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REVIEW

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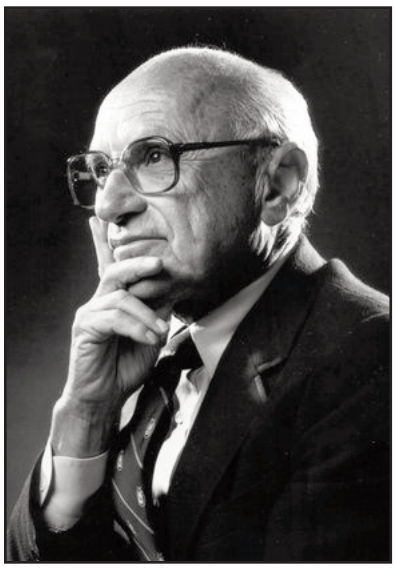
Milton Friedman, 1912-2006: Some Personal Reflections

William Poole

Milton Friedman died the week before Thanksgiving. In the days that followed, articles in major newspapers ably covered the tremendous importance of his work in economic science and his historic contributions to public policy. Throughout his career, Milton—everyone who knew him called him Milton—provided specific examples of how the magic of competitive markets could be brought to bear on public policy issues. Those examples, such as his successful advocacy of a volunteer army, taught many other economists to pursue the same approach on a wide range of issues.

But the recent articles on Milton did not adequately emphasize an important point. On numerous issues, Milton did not disagree with liberals on goals but he did disagree with them on the best policies to achieve those goals. He wanted, for example, to see children receive a good education. He simply believed that market-oriented approaches would work better than governmental approaches. Thus, he favored government-provided school vouchers, which could be tendered at private schools, rather than public schools. Similarly, he favored housing vouchers over public housing. This is an important point because many liberals have tended to dismiss Milton's approaches because they just could not believe that anyone could favor a goal and not favor a direct government approach to achieving the goal.



I heard Milton debate on many occasions. He typically destroyed his opponents in those debates—destroyed the case but not the person. His method was simple but always brilliantly executed. "Do you agree with these goals?" Answer: "Yes." "Do you agree with these propositions from economic theory?" (An example would be that demand curves slope downward.) Answer: "Yes, I agree that demand curves slope downward." "Here are the facts as I see them—X, Y, and Z. So, given that we agree on the goals, we agree on economic theories A, B, and C, facts X, Y, and Z, then logic takes us to these conclusions."

I heard more than one debate opponent, not liking the conclusions, tell Milton that "you are

William Poole is the president of the Federal Reserve Bank of St. Louis. The views expressed are the author's and do not necessarily reflect official positions of the Federal Reserve System.

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taking logic too far." Milton would reply, "That is the only place you can take logic. If you do not like the conclusions, you'll have to find different premises."

Many have noted Milton's prowess in debate. I would add that he attacked his opponents' logic, or illogic, and not their person or motives. I know that he often believed that there were hidden motives or goals behind policy positions he did not accept, but in my experience, although he might discuss hidden motives in general, he would not try to ascribe them to a particular debate opponent. He kept debate on a high, impersonal level; he focused on ideas and logic and not persons.

When I went to the University of Chicago for graduate study in 1959, I audited Milton's price theory course my first semester and later became a member of his justly famous Money Workshop. Milton pushed his students, but was quite patient with them. He would pause in his presentations, seeking feedback and questions and engaging in conversation, trying to be sure that students understood whatever point he was making. Unlike some other professors I had over the years, he never made jokes at a student's expense. Occasionally he became exasperated with a student who continued with some inane argument and his exasperation would show. He was very generous with his time and as a student I made good use of his office hours.

Milton was on leave during my thesis-writing year at Chicago, but he got me started on my topic, the Canadian experience with floating exchange rates. For some years after I left Chicago, Milton would comment on drafts of papers I sent him. He was a mentor and I greatly appreciated the time he took to help me sharpen my analysis.

I was privileged to be Milton's student and to have maintained contact with him over a span of almost 50 years. We have lost a giant intellect and a fine human being.

Understanding the Fed

William Poole

This article was originally presented as a speech at the Dyer County Chamber of Commerce Annual Membership Luncheon, Dyersburg, Tennessee, August 31, 2006.

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People often ask me questions about the Fed, sometimes out of simple curiosity and sometimes out of a real need to know for business reasons. Portfolio managers, for example, have a real need to know. My remarks reflect my effort to provide rather systematically some answers to common questions. And I will also answer questions that ought to be put to me, but usually are not. There is no reason why the Federal Reserve should be a mysterious organization—we ought to be responsive to your concerns.

Obviously, I want to emphasize that the views I express here are mine and do not necessarily reflect official positions of the Federal Reserve System. I suspect that each of us involved in Federal Reserve policy would answer the questions somewhat differently and emphasize different things. In any event, I'll offer my answers. I thank my colleagues at the Federal Reserve Bank of St. Louis for their comments, especially Robert H. Rasche, senior vice president and director of research, who provided special assistance.

THE ROLE OF ECONOMIC SCIENCE IN MONETARY POLICY

A very general question concerns the basis on which policy decisions are made. It is important to recognize that economists have developed a formal theory of monetary policy over the past 60 years or so and that this theory really does guide our thinking. The theory has two logical parts. The first is a clear set of objectives. The second is a specification of how policy, in pursuit of these objectives, affects the economy.

The model of how the economy works is complicated, and I could not possibly begin to present it here. But I will say that our understanding of how the economy works is based on economic theory and an enormous body of empirical research that tests the theory. Our understanding is often qualitative, and we know that we must attach standard errors to our numerical predictions. An active research program within the Federal Reserve and by academic and business economists continuously refines the theory and our empirical understanding.

Let me use an analogy: Hurricane forecasting has come a long way, but, as anyone who watches the weather news knows, the forecasts are not perfectly reliable. Ship captains have to make policy decisions on what courses to set, taking into account the forecasts and what is known about forecast accuracy. Economic policymakers have to make the same sorts of decisions based on incomplete knowledge.

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So, given policy objectives, and given a view about how policy decisions affect the economy, the central bank can in principle specify a policy rule, or response function, that guides policy. To achieve a good result, the general public and market participants need to understand the objectives and the response function so that the private economy can determine its activities with full knowledge of how the central bank will act. Of course, uncertainty is an inherent characteristic of the economic world. What should be predictable are the central bank's responses to the never-ending sequence of surprises that characterize the economic environment.

Monetary Policy Objectives

Congress sets the mission of the Federal Reserve in the conduct of monetary policy. Originally, the Fed's mission was specified in the Federal Reserve Act signed into law by President Woodrow Wilson in December 1913. The Fed's current mandate, set formally in an amendment to the Federal Reserve Act in 1977 and reaffirmed in 2000, requires the Federal Reserve to pursue three objectives through its conduct of monetary policy. They are "maximum employment, stable prices and moderate long-term interest rates" (Bernanke, 2006a). Economists recognize that long-term interest rates incorporate a premium for expected inflation. Thus, the objectives of price stability and low long-term interest rates are essentially the same objective.

This "dual mandate," so-called because of its emphasis on both employment and price stability objectives, differs from that of other central banks, especially the "inflation targeting" central banks. Inflation targeters, including the Bank of Canada, the Bank of England, and the Reserve Bank of New Zealand, among others, operate under an agreement with their respective governments that defines price stability as the single objective and specifies a quantitative definition of the inflation objective. In a similar fashion, the European Central Bank (ECB) is given a price stability mandate under the Maastricht Treaty, though the treaty does not give a numeric value or range to the ECB. The ECB has interpreted its mandate as preventing the inflation rate from exceeding 2 percent per annum over a "medium term" horizon.

Today, there is general agreement among professional economists and central bankers around the world that, in the long run, monetary policy cannot achieve a tradeoff between inflation and employment. Successive Fed chairmen have emphasized that price stability is not only a mandated objective of monetary policy but also the means by which monetary policy contributes to achieving the other two objectives. The view goes back at least to Chairman William McChesney Martin: "My interest in a monetary policy directed toward a dollar of stable value is not based on the feeling that price stability is a more important national objective than either maximum sustainable growth or a high level of employment, but rather on the reasoned conclusion that the objective of price stability is an essential prerequisite for their achievement" (McChesney Martin, 1959, p. 5). In his 1979 confirmation hearing, Chairman Paul Volcker (U.S. Congress, 1979) made this statement: "I believe that ultimately the only sound foundation for continuing growth and prosperity of the American economy is much greater price stability." Early in his tenure, Chairman Alan Greenspan (1988) concurred in this view: "The Committee continued to focus on maintaining the economic expansion and on progress toward price stability, which was seen as a necessary condition for long-term sustained economic growth." In July 2006, Chairman Ben S. Bernanke (2006b) acknowledged the following: "The achievement of price stability is one of the objectives that make up the Congress's mandate to the Federal Reserve. Moreover, in the long run, price stability is critical to achieving maximum employment and moderate long-term interest rates, the other parts of the congressional mandate."

I believe that we can go a step beyond these statements. In my view, the goal of price stability must be the primary goal for three reasons. First, in the long run, employment and economic growth are maximized in an environment of price stability. Second, only in an environment of price stability and market confidence that the central bank will continue to maintain price stability will the central bank be in a position to act deliberately to offset

many types of disturbances that would otherwise create fluctuations in employment and output. The Federal Reserve does not have the power to completely offset all such disturbances, but it can cushion their effects and thereby improve economic stability. Finally, price stability is a goal in its own right simply because price instability creates arbitrary and unfair redistributions of income and wealth.

