ degrees of freedom. The incremental \bar{R}^2 is the difference in explained variation in a specification that includes lags of the sentiment index and the control variables and a specification that includes only the control variables. All regressions include quarterly dummy variables. */**/** denote significance at the 10/5/1 percent levels, respectively.

Table 5
The Impact of CCI on B-K Filtered Retail Sales Growth

State	National CCI			
	Without Z		With Z	
	\bar{R}^2	Wald	Incremental \bar{R}^2	Wald
United States	0.4494	***59.5632	0.0010	***22.4383
Alabama	0.4259	***50.5937	0.0015	***31.4574
Arkansas	0.2768	***56.4146	0.0010	***16.2626
Arizona	0.0971	6.6743	0.0006	*8.3992
California	0.0663	4.9006	0.0000	4.9454
Colorado	0.4393	***38.4504	0.0003	*8.1545
Connecticut	0.1918	**10.2275	0.0009	5.1699
District of Columbia	0.0328	**11.1118	0.0011	***14.3203
Florida	-0.0143	7.0437	0.0007	6.2027
Georgia	0.2282	***30.2795	0.0002	7.0174
Hawaii	0.0222	4.3974	0.0006	**12.4077
Idaho	0.1683	6.4689	0.0011	*7.9442
Illinois	0.1123	***14.8746	0.0024	***19.5365
Indiana	0.0129	***15.9946	0.0021	***26.2565
Iowa	0.2683	***24.8176	0.0002	5.3151
Kansas	0.0242	**11.5989	0.0006	**11.9320
Kentucky	0.0916	***19.9457	0.0015	***14.6352
Louisiana	0.1149	***23.9777	0.0006	*8.5058
Maine	0.1902	***30.8777	0.0016	***16.6692
Maryland	0.0977	***30.0958	-0.0018	4.2129
Massachusetts	0.0836	**11.6382	-0.0009	3.575
Michigan	0.1140	***15.2409	0.0001	*8.8736
Minnesota	0.0182	*9.3121	0.0041	***21.9944
Mississippi	0.0138	**10.9348	0.0006	**11.3909
Missouri	0.1997	***14.4171	0.0010	**10.9872
Nebraska	0.2475	***26.0480	-0.0003	6.0452
New Jersey	0.0163	2.2212	-0.0007	1.8269
New Mexico	-0.0044	4.6305	-0.0003	4.8008
New York	0.0437	7.236	0.0036	**11.3987
North Carolina	0.2576	***16.9984	0.0028	***19.3355
North Dakota	0.0397	*8.8050	-0.0010	3.4515
Ohio	0.2643	**12.5101	0.0004	6.4235
Oklahoma	0.0289	5.9615	-0.0008	0.8754
Pennsylvania	0.3002	***36.7049	0.0036	***20.3744
Rhode Island	0.1727	***16.6432	0.0018	**11.5002
South Carolina	0.0090	6.0099	-0.0005	3.6021
South Dakota	0.1232	**10.4177	0.0016	***14.1806
Tennessee	0.1888	***15.2097	0.0007	**9.6399
Texas	0.2563	***18.4421	0.0000	4.5892
Vermont	-0.0106	6.1181	0.0014	**10.9100
Virginia	0.0992	***25.4387	0.0006	**9.9386
Washington	0.1034	**10.9625	-0.0009	3.2508
West Virginia	0.0193	5.3236	0.0005	*8.8752
Wisconsin	-0.0151	3.733	-0.0007	4.349
Wyoming	-0.0523	2.6545	0.0004	***16.4838
No. of significant states		30		27
Share of significant states		0.6818		0.6136
No. of observations		100		100

NOTE: The baseline regression equation is $R_t = \alpha + \sum_{i=1}^K \beta_i S_{t-i} + \gamma' Z_{t-1} + \varepsilon_t$, where Z includes four lags of real retail sales and four lags

of real personal income growth. The Wald statistic is from the joint significance test on the lags of the consumer sentiment measure, which is distributed asymptotically as a χ^2 with $K = 4$ degrees of freedom. The incremental \bar{R}^2 is the difference in explained variation in a specification that includes lags of the sentiment index and the control variables and a specification that includes only the control variables. All regressions include quarterly dummy variables. */**/** denote significance at the 10/5/1 percent levels, respectively.

by employing the Baxter-King *bandpass* filter (henceforth, BK filter) to the retail sales and consumer sentiment data.⁹ The algorithm has the effect of filtering out fluctuations that occur outside a prespecified periodic band. Because we are interested in business cycle fluctuations, we parameterize the filter using Baxter and King's suggestion of filtering out fluctuations with periodicity lower than 18 months and greater than 8 years. An example of the resulting bandpassed series and the original retail sales data (for Texas) is plotted in Figure 3. Specifically, note that the BK filter eliminates the high-frequency noise in the retail sales series.