I have often noted that my own personal preference is to define "price stability" as a condition in which the rate of inflation, properly measured, is on average zero. I insert the qualifier "properly measured" to point out that actual price indices may have statistical problems such that zero measured inflation on a particular price index might not in fact reflect a true state of zero inflation. Although my own preference is for zero inflation properly measured, I believe that a central bank consensus on some other numerical goal of reasonably low inflation is more important than the exact number chosen. Thus, I find that recent discussion of a "comfort zone" of 1 to 2 percent inflation measured by the price index for personal consumption expenditures (PCE), excluding the volatile food and energy components, is perfectly consistent with my own thinking.

Note that the congressional mandate to the Federal Reserve does not include any of numerous objectives that from time to time have been advocated by supporters of various interests: for example, stable exchange rates, stable asset prices, or housing investment. Clarity of objectives is an important attribute of monetary policy today and contributes greatly to its success.

Systematic Policy

The dual nature of the Fed mandate is well summarized in the "Taylor rule." In 1993, Stanford economist John Taylor proposed a simple formula relating the federal funds rate to (i) a long-run inflation target and (ii) short-run deviations of inflation from that target and short-run deviations of real gross domestic product (GDP) (Taylor, 1993) from a measure of "potential real GDP."[1] Taylor suggested that his simple relationship characterized in broad outline the actual behavior of the federal funds rate in the early years of the Greenspan FOMC. The essence of this relationship is that, in the long-run, the FOMC seeks to keep the federal funds rate roughly consistent with a level that is believed to produce a target level of inflation. Taylor assumed a target rate of inflation of 2 percent per year measured by the total consumer price index (CPI). In the short run, the relationship implies that the FOMC adjusts the target federal funds rate up as either the observed inflation rate exceeds the target level of inflation or real GDP exceeds potential real GDP. Conversely, under the Taylor rule, the FOMC reduces the target federal funds rate when inflation falls below its target and/or real GDP falls short of potential real GDP. Thus the relationship incorporates the primacy of a long-run inflation objective while incorporating short-run stabilization efforts.

Figure 1 shows the actual value of the federal funds rate target on FOMC meeting dates starting in 1987 as well as a computed value based on Taylor's original formula and the information available to the FOMC at the time of each meeting.[2] The inflation rate in the figure is the total CPI. Through 2000, the gap between real GDP and potential real GDP is the value measured by the staff of the Board of Governors at the time of each FOMC meeting.

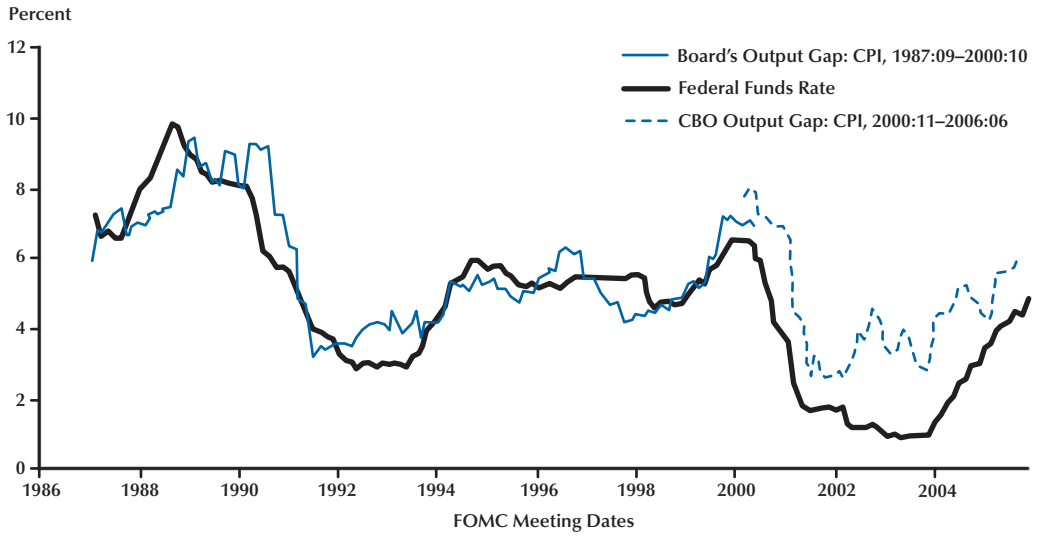
After 2000, the staff assumptions about the GDP gap are not yet publicly available, so the dotted line in the graph for this period is computed with the GDP gap as constructed by the Congressional Budget Office. Also beginning in 2000, the FOMC changed its inflation objective in two ways. First, the Committee emphasized the inflation rate as measured by changes in the PCE inflation rate rather than the CPI inflation rate. Second, the Committee emphasized the core PCE index, which excludes the volatile food and energy components. Hence, it is likely that after

[1] Taylor compared the values of his formula against the observed history of the funds rate from 1987 through 1992.

[2] In the figure, the Taylor formula is evaluated on the basis of "real time" information that could have been used in reaching a policy decision. Since May 17, 1989, all changes in the intended funds rate have been 25 basis points or multiples thereof. Since April 18, 1994, all changes in the intended funds rate have been voted on by the FOMC either at a regularly scheduled meeting or on an intermeeting conference call.

Figure 1

Greenspan Years: Federal Funds Rate and Taylor Rule
(CPI p^* = 2.0, r^* = 2.0) a = 1.5, b = 0.5



2000 the Taylor formula does not accurately reflect the information used by the FOMC as input to its deliberations.

Note that the target funds rate predicted by the Taylor formula generally tracks the actual funds rate through 2000, though there are sizable and persistent deviations of the funds rate from the values predicted by the formula. Nevertheless several of these episodes are consistent with a systematic monetary policy. First, in 1989, the FOMC increased the target funds rate more quickly than predicted by the formula, suggesting that the Committee responded more vigorously to rising inflation than incorporated in the Taylor specification. Second, during 1990-91, the FOMC reduced the funds rate more quickly than predicted by the formula, suggesting a stronger response to the recession than incorporated in the Taylor specification. Third, between late September 1992 and February 1994, the target funds rate was held at a lower level (3 percent) than predicted by the Taylor specification. It was during this period that the FOMC expressed concern about "financial headwinds" that were restraining the recovery from the 1990-91 recession. Finally, in the fall of 1998, the FOMC lowered the funds rate when the Taylor specification predicted that the rate would be held constant. At this time, concern about financial stability figured strongly in policy deliberations in the wake of the Asian financial crisis, the Russian Default, and the collapse of Long-Term Capital Management (LTCM).

The FOMC, and certainly John Taylor himself, view the Taylor rule as a general guideline. Departures from the rule make good sense when information beyond that incorporated in the rule is available. For example, policy is forward looking, which means that from time to time the economic outlook changes sufficiently that it makes sense for the FOMC to set a funds rate target either above or below the level called for in the Taylor rule, which relies on observed recent data rather than on economic forecasts of future data. Other circumstances—an obvious example is September 11, 2001—call for a policy response. These responses can be and generally are understood by the market. Thus, such responses can be every bit as systematic as the responses specified in the Taylor rule.

Credibility of the Inflation Objective

A critical ingredient in the Taylor specification as a description of monetary policy is the long-run target rate of inflation. In practice, financial market participants and the public in general cannot adequately understand the Fed's monetary policy—that is, the strategic thinking that guides the sequence of individual policy actions—without a good understanding of what the FOMC considers to be an acceptable long-run average rate of inflation. When monetary policymakers articulate their goal for long-run inflation and pursue credible policies to achieve that goal, they provide the basis for "anchoring" the inflation expectations that guide consumption behavior of households and investment decisions of firms. Inflation expectations also determine the inflation premiums in nominal interest rates that are required to equilibrate financial markets.

Evidence suggests, particularly in the U.S. economy, that the actual inflation experience is driven by inflation expectations, resource utilization—usually measured by a gap term as in the Taylor rule—and "supply shocks" such as changes in the world market prices of energy and other commodities. Of these, the most significant factor historically has been the influence of inflation expectations. Hence, when the anchor for inflation expectations begins to drag, actual inflation becomes volatile, and the resulting distortions to economic activity and conditions in financial markets produce significant disruptions in the economy. The most recent severe example from our economic history of inflation expectations getting out of control occurred in 1977-79.

It is a terrible thing if monetary policymakers lose their credibility that they will maintain low and stable long-run inflation. Once credibility is impaired, it can only be re-established the "old fashioned way"—policymakers have to earn it! Restoring credibility takes time in the face of substantial persistence in the actual inflation process. It took well over a decade to completely restore low inflation in the United States after the Great Inflation of the 1970s, and in the process the economy experienced the worst recession, in 1981-82, since the Great Depression.

INTERPRETING NEW INFORMATION

Financial market participants form expectations with respect to the prospective state of the economy from evidence of the current state of the economy as indicated in regular data releases, and other activities, such as political events and policy actions that influence economic activity and market prices. The evidence for such forward-looking expectations is widespread. Futures contracts in commodities, interest rates, and foreign exchange are actively traded in large volume on organized exchanges. Surveys of forecasts of forthcoming data releases appear regularly (e.g., *The Ticker*, which appears every Monday in the *Wall Street Journal*, and the *Calendar of Releases*, which appears each Friday on the cover page of *U.S. Financial Data* published by the Federal Reserve Bank of St. Louis).[3] Prices in financial markets respond to differences between the observed information on the economic situation and the expectations about such information—that is, markets respond to "news."

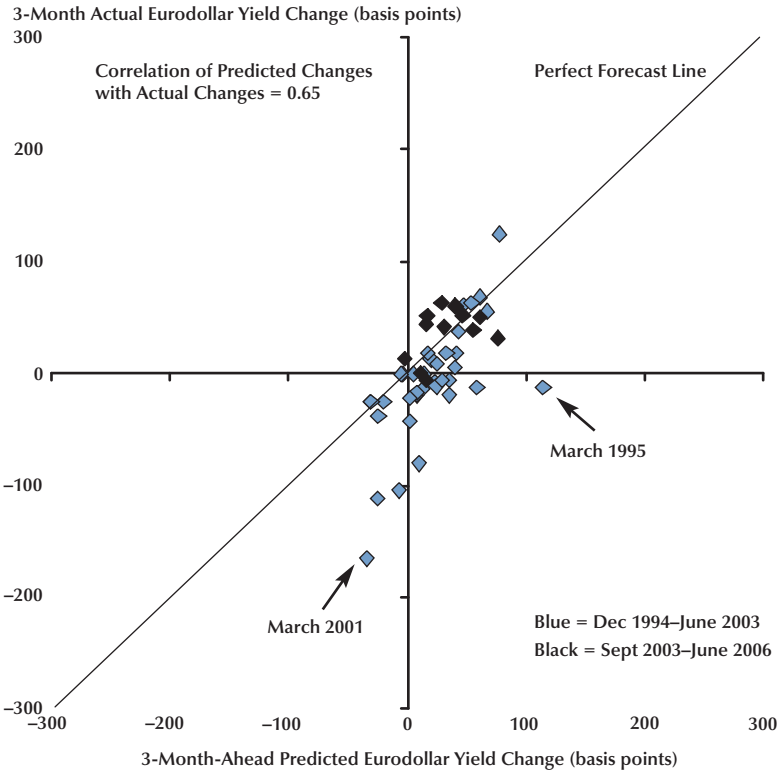
There are many claims but no convincing documented evidence of lagged responses to "news." Economic theory suggests that market prices of assets should behave like random walks—that the accumulated information at a point in time should have no predictive power for future changes in prices. Put another way, new information is quickly reflected in market prices, leaving no remaining predictable change in market prices that would permit an investor to expect an above-normal return from buying or selling the asset.

A huge body of empirical research is broadly consistent with this hypothesis. Thus, market commentary that today's market adjustments are caused by, or due to, continuing concerns over implications of old information are of doubtful validity. Traders, financial journalists, and economic pundits seem to believe that they have to attribute market adjustments to something, even when there is no evidence to support the asserted reasons.

[3] The latter data are from a survey conducted by Thomson Financial.

Figure 2

Actual and Predicted Changes in Eurodollar Yields, 3-Month Horizon



An analyst who is presumed to be an expert ought often to say that price changes appear inexplicable or random. But few experts in fact say such a thing. Therefore, I recommend that the wary observer be skeptical about purported explanations for price changes and should always check an explanation against behavior in other markets. In my experience, explanations for stock market fluctuations are especially suspect. In recent years, I have often read claims that the stock market went down because of interest rate fears, only to find that interest rates in the bond market were unchanged or went down instead of up. Given that so many institutions deal in both the equity and bond markets, it makes absolutely no sense that interest rate fears could drive down stock prices and have no effect on interest rates.

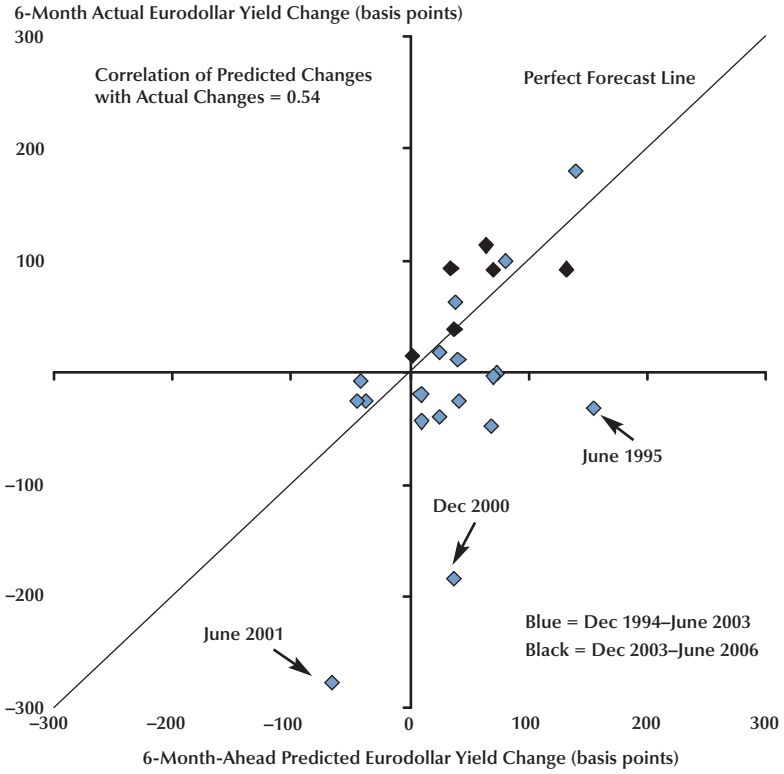
Clearly, Federal Reserve policy adjustments and market expectations about future policy adjustments do explain some stock market fluctuations. I accept that fact. Indeed, the transmission mechanism linking monetary policy decisions to changes in the inflation rate and employment require such effects. But, I really don't want to be held responsible for stock market fluctuations that occurred for other reasons or are simply inexplicable! So, next time you read that the stock market went down because of "interest rate fears," please do take a quick look at the bond tables to see if interest rates actually changed that day.[4]

New information drives both market adjustments and policy changes. Policy decisions ordi-

[4] Those who report on the stock market do not confine their misleading causal statements to the Fed. In mid-August 2006, the Dow Jones average closed down over 90 points, attributed by at least one report to "oil price fears." Looking at trading in the oil markets, September oil futures on the NYMEX exchange closed up only 4 cents, but October futures closed down 19 cents.

Figure 3

Actual and Predicted Changes in Eurodollar Yields, 6-Month Horizon



narily cannot be set long in advance because the FOMC must be open to changing its policy stance in response to new information, which is inherently unpredictable. To gain a sense of the impact of new information on interest rates, I'll analyze data from the eurodollar futures market. Eurodollar deposits are not federal funds, though changes in the two yields are highly correlated. To study market expectations about the federal funds rate over horizons of four or more months, it is best to use eurodollar futures because these contracts are actively traded over far future horizons, whereas trading of federal funds futures is relatively thin on horizons of more than a few months.

Prices in the eurodollar futures market provide direct information on market expectations of future FOMC policy actions setting the target federal funds rate. Consider the forecasting record on three-month and six-month horizons. Figure 2 focuses on the difference between the yield on a three-month eurodollar futures contract with three months to maturity and the actual eurodollar deposit yield. This difference is plotted on the horizontal axis against the actual change in the yield on eurodollar deposits over the corresponding three months to the maturity date on the vertical axis. Thus, the three-month *actual* change in the eurodollar deposit rate is plotted against the *forecasted* change in the eurodollar deposit yield over the same time period. The observations are taken every three months starting in December 1994.[5] The same exercise is repeated at a six-month horizon in Figure 3.

In each of the two graphs, the diagonal line from the lower left to the upper right represents a line of perfect forecasts—if all the points lay along

[5] Hence, the observations are nonoverlapping.

this line, the eurodollar futures market would never have made any errors in forecasting the change in the eurodollar yield over the succeeding three (six) months. It is evident from the figures that the futures markets fall short of such perfection. In fact, over the entire period, the correlation between the forecast changes and the actual changes on a three-month horizon is only 0.65; on the six-month horizon the correlation falls to 0.54.

As an aside, note that economists and statisticians usually measure forecasting accuracy by the square of the correlation coefficient, or R^2. Thus, a correlation of 0.65 is an R^2 of 0.42, which means that the forecasts embedded in the eurodollar futures market explain 42 percent of the variance of fluctuations in the actual eurodollar yield. Thus, unpredictable events even over a three-month horizon are responsible for more than half of the variance of the eurodollar yield. Over a six-month horizon, the R^2 is 0.29, which means that unpredictable events are responsible for more than 70 percent of the variance over a six-month horizon.

The overall correlations mask some interesting details. The points plotted in black in each figure represent observations since the middle of 2003, when the FOMC started providing "forward guidance" regarding future policy actions. Note that these points scatter fairly tightly around the line of perfect forecasts—markets were not particularly surprised by the evolution of policy actions over this period. In contrast, consider the forecasts for the first half of 1995. The three-month and six-month futures market forecasts in December 1994 were for large positive changes in the eurodollar deposit rate over the succeeding three and six months. In the event, the eurodollar deposit rate fell a bit over these horizons. The December 1994 futures prices were observed shortly after the FOMC increased the funds rate target by 75 basis points in November 1994, and the market had expected further substantial increases. In fact, the FOMC increased the funds rate target by only 50 basis points in the first half of 1995 (at the January FOMC meeting).

Another large miss occurred in December 2000. At that time, the futures market forecasts were for a decline in the eurodollar yield of 35 basis points over the following three months and a total of 67 basis points over the six-month period. Instead, the FOMC acted aggressively to lower the funds rate target starting in January and continuing through May 2001 by a total of 250 basis points. The FOMC acted aggressively as incoming information pointed to growing weakness in economic activity. Both the FOMC and the markets were surprised by incoming information indicating that the economy was weakening quickly and significantly.

It is rare that a single data report is decisive for the FOMC. The economic outlook is determined by numerous pieces of information. Important data such as the inflation and the employment reports are cross-checked against other information. The FOMC is aware of the possibility of data revisions and short-run anomalies.

My key point is that market commentary indicating that the FOMC is unpredictable is off base. Typically, the FOMC cannot be predictable because new information driving policy adjustments is not predictable. All of us would like to be able to predict the future. We in the Fed do the best we can, but the markets should not complain that the FOMC lacks clairvoyance! What the FOMC strives to do is to respond systematically to the new information. There is considerable evidence that the market does successfully predict FOMC responses to the available information at the time of regularly scheduled meetings.[6]

FOMC PROCESSES

The Board of Governors and the Reserve Banks are fortunate to have highly professional, nonpolitical staffs of economists. The role of the staff is to provide analysis of current economic conditions, forecasts of the evolution of the economy over a horizon of a couple of years, and assessments of the risks to those forecasts. Such information is a valuable and valued input into policy discussions. I myself do not finally make up my mind on a policy position until I've heard both staff presentations and the views of other FOMC participants. More accurately, I go into each FOMC

[6] See, for example, Poole (2005).

meeting with a view on the appropriate policy action given my assessment of the economic outlook, but I try to be as open as I can to having my view altered by discussion at the FOMC meeting. There are certainly instances when I have changed the view I took into the meeting as a consequence of the discussion.