Using the BK-filtered data, we perform the same regressions from the Estimation and Results section. Results are illustrated in Tables 4 and 5. We find that, without high-frequency noise, the explanatory power of consumer sentiment increases considerably. In fact, the number of states in which lags of national ICS enter significantly in the joint test, once the high-frequency fluctuations are filtered out, jumps from 17 to 30, and the average adjusted R^2 equals 15.5 percent among these states. The number of states in which lags of regional ICS enter significantly jumps from 13 to 30, with an average adjusted R^2 of 14.5 percent. The number of states in which lagged CCI enters significantly increases from 12 to 30, with an average adjusted R^2 of 16.6 percent. The national estimates are significant in both the ICS and CCI cases. The adjusted R^2 equals 33.4 percent using the ICS and 44.9 percent using the CCI. The average increment in explained variation when using additional control variables, however, does not exceed 0.1 percent in any of the specifications, suggesting that no additional information is provided by the consumer sentiment indices that is not contained in the control variables.

This increase in explanatory power across states suggests that high-frequency fluctuations do confound the assessment of consumer sentiment's merit in evaluating regional economic conditions. Although these results validate, in part, the theory of employing consumer sentiment indices to predict economic conditions, the prac-

tical value of the indices as forecasting instruments is limited. The results imply that the business cycle component of the indices (that is, fluctuations that occur with business cycle periodicity) are useful in forecasting the business cycle component of retail sales; forecasting actual retail sales from actual consumer sentiment, however, is problematic because filtering the data requires dropping observations at the end of the sample as well, not just at the beginning. Thus, the indices may provide some indication about the *overall* state of the regional economy but little information about next month's data releases.

SUMMARY

In this paper we examine how well consumer sentiment predicts state-level retail sales growth. The empirical results suggest that consumer sentiment measures are relatively weak predictors of state-level retail sales growth. We find that, on average, consumer sentiment forecasts retail sales growth for at least 27 percent of the 44 states we analyzed. In those states having a significant sentiment/spending relationship, the incremental explanatory power of including lagged sentiment in the forecasting models averages about 4 percent.

We find that consumer sentiment predicts national-level retail sales growth. This, however, raises the question of why the results between state and national forecasting models are different. This study shows that aggregation at the national level mitigates random state-level variations in retail sales growth. However, while data aggregation reduces state-level variations in retail sales growth, our analysis also revealed that the significant sentiment and spending relationship using national retail sales is not driven by a strong sentiment/spending relationship in only a few states. Focusing the investigation on fluctuations at the business cycle frequency reveals a significant sentiment/spending relationship in a greater number of states. The findings here reveal that, while consumer sentiment may help assess the general state of the national economy, it may not be an important factor in forecasting regional economic growth.

⁹ See Baxter and King (1999) for details about this filter.

REFERENCES

- Allenby, Greg M.; Jen, Lichung and Leone, Robert P. "Economic Trends and Being Trendy: The Influence of Consumer Confidence on Retail Fashion Sales." *Journal of Business and Economic Statistics*, January 1996, 14(1), pp. 103-11.
- Batchelor, Roy and Dua, Pami. "Improving Macroeconomic Forecasts: The Role of Consumer Confidence." *International Journal of Forecasting*, March 1998, 14(1), pp. 71-81.
- Baxter, Marianne and King, Robert G. "Measuring Business Cycles: Approximate Band-Pass Filters for Economic Time Series." *Review of Economics and Statistics*, November 1999, 81(4), pp. 575-93.
- Bram, Jason and Ludvigson, Sydney. "Does Consumer Confidence Forecast Household Expenditure? A Sentiment Index Horse Race." Federal Reserve Bank of New York *Economic Policy Review*, June 1998, 4(2), pp. 59-78.
- Carroll, Christopher D.; Fuhrer, Jeffrey C. and Wilcox, David W. "Does Consumer Sentiment Forecast Household Spending? If So, Why?" *American Economic Review*, December 1994, 84(5), pp. 1397-408.
- Howrey, E. Philip. "The Predictive Power of the Index of Consumer Sentiment." *Brookings Papers on Economic Activity*, 2001, (1), pp. 175-207.
- Leeper, Eric M. "Consumer Attitudes: King for a Day." Federal Reserve Bank of Atlanta *Economic Review*, July-August 1992, 77(4), pp. 1-15.
- Matusaka, John G. and Sbordone, Argia M. "Consumer Confidence and Economic Fluctuations." *Economic Inquiry*, April 1995, 33(2), pp. 296-318.
- Owyang, Michael T.; Piger, Jeremy M. and Wall, Howard J. "Business Cycle Phases in U.S. States." Working Paper No. 2003-011E, Federal Reserve Bank of St. Louis, 2004.
- Piger, Jeremy M. "Consumer Confidence Surveys: Do They Boost Forecasters' Confidence?" Federal Reserve Bank of St. Louis *Regional Economist*, April 2003, pp. 10-11.
- Rodgers, James D. and Temple, Judy A. "Sales Taxes, Income Taxes, and Other Non-Property Tax Revenues," in J.R. Aronson and Eli Schwartz, eds., *Management Policies in Local Government Finance*, Municipal Management Series, Fourth Edition. Washington, DC: International City/County Management Association for the ICMA University, 1996, pp. 229-59.



Federal Reserve Bank of St. Louis

P.O. Box 442

St. Louis, MO 63166-0442