Distinction Between Members and Participants

Except when there are vacancies in offices, there are 19 principals, or participants, at each FOMC meeting—the 7 members of the Board of Governors and the 12 Reserve Bank presidents. All of these participants are fully engaged in presenting their views. They bring information from their business and academic contacts, comment on staff presentations, discuss analytical issues relevant to understanding the economy and policy issues, and present their views as to the most appropriate policy action. However, at any particular meeting there are only 12 voting members of the Committee. Each of the 7 members of the Board of Governors is a permanent member of the FOMC. The president of the Federal Reserve Bank of New York is also a permanent member. The remaining Federal Reserve Bank presidents rotate as members of the FOMC. As president of the Federal Reserve Bank of St. Louis, I am in a rotation group with the presidents of the Federal Reserve Banks of Atlanta and Dallas. This structure of the FOMC dates from 1942. In the early years of the FOMC, not all the principals were allowed to participate, or even attend, meetings at which they were not voting members of the Committee.

The purpose of FOMC meetings is to reach a consensus among the participants and, particularly, among the members about the appropriate policy action (setting of the funds rate target) given policy goals and the outlook for the economy. Unanimous decisions, while desirable, are not required, and members are free to dissent from the consensus view if they feel strongly that an alternative policy action is preferable. Indeed, I believe that it is my obligation under the Federal Reserve Act to dissent when I believe strongly that an alternative policy course would be better. Historically, dissents were not unusual; though, in the recent years, they have been relatively rare.

Communication

Once policy action has been set, it is absolutely necessary that communication to the public about the policy action not be garbled. Hence, the Chairman is the only participant who speaks officially for the Committee. He presents official Federal Reserve positions through testimony before congressional committees and in public speeches. The minutes of FOMC meetings, currently released three weeks after each meeting, also represent the official position of the Committee.

Participants other than the Chairman express their own views in speeches. These speeches often may seem to reflect a "party line" but are rarely centrally coordinated in any way. In my experience, the only time there has been a real effort to coordinate public comments by the participants was in the late summer of 1998. At that time, financial markets were skittish as a result of the Russian default and financial troubles of LTCM. I recall an informal gathering in the late summer of 1998 with Chairman Greenspan and a couple of other FOMC members when the Chairman made a request that we say very little given the rather tense state of the markets as the LTCM situation unfolded.

Seeming coordination at other times is a consequence of the fact that FOMC participants ordinarily see things quite similarly. But most participants are not shy about expressing their differences. Differences are registered in a formal way through discount rate decisions of the Reserve Banks and informally through positions stated in speeches. Anyone can obtain an excellent feel for what goes on at an FOMC meeting by reading transcripts that are released with a lag of five years and are made available on the website of the Board of Governors.

Dealing with the Press

Different FOMC participants have different attitudes and comfort levels in dealing with the press. I myself give many speeches and almost

always talk with the press after my speeches. I try to be as clear as I can, but from time to time I realize after the fact that I have not expressed myself as clearly as I would have liked. When reading press accounts, be aware that FOMC members misspeak from time to time and press interpretations are not always as intended. We all try to be as careful as possible but are not infallible. Be wary of headlines. Reporters will tell you that they are sometimes frustrated with the headlines that appear over their stories. Be aware also that wire service reports are sometimes designed to move markets. Considerations behind policy adjustments are often complex—be cautious about simple interpretations.

I believe that one of my responsibilities is to communicate to a wider audience through the press, doing the best I can to be accurate and to convey both policy fundamentals and policy nuances. A well-informed public is essential to an effective monetary policy. In my experience, press reports are generally, but not always, accurate. The financial journalists with whom I interact are genuinely interested in getting the story right. They do ask probing questions, as they should, but do not try to impose their own personal slant to the reports they publish. Inaccuracies are generally a consequence of the complexity of the subject and the need, on my part and the journalists' part, to make reports simple enough for a wide audience to understand.

When talking with the press, one of the points I try to convey is that I do not come to a firm conclusion about my policy position until just before the FOMC meeting; as I have said, even then, I do my best to maintain an open mind, which can be changed by the staff presentation and general discussion at the meeting itself. I have already documented the most important reason for this policy of mine. Inherently unpredictable information can arrive right up to the day of the meeting. It would not be sound practice for policymakers to lock themselves into decisions impervious to new information.

Another reason why I ordinarily do not have a settled policy position weeks before an FOMC meeting is this: I follow economic reports continuously between FOMC meetings, but do not ordinarily dig deeply into them until the period of intense preparation the week before an FOMC meeting. Thus, my views on incoming information are often tentative and incomplete; I know that I'll be reviewing all available information in the intense preparation period. I believe that it would not be helpful to the markets for me to convey views that I know are tentative and incomplete; thus, I try not to speculate about the significance of new information for the policy decision to be debated at the next FOMC meeting. My responsibility is to convey accurate information and, equally, not to be a source of misleading or inaccurate interpretations of incoming information.

Bottom Line

The Federal Reserve has the responsibility to provide leadership. The ideal situation is when the market can reasonably predict what the Fed is going to do because the Fed has provided the leadership to make clear its objectives and how it pursues those objectives. The Fed is not and ought not to be viewed as an adversary of the markets. Policy actions and statements do have market effects. Those are unavoidable, but the Fed strives to make policy as clear as it can so that what is really surprising the markets is not Fed actions but the arrival of new information that surprises the Fed and markets together.

I've tried to answer questions that are commonly put to me and to provide a general framework for better understanding of the Federal Reserve. And I hope that I have provoked some additional questions.

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The Rise in Personal Bankruptcies: The Eighth Federal Reserve District and Beyond

Thomas A. Garrett

Personal bankruptcy filings in the United States increased, per capita, nearly 350 percent between 1980 and 2005. This paper first addresses the changes in economic and institutional factors that have occurred over the past 100 years, many of which have occurred in the past 30 years, which are likely contributors to the dramatic rise in personal bankruptcy filings seen across the country. These factors include a reduction in personal savings, an increase in consumer debt, the proliferation of revolving credit, changes to bankruptcy law, and a reduced social stigma associated with filing for bankruptcy. Given the availability of bankruptcy data at various levels of aggregation, the remaining sections of the paper contain results from several different empirical analyses of bankruptcy filings using various data sets. Careful attention is paid to personal bankruptcy filings in counties located in Eighth Federal Reserve District states. (JEL D14, K35, G33)

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Personal bankruptcy filings in the United States have soared over the past 30 years, from 1.2 per 1,000 persons in 1980 to nearly 5.4 per 1,000 persons in 2005, an increase of nearly 350 percent. Over this period, bankruptcies have been growing at an average annual rate of nearly 7 percent, about 1.5 times greater than the average rate of annual per capita gross domestic product (GDP) growth. Taking a longer perspective, the 2005 filing rate of 5.4 per 1,000 persons is nearly 80 times greater than the 1920 rate of 0.06 filings per 1,000 persons.[1]

These statistics disguise the fact that personal bankruptcy filings are not equal across the country. For example, at the state level, Tennessee has usually had the highest rate of personal bankruptcy filings in the nation, with over 10 filings per 1,000 persons.[2] Shelby County in Tennessee (Memphis area) led the nation in personal bankruptcy filings, with a rate of over 20 filings per 1,000 persons, or 2 percent of the population of Shelby County. At the other end of the spectrum, Massachusetts had a filing rate of 2.8 filings per 1,000 persons, ranking last of all states.

So what is behind this rapid increase in bankruptcy filings? The general cause of most personal bankruptcy filings is no mystery: An individual has too much debt and often also experiences an unexpected negative shock to his or her income, such as divorce, unemployment, or an uncovered medical expense. But this does not explain the increase in personal bankruptcy filings that has occurred over the past 100 years, nor does it explain the explosive growth in bankruptcy filings over the past 30 years.

The first part of the paper will discuss changes in several economic and institutional factors that are likely contributors to the dramatic rise in personal bankruptcy filings seen across the country.

[1] Bankruptcy data are from the Administrative Office of the U.S. Courts: www.uscourts.gov/adminoff.html.

[2] Tennessee ranked third in personal bankruptcies in 2005—bankruptcies per 1,000 persons were greater in Indiana and Ohio in 2005.

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An examination of these factors may help clarify the causes of increased bankruptcy filings and may thus lead to a better understanding of the solutions to reverse this trend.

The availability of bankruptcy data at various levels of aggregation—that is, national, state, and local—affords us the opportunity to conduct temporal and cross-sectional analyses of bankruptcy filings at these different levels of aggregation. The remaining section of the paper will present and discuss the results from several different empirical analyses of bankruptcy filings using various data sets. Analysis at the national level will explore the long-run versus short-run relationship between bankruptcy filings and several key economic variables, such as the savings rate, consumer debt, and income. An analysis of state-level personal bankruptcy filings reveals that bankruptcy filing rates have been converging over time. That is, states having had higher personal bankruptcy filings are found to have had lower rates of growth in bankruptcy filings. Finally, analysis at the county level uses data for all counties in Eighth Federal Reserve District states. The county analysis explores the relationship of personal bankruptcy filings with income and the distribution of income.

A BRIEF HISTORY OF BANKRUPTCY LAW IN THE UNITED STATES

The U.S. Constitution gives Congress the authority to legislate bankruptcy. Article I, Section 8 of the Constitution reads "The Congress shall have Power To establish…uniform Laws on the subject of Bankruptcies throughout the United States." Despite this Constitutional authority, no permanent bankruptcy law existed in the United States for the first 120 years after this country's founding.[3]

Three federal bankruptcy acts were passed—in 1800, 1841, and 1867—but all were repealed shortly after their enactment for several reasons. First, during the late 1700s and most of the 1800s, the demand for bankruptcy legislation by debtors and creditors increased during recessionary periods and diminished during boom periods. Second, strong political divides in Congress between Whigs and Federalists (Republicans), who were pro-creditor, and Democrats, who were pro-debtor, prevented the permanency of any legislation. Third, the process of filing for bankruptcy under each of the three acts was far from easy—a costly administrative structure was in place and all bankruptcy filings had to be done in one of the relatively small number of federal courts across the country.

The first long-lasting piece of bankruptcy legislation in the United States was the 1898 Bankruptcy Act. The 1898 Act was designed to aid creditors in the liquidation of an individual's assets and reorganize insolvent corporations. At the time of the 1898 Act, corporate bankruptcies accounted for the vast majority of all bankruptcy filings. Unlike the earlier acts of 1800, 1841, and 1867, the permanency of the 1898 Act was due to (i) a unified Congress and presidency (Republican) and (ii) the rapid growth and political strength of special interest groups (pro-debtor and pro-creditor) that culminated in the late 1800s. The rise of populism through the 1800s contributed to a strong political demand for pro-debtor bankruptcy legislation. On the other hand, the growth in business and industry over this same time period resulted in the rise of pro-business interest groups such as chambers of commerce and commercial trade groups. Competition between these growing interest groups placed great political pressures on Congress to pass long-lasting bankruptcy legislation. The 1898 Act also fostered the growth of professional bankruptcy groups that had tremendous political influence, such as the American Bar Association and Community Law League.

The Great Depression in the 1930s revealed several problems with the 1898 Bankruptcy Act.[4] First, the percentage of voluntary personal bankruptcy filings grew at this time. The 1898 Act, while containing some provisions for personal bankruptcy filing, mostly addressed the issue of

[3] A detailed history of bankruptcy legislation in the United States can be found in Skeel (2001) and www.princeton.edu/~pefinmar/Hansen.pdf.

[4] See http://eh.net/encyclopedia/article/hansen.bankruptcy.law.us.

corporate bankruptcy. Second, the 1898 Act stipulated that all corporations that filed for bankruptcy be placed in corporate receivership.[5] Increased business bankruptcies during the Great Depression revealed several problems, including corruption, with the structure of corporate receivership established under the 1898 Act.

The Chandler Act of 1938 was designed to remedy weaknesses of the 1898 Bankruptcy Act. Many more provisions for individual and corporate debtors were contained in the Chandler Act. For example, it allowed debtors to choose between liquidation and repayment of debt and also provided for voluntary and involuntary bankruptcy filings. As with the 1898 Act, the impetus behind the Chandler Act was the strong desire of various special interest groups, such as the American Bar Association, National Association of Credit Management, and the Commercial Law League, to change federal bankruptcy law.

The next significant piece of bankruptcy legislation was the Bankruptcy Reform Act of 1978. Between the 1930s and 1970s, corporate bankruptcy filings decreased but personal bankruptcies steadily increased. The 1978 Act (also known as the "Bankruptcy Code") replaced many earlier provisions for voluntary personal bankruptcy established by the 1898 Act. Individuals could chose between Chapter 7 filing, which provided for the liquidation of the debtor's assets, or Chapter 13, which allowed for the repayment and reorganization of a debtor's assets.[6] Many of the changes to Chapter 13 made bankruptcy a more attractive option to debtors than in the past, and it is argued by some that the 1978 Act caused, at least in part, the increase in bankruptcy filings immediately following implementation of the Act.[7]

Additional changes to the 1978 Act were made by the Bankruptcy Reform Act of 1994, such as expediting the procedures for personal and corporate bankruptcy filings and increasing the percentage of a debtor's assets that are exempt from creditors (called the homestead exemption).

President George W. Bush signed the Bankruptcy Abuse Prevention and Consumer Protection Act of 2005 into law on April 20, 2005, with the Act taking effect on October 17, 2005. The Act was designed to reduce the number of personal bankruptcy filings that have continued to increase since the late 1970s, by increasing the cost of filings for personal bankruptcy.[8] Specifically, the 2005 Act introduces two needs-based tests (based on income) for Chapter 7 filings (liquidations), requires filers to participate in credit counseling, and increases the allowable time between Chapter 7 filings to 8 years. The Act also established several requirements for lenders, such as better disclosure regarding minimum payments, interest rates (on credit cards), late payment deadlines, and introductory rates. The 2005 Act was seen by consumers as increasing the costs of filing for bankruptcy; consequently, filing rates increased dramatically (nearly six times higher than average) prior to the Act's effective date, as seen in Figure 1. Note that after October 2005, bankruptcy filings were lower than the previous two-year average. Discussions with various bankruptcy professionals reveal, however, that personal bankruptcy filings are again on the rise.

THE BANKRUPTCY BOOM: CITED CULPRITS

The primary cause of personal bankruptcy is a high level of consumer debt often coupled with an unexpected insolvency event, such as the loss of a job, a major medical expense not covered by insurance, divorce, or death of a spouse (Gropp, Scholz, and White, 1997; Buckley and Brinig,

[5] A receiver is a person or company appointed to manage a corporation during its reorganization.

[6] See Nelson (1999) on consumers' choice between filing Chapter 7 or Chapter 13.

[7] See Shepard (1984a). Several features of the 1978 Act made filing for bankruptcy relatively more attractive than in the past: (i) federal exemption levels were increased, (ii) the requirement that creditors must approve the repayment plan under Chapter 13 was removed, (iii) Chapter 13 provided for the discharge of some debts that could not be discharged under Chapter 7, and (iv) eligibility for Chapter 13 was expanded, thus allowing almost all individuals protection from creditors under Chapter 7.

[8] The 2005 Act can be found at www.uscourts.gov/bankruptcycourts/abuseprotection.pdf. Various legal professionals in St. Louis and Memphis have commented to the author that the 2005 Act has many loopholes that result in minimal additional costs to consumers relative to earlier bankruptcy laws.

Figure 1

U.S. Personal Bankruptcy Filings: Monthly, 2004 to 2005

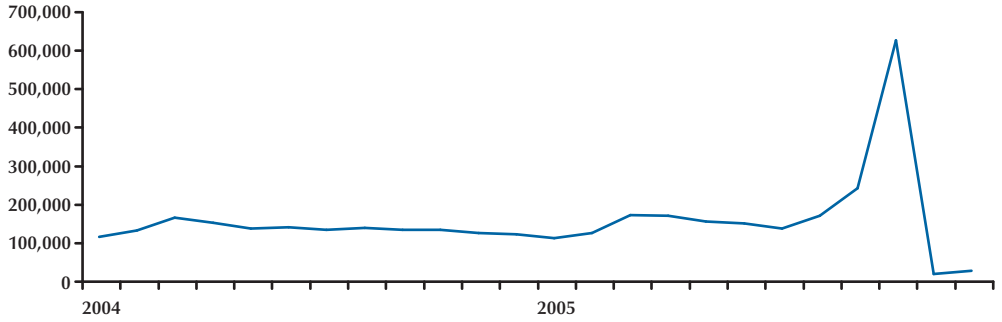


Figure 2

U.S. Personal Bankruptcies Per 1,000 Persons: 1900 to 2005

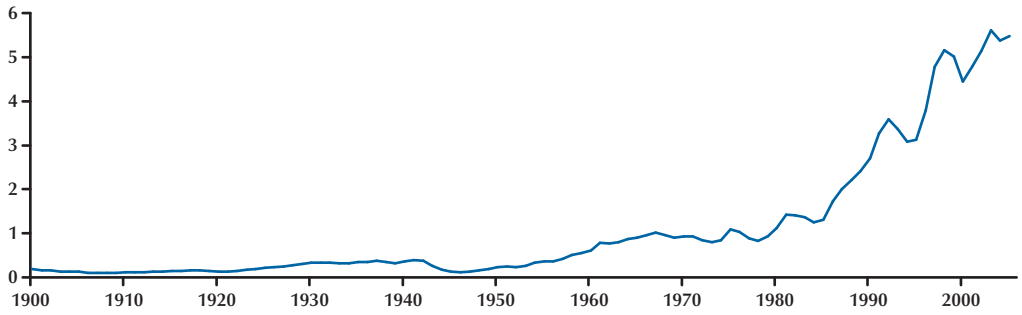
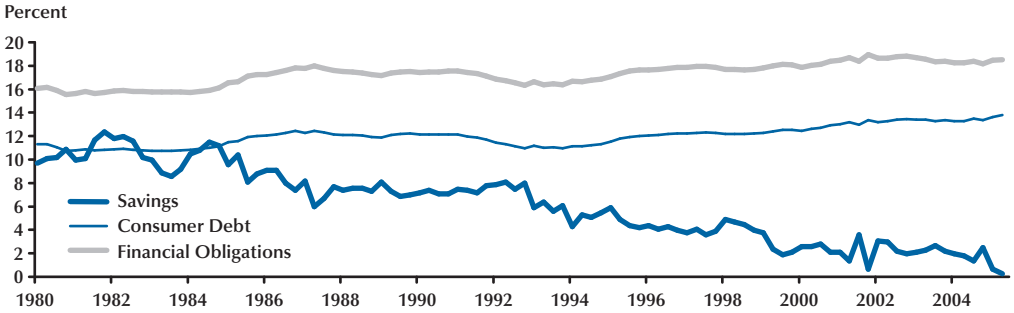


Figure 3

U.S. Consumer Saving and Debt as a Percentage of Income: Quarterly, 1980 to 2005



1998; and Nelson, 1999). Lower- to middle-income individuals are more likely to file for bankruptcy in response to an insolvency event, given their relatively limited access to financial counseling and fewer and less-diversified financial resources. According to consumer economists' surveys, the typical bankruptcy filer is a blue collar, high school graduate who is the head of a household in the lower-middle income class, with heavy use of credit.[9] But, as mentioned earlier, this description of the average bankruptcy filer cannot by itself explain the rapid increase in personal bankruptcy filings that has occurred over the past 30 years.

It is unlikely that one event triggered the rise in bankruptcy filings. Rather, various economic and institutional changes have occurred that are likely contributors. Many of the changes discussed in this paper, such as the increased availability of credit, lower costs to filing for bankruptcy, decreased consumer savings, and increased consumer debt, do not necessarily cause bankruptcies, per se, but rather have made individuals more susceptible to negative income shocks, thus increasing the *chance of* bankruptcy.

Economic Factors

Personal bankruptcy filings per 1,000 persons in the United States from 1900 to 2005 are shown in Figure 2.[10] Bankruptcy filings were relatively low and steady from about 1900 to 1920. Filings then increased slightly during the 1920s and 1930s. World War II saw a marked drop in filings, likely the result of increased employment in support of the war effort. After the war, the number of filings increased and continued to do so into the 1960s. Two reasons for this rise were an increase in economic activity following World War II and the rise in federal and state transfer programs such as Medicare, welfare, and disability, which (i) may have created an incentive for individuals to be less financially responsible given the expanding government safety net or (ii) is reflective of generally poorer financial decisionmaking by lower-income individuals.[11]

Corresponding with the dramatic change in bankruptcy filings since the early 1980s has been a marked decrease in consumer savings. For example, total saving as a percentage of income averaged nearly 10 percent in 1980 compared with 0.1 percent in the second quarter of 2005 (see Figure 3).[12] Although rising property values have likely led to a portfolio shift from traditional savings to investing in one's home, this latter option offers much less diversity, and thus higher risk, than traditional savings.

Consumer debt has increased dramatically over the past 30 years. Consumer debt service, which includes mortgage payments and personal debt (including credit cards), as a percentage of income increased from about 11 percent of personal income in 1980 to nearly 14 percent of income in the second quarter of 2005, as seen in Figure 3. Similarly, consumer financial obligations (a broader measure than consumer debt) as a percentage of income have increased since 1980, as seen in Figure 3.[13] These statistics, combined with the saving statistics, reveal that Americans have been saving less and spending more (through debt) over the past 30 years, thus making individuals more susceptible to negative income shocks and thus more likely to file for bankruptcy.

The simultaneous spread of casino gambling and rising bankruptcy rates in the 1990s has been

[9] Shepard (1984b).

[10] Data prior to 1960 were obtained from Hansen and Hansen (2006); for these years, it was assumed that "miscellaneous bankruptcies" reported in Hansen and Hansen were 60 percent corporate and 40 percent personal.

[11] Visa USA, Inc. (1996) and Edmiston (2006).

[12] The savings rate referred to here is the difference between disposable personal income and current consumption divided by disposable personal income. This measure of the savings rate is from the Bureau of Economic Analysis' National Income and Product Accounts (NIPA). This measure of savings is not without criticism. For example, realized capital gains are excluded, whereas taxes on realized capital gains are included. Also, pension benefits are not included in personal income but contributions to pensions are deducted from personal income. Another measure of the savings rate is based on the flow of funds (FOF) by the Federal Reserve Board of Governors. This measure computes savings as the change in net wealth divided by disposable income. The FOF measure and the NIPA measure are quite different. The FOF savings rate averaged 11.2 percent between 1954 and 2005, and the NIPA measure averaged 6.9 percent over the same time period. Although producing different estimates of the savings rate, the two measures are correlated over time.

[13] Financial obligations is a broader measure than consumer debt in that it considers automobile payments, rental payments, homeowners insurance, and property tax payments.

noted and studied for evidence of a causal relationship. Research has provided mixed results. The U.S. Treasury Department (1999), using data from 1962 to 1998 and applying an intervention model, found no measurable effect of gambling on personal bankruptcy rates in Mississippi and New Jersey. Expanding on the study performed by the Treasury Department, de la Viña and Bernstein (2002) examined county-level bankruptcy rates for the years 1988 to 1996. The authors found no relationship between casino gambling (available within a 50-mile radius) and bankruptcy.

Thalheimer and Ali (2004) examined personal bankruptcy rates over the period 1990 to 1997 in the riverboat gambling states of Iowa, Illinois, Missouri, and Mississippi. The authors found that access to casino gambling had no significant influence on personal bankruptcies. However, the authors did estimate that personal bankruptcy rates, on average, would have been 0.4 percent lower in the absence of casino gambling.

Finally, Barron, Staten, and Wilshusen (2002) found a small localized influence of casino gambling on bankruptcy. Using county-level data for the period 1993 to 1999, the authors found that casino gambling had a positive and significant influence on personal bankruptcy. They noted that, without gambling, counties with or adjacent to casinos would have had bankruptcy rates that were 5.4 percent lower in 1998.

Institutional Factors

The rise in personal bankruptcies in the 1920s and 1930s, along with growing corruption and legal challenges regarding corporate bankruptcy filings during the Great Depression, prompted passage of the Chandler Act in 1938. The Chandler Act created a host of new options for those filing for personal bankruptcy, such as alternatives to complete liquidation (e.g., a repayment plan) and a greater ability to file voluntary petitions. The bankruptcy reforms that resulted from the Chandler Act made personal bankruptcy filing relatively more attractive and less costly than in the past.

An increased availability of consumer credit, especially in the form of credit cards, has occurred since the 1950s.[14] Although proprietary charge cards were available in the early 1900s, the use of these cards was traditionally limited to a single store. Also, many of these cards did not have the feature of revolving credit.[15] The first general purpose credit card (BankAmericard, now known as Visa) was introduced in 1966. In 1970, only 16 percent of families had a credit card, compared with 82 percent of families in 2000.

Table 1 shows statistics on credit card ownership and balances, broken down into family income categories for select years.[16] The top portion of the table reveals that credit card ownership by all income groups has increased over time, but that wealthier families are more likely to possess a credit card. For example, in 1970, only 2 percent of the lowest income families possessed a credit card, compared with 47 percent in 2003. But, in 1970, 33 percent of the highest income families possessed a credit card, compared with 99 percent in 2003.

Not surprisingly, higher income groups tend to have higher balances. However, the important measure is balance as a percentage of income—which reflects the *burden* of credit card debt. As seen in Table 1, average credit card balances for the lowest income families are a greater percentage of family income than balances for wealthier families. In 1970, for example, credit card balances were about 5 percent of income for the lowest income families and less than 1 percent of income for the highest income families. In 2003, credit card balances were nearly 12 percent of income for the lowest income families and roughly 8.5 percent of income for the highest income families. Although wealthier families are more likely to have a credit card than lower income families, their balances are a smaller percentage of their income.

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[14] Sienkiewicz (2001).

[15] Revolving credit is an agreement to lend a specific amount to a borrower and to allow that amount to be borrowed again once it has been repaid.

[16] Data prior to 2003 were obtained from Durkin (2000). Data for 2003 were computed using data from the Survey of Consumer Finances (2004). "Lowest" is the upper range of the first quartile (about $25,000 in 2004), "middle" is the upper range of the third quartile (about $66,000 in 2004), and "highest" is the lowest range of the top 5 percent (about $174,000 in 2004). See www.census.gov/hhes/www/income/histinc/f01ar.html for a description of the family income distribution data.

Table 1

Credit Card Usage and Balance by Family Income

	Income Level		
	Lowest	Middle	Highest
Percent of families with a credit card			
1970	2	14	33
1989	17	62	89
1998	28	72	95
2003	47	91	99
Mean credit card balance ($)*			
1970	1,038	950	882
1989	909	2,502	3,960
1998	2,596	4,785	6,063
2003	2,938	6,077	14,713
Mean balance as a percent of family income			
1970	4.8	2.0	0.9
1989	3.9	4.2	2.7
1998	10.4	7.4	3.6
2003	11.9	9.1	8.4

NOTE: *Dollar values are in 2004 dollars (adjusted for inflation).

SOURCE: See text for data sources. Income data for each group are from the U.S. Census. Income data are available at www.census.gov/hhes/www/income/histinc/f01ar.html.

The late 1970s saw numerous legal changes that likely had an impact on bankruptcy filings. First, the Bankruptcy Reform Act of 1978 revamped bankruptcy practices set forth under the 1898 Act and the Chandler Act. Although the 1978 Act was passed in response to the rise in personal bankruptcies during the 1960s, many provisions in the Act made it easier for both businesses and individuals to file for bankruptcy. Academic research on the effect of the Bankruptcy Reform Act of 1978 on subsequent bankruptcy filings is mixed, however (Shepard, 1984a; and Domowitz and Eovaldi, 1993).

A second legal change in the late 1970s was a Supreme Court ruling in 1978 called the Marquette decision.[17] Prior to this time, many states had usury ceilings on credit card interest rates. The high inflation and interest rates of the late 1970s significantly reduced the earnings of credit card companies. As a result, credit card companies in states with relatively high interest rate ceilings attempted to solicit their credit cards to people living in states with lower interest rate ceilings—and still charge the higher interest rates.

Controversy over this practice culminated in the Supreme Court, which ruled that lenders in states with high interest rate ceilings could export those high rates to consumers residing in states with more restrictive interest rate ceilings. The result of this ruling was an expansion of credit card availability and a reduction in the average credit quality of card holders.

The third legal change in the late 1970s was the Community Reinvestment Act (CRA), which was enacted in 1977 to encourage depository institutions to help meet the credit and financing needs of the community, especially low- to moderate-

[17] The actual case is Marquette National Bank of Minneapolis v. First of Omaha Service Corp. See Ellis (1998) for a discussion.

income communities.[18] Because the Act has increased credit flows to disadvantaged communities, it is possible that it also has increased the number of bankruptcy filings by lower income individuals. Research has suggested that the number of bankruptcies that result from CRA loans is, at most, 3 to 4 percent of overall bankruptcy filings.[19]

Although some minor legal changes to the Bankruptcy Code did occur in the 1980s, the next significant change was the Bankruptcy Reform Act of 1994. Each state has laws regarding the percentage of an individual's various assets that are exempt from creditors when that individual files for bankruptcy. These assets include insurance plans, pensions, personal property, and real estate (the homestead exemption). The federal government also sets exemption levels for these assets, and individuals may choose between using the federal exemption and their state's exemption (depending which is higher) if their state allows such a choice.[20] The 1994 Act increased federal personal property exemption levels, which in essence made it less costly for individuals to file for bankruptcy because they could now keep a greater percentage of their assets. Not surprisingly, personal filings increased roughly 17 percent between 1994 and 1995 in the states affected by the higher federal exemptions.

In addition to the legal changes that have occurred over the past several decades, another potential contributor to the rise in bankruptcy filings is the decrease in the social stigma associated with filing for bankruptcy. Although such a measure is largely unquantifiable, it is not unreasonable to suspect that filing for bankruptcy becomes less undesirable as more people declare bankruptcy. It is likely that the aforementioned legal and economic changes were greater causes of the initial rise in filings rates over the past 30 years, but the public's view of personal bankruptcy arguably would have become less negative as a greater percentage of the population had filed for bankruptcy.

This section has discussed the institutional changes that are likely contributors to the rapid increase in personal bankruptcy filings; the rise in credit card usage and the relaxation of restrictions on interstate credit card provision; greater availability of credit to lower income individuals; decreased social stigma associated with bankruptcy filings; and changes to bankruptcy law that have made it less costly for individuals to file for bankruptcy.

Empirically disentangling the effect of each of the institutional changes on bankruptcy filings is quite difficult, however. As seen in Figure 2, there is a marked break in the trend level of bankruptcy filings in the late 1970s and early 1980s—the period of time that corresponds with many of the legal changes that have been hypothesized to increase the rate of bankruptcy filings. Bankruptcy filings were regressed on a time trend for two periods: 1900 to 2005 and 1978 to 2005. Not surprisingly, empirical tests revealed that the coefficient on the 1978 to 2005 time trend variable was statistically greater than the coefficient on the overall sample period.[21] However, because many of these events occurred around the same period of time, it is difficult to determine the separate effects of each event on bankruptcy filings. Thus, it remains unclear whether all changes have had some effect on bankruptcy filings or the rapid rise is the result of only one or two events.

THE BANKRUPTCY BOOM: NATIONAL AND REGIONAL ANALYSES[22]

National Level Analysis

The rise in personal bankruptcies over the past 30 years (Figure 2) was paralleled by an

[18] See www.stlouisfed.org/community/about_cra.html for a discussion of the Community Reinvestment Act.

[19] See Gramlich (1999): www.federalreserve.gov/BoardDocs/speeches/1999/19990616.htm.

[20] The following states allow debtors to select the federal or state exemptions: AR, CT, HI, MA, MI, MN, NJ, NM, PA, RI, SC, TX, VT, WA, WI. See www.Bankruptcyinformation.com for detailed information on each state's bankruptcy law and exemptions.

[21] The coefficient (standard error) on $\text{Trend}_{1900\text{-}2005}$ = 0.0086 (0.0012), and the coefficient (standard error) on $\text{Trend}_{1978\text{-}2005}$ = 0.164 (0.0047).

[22] The empirical work done on the issue of personal bankruptcy is quite extensive. See, e.g., Fisher (2004, 2005), Filer and Fisher (2005), Fan and White (2003), and Nelson (1999).

increase in consumer debt and a decrease in consumer savings (Figure 3). An interesting question is whether changes in the economic variables from one period to another can explain changes in bankruptcy filing rates. In other words, there appears to be a long-run relationship between bankruptcy filings and the various economic variables (Figures 2 and 3), but one cannot tell whether short-run changes in the economic variables influence short-run changes in bankruptcy filing rates.

Before considering the relationship between changes in bankruptcy and changes in these variables, however, it is useful to understand the pattern of personal bankruptcy changes quarter to quarter. Percent changes in quarterly U.S. bankruptcy filing rates from 1980 to 2005 are shown in Figure 4.

Figure 4 reveals two interesting points. First, the majority of the changes are positive rather than negative, thus showing that since 1980 there has been, overall, positive quarterly growth in bankruptcy filings. Second, quarterly filing rates increased dramatically at the start of three recessions (1980, 1990-1991, and 2001) and actually decreased in the following quarter for the latter two recessions. This suggests that the past two recessions served as housecleaning events of sorts—individuals teetering on the edge of bankruptcy immediately prior to each recession were pushed into bankruptcy from job losses, unemployment, and other setbacks resulting from the recession. After these individuals filed for bankruptcy, the number of individuals filing for bankruptcy was initially lower, as reflected by the negative growth in filing rates.

The following analysis attempts to answer the question of whether quarterly percent changes in personal bankruptcy filings are influenced by quarterly percent changes in per capita income, employment, the savings rate, health coverage, and debt as a percentage of income. Changes in these variables represent shocks to each variable. The data shown in Figure 4 are used for the analysis (1980:Q3 to 2004:Q4). The empirical model is

$$(1) \qquad Bankruptcy_t = \mathbf{X}_t \boldsymbol{\beta}_k + \mathbf{X}_{t-1} \boldsymbol{\alpha}_k + \mathbf{e},$$

where $Bankruptcy_t$ is the percentage change in U.S. personal bankruptcy filings per 1,000 persons in quarter t. The matrix $\mathbf{X}_t$ contains the quarterly percentage change in per capita income, payroll employment, savings as a percent of disposable income, the percent of the population covered by private/public health insurance, and consumer debt as a percentage of personal income.[23] The one-period lag of each variable is included in matrix $\mathbf{X}_{t-1}$ to account for the possible lagged effect of each variable on bankruptcy filings.

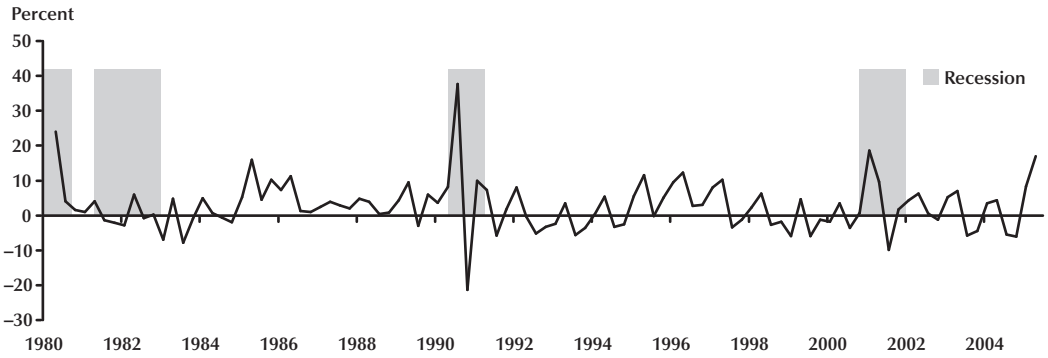
Recessions may proxy for negative income shocks. Different stages of a recession may also have different effects on bankruptcy filings, as seen in Figure 4 by the large positive change and subsequent negative change occurring during recessions. Three dummy variables are included in the empirical model to capture the effects of recession stages on bankruptcies. (National Bureau of Economic Research recession dates are used.) The first variable takes a value of 1 for the first quarter of a recession and 0 otherwise. The second variable takes a value of 1 for the second quarter of a recession and 0 otherwise. Finally, the third variable takes a value of 1 for the third and all remaining quarters of a recession and 0 otherwise. Each dummy variable will reflect the average change in bankruptcy filings for the respective recession quarter relative to non-recession quarters.

Coefficient estimates from equation (1) are shown in Table 2. None of the continuous variables has a significant effect on changes in personal bankruptcy filings. The first and second quarters of a recession, however, are found to have a statistically significant effect. Specifically,

[23] Data sources: Personal bankruptcy filings are from the Administrative Office of the U.S. Courts, per capita income and savings as a percent of income are from the Bureau of Economic Analysis, payroll employment is from the Bureau of Labor Statistics, consumer debt as a percentage of income is from the Federal Reserve Board of Governors, and the percent of the population with public/private health insurance is from the *Source Book of Health Insurance Data* (for the years 1980 to 1987) and the U.S. Bureau of the Census (for the years 1988 to present). Although bankruptcy data are available through the second quarter of 2005, these data were not used because the passage of the 2005 Bankruptcy Abuse Prevention and Consumer Protection Act was signed in April. It was thought the bankruptcy data for the first two quarters of 2005 would in part reflect action on the part of consumers to file before the Act took place.

Figure 4

U.S. Personal Bankruptcies: Quarterly Percent Changes, 1980 to 2005



the estimates suggest that the average change in bankruptcy filings is 14.9 percentage points higher during the first quarter of a recession compared with a non-recession quarter. In the second quarter of a recession, however, bankruptcy filings are 9.2 percentage points lower than during non-recession quarters. The first quarter and second quarter recession dummy coefficients suggest a net positive effect of recessions on bankruptcy filing rates of 5.7 percentage points (14.9 – 9.2).[24]

To test whether the first quarter and second quarter recession dummy coefficients are statistically different in magnitude, an *F*-test was conducted on the null hypothesis that the two coefficients sum to zero. The *F*-statistic from this test is 0.764, with a *p*-value of 0.39. Thus, the net effect of the first two quarters of a recession on the percentage change in bankruptcy filings is not statistically different from zero. The positive increase during the first quarter of a recession is offset by a decrease of a statistically similar magnitude during the second quarter of a recession.

One study by VISA that also used national data (1980 to 1996) to empirically model bankruptcy filings found that lagged changes in employment "proved to have the single most powerful coefficient in explaining bankruptcy behavior."[25] The Visa study did not consider the separate effects of recession in its empirical models. To explore whether the recession variable in equation (1) is dampening the effects of employment changes, model (1) was re-estimated without the recession dummy variables. The estimated effects of employment on bankruptcy filings still remained statistically insignificant, but less so than when the recession variables were included.

The main conclusion from the national analysis presented here is that recessions (a good proxy for a negative income shock) can have significant effects (both positive and negative) on the short-term growth in national bankruptcy filings. Specifically, the results showed that bankruptcies increase dramatically at the start of a recession but tend to fall in the second quarter of a recession. At least for the sample period studied here, recessions serve as temporary disruptions to the trend rate of growth in personal bankruptcy filings. However, the first quarter increase and second quarter decrease are not statistically different in magnitude, so the net effect of an entire recession on bankruptcy filings is no different from that which occurs in non-recession quarters.

State-Level Statistics

Descriptive statistics on state-level bankruptcy filings and bankruptcy filing growth rates for

[24] The null hypothesis that the first quarter and second quarter recession coefficients are the same can be rejected at the 1 percent level (*F*-statistic = 20.09).

[25] See Visa USA, Inc. (1996).

Table 2

Effect of Economic Variables on Bankruptcy Growth Rates

Variable	Coefficient	*t*-Statistic
Constant	0.020	1.20
Per capita income	–0.030	0.02
Savings as % of income	–0.002	0.15
Debt as % of income	0.393	0.25
Percent with health coverage	–0.205	0.57
Payroll employment	–5.027	1.36
Per capita income (*t*–1)	–0.093	0.05
Savings as % of income (*t*–1)	0.013	0.92
Debt as % of income (*t*–1)	0.525	0.36
Percent with health coverage (*t*–1)	–0.327	0.98
Payroll employment (*t*–1)	3.847	1.12
Recession, first quarter	0.149***	3.72
Recession, second quarter	–0.092**	2.07
Recession, third plus remaining quarter(s)	–0.021	0.60
R^2	0.164	
Durbin-Watson	2.21	
Number of observations	98	

NOTE: */**/*** denote statistical significance at the 10/5/1 percent levels. Each recession variable is a dummy variable taking the value of 1 for the respective quarter of a National Bureau of Economic Research–dated recession and 0 otherwise. The sample period is 1980:Q3–2004:Q4. All continuous variables are in percent changes. The dependent variable is the percentage change in national bankruptcy filings per 1,000 persons. See text for a description of each variable.

selected years from 1980 to 2005 are shown in Table 3.

The data reveal that average state filings per 1,000 persons increased from about 1.2 in 1980, to 5.3 in 2004, and to 6.9 in 2005. This 30 percent increase from 2004 to 2005 is, in large part, due to the increase in filings prior to the 2005 Bankruptcy Act (see Figure 1). One should keep in mind, however, that the statistics for 2005 may not represent any long-term changes from prior years if the large increase in filings prompted by the 2005 Bankruptcy Act is temporary.

The data in Table 3 reveal some interesting facts about bankruptcy filings in Eighth District states. From 1980 to 2005, bankruptcy filing rates in Eighth District states were, in most cases, in the top half to top one-third of all states. Tennessee typically has had the highest filing rate in the nation, but the state was surpassed by Indiana (rank of 1) and Ohio (rank of 2) in 2005. Arkansas experienced the greatest increase in rank, moving from 27 in 1980 to 5 in 2005, whereas Illinois had a rank of 6 in 1980 and a rank of 16 in 2005. Kentucky's ranking of 11 in 2004 remained fairly consistent over the past 25 years, including 2005. Missouri's rank has worsened over time, moving from a rank of 21 in 1980 to a rank of 11 in 2005. Mississippi, which has typically ranked in the top 10, moved from a rank of 9 in 2004 to a rank of 19 in 2005.

In 1980, Arkansas was the only Eighth District state to have had a filing rate (0.99) that was lower than the U.S. state average of 1.18. In 2004 and 2005, all Eighth District states had filing rates greater than the U.S. state average (5.34 and 6.38, respectively). In 2004, Tennessee was the only

Table 3

State Bankruptcy Statistics

State	Rank				Bankruptcies per 1,000 persons			Average annual growth (%) 1980-2004
	1980	1990	2004	2005	1980	2004	2005	
Alaska	46	37	51	51	0.52	2.20	3.34	12.79
Alabama	2	3	2	6	2.38	9.20	10.42	11.46
Arkansas	27	22	4	5	0.99	8.69	10.85	31.17
Arizona	22	6	22	24	1.18	5.38	6.68	14.31
California	12	15	45	43	1.66	3.32	4.50	4.01
Colorado	11	5	20	10	1.67	5.95	9.04	10.23
Connecticut	42	43	47	45	0.59	3.23	4.31	17.96
Delaware	36	45	35	39	0.74	4.09	4.92	18.10
Florida	47	25	26	31	0.50	4.87	5.97	34.59
Georgia	9	2	6	12	1.78	8.51	8.74	15.13
Hawaii	41	51	50	50	0.59	2.43	3.46	12.49
Iowa	29	38	33	29	0.98	4.31	6.15	13.67
Idaho	8	12	12	17	1.78	6.69	8.28	10.99
Illinois	6	17	17	16	2.14	6.24	8.30	7.69
Indiana	5	9	5	1	2.18	8.66	12.47	11.87
Kansas	13	16	21	18	1.57	5.86	8.15	10.96
Kentucky	7	13	11	9	1.95	6.71	9.55	9.74
Louisiana	26	23	14	20	1.01	6.48	7.96	21.59
Massachusetts	48	46	48	47	0.46	2.83	4.11	20.61
Maryland	33	34	24	27	0.84	5.22	6.18	20.77
Maine	38	49	44	40	0.66	3.32	4.90	16.08
Michigan	19	30	16	13	1.37	6.29	8.73	14.37
Minnesota	30	18	46	42	0.96	3.26	4.69	9.62
Missouri	21	24	15	11	1.31	6.47	8.98	15.77
Mississippi	10	8	9	19	1.75	7.24	8.04	12.52
Montana	25	29	32	28	1.07	4.56	6.17	12.99
North Carolina	23	39	34	41	1.15	4.23	4.88	10.67
North Dakota	44	47	41	35	0.55	3.46	5.41	20.96
Nebraska	16	27	25	23	1.50	5.03	6.72	9.41
New Hampshire	40	33	42	46	0.61	3.46	4.21	18.51
New Jersey	39	35	30	33	0.63	4.67	5.60	25.75
New Mexico	28	26	31	30	0.98	4.62	6.01	14.82
Nevada	3	4	10	7	2.30	7.14	9.71	8.41
New York	24	40	37	34	1.07	3.94	5.58	10.66
Ohio	4	14	7	2	2.22	7.72	11.65	9.93
Oklahoma	18	7	8	4	1.38	7.38	10.85	17.35
Oregon	14	11	13	15	1.56	6.57	8.66	12.88
Pennsylvania	45	48	29	26	0.54	4.69	6.24	30.56
Rhode Island	35	31	38	36	0.83	3.77	5.30	14.12
South Carolina	51	44	39	49	0.31	3.64	3.61	43.15
South Dakota	43	41	40	38	0.57	3.52	5.12	20.51
Tennessee	1	1	1	3	2.60	10.28	10.96	11.82
Texas	49	28	36	37	0.43	4.03	5.14	33.30
Utah	20	10	3	14	1.37	9.03	8.70	22.43
Virginia	17	19	23	32	1.48	5.31	5.90	10.38
Vermont	50	50	49	48	0.34	2.60	4.08	26.42
Washington	15	20	19	21	1.52	6.08	7.34	11.98
Washington, D.C.	32	42	43	44	0.87	3.41	4.33	11.68
Wisconsin	31	32	27	22	0.92	4.85	6.76	17.08
West Virginia	37	36	18	8	0.74	6.23	9.62	29.68
Wyoming	34	21	28	25	0.83	4.78	6.25	18.94
State average					1.18	5.34	6.93	16.72

state to have a filing rate greater than 10 per 1,000 persons (1 percent). By 2005, however, Arkansas, Indiana, and Tennessee all had filing rates greater than 10 per 1,000 persons. Over the 25-year period, bankruptcy filing rates in Missouri and Mississippi have been the closest to the U.S. state average.

The final column in Table 3 contains the average annual growth rate in bankruptcy filings from 1980 to 2004. The year 2005 was not considered in the calculation because of the unusually high number of filings in that year, due to the 2005 Bankruptcy Act. South Carolina experienced the greatest average annual growth in bankruptcy filings, 43 percent, while California's average annual growth rate of 4 percent was the lowest in the country. Although Eighth District states have bankruptcy filing rates that are greater than the U.S. state average, average annual growth rates in six of the seven Eighth District states have been lower than the U.S. state average growth rate (16.7 percent). Arkansas experienced an average annual growth rate of 31.2 percent from 1980 to 2004, a rate nearly double that of the U.S. state average growth rate. Illinois, Kentucky, and Tennessee had the lowest bankruptcy growth rates of the Eighth District states (7.7 percent, 9.74 percent, and 11.8 percent, respectively).

A visual comparison of bankruptcy filings with average annual growth rates reveals that states with higher levels of bankruptcy filings appear to have had lower average annual bankruptcy growth rates. To explore whether this possibility has statistical validity, a simple regression model was estimated to examine the relationship between bankruptcy filings rates in 1980 and the average annual bankruptcy growth rate from 1980 to 2004.[26] The results reveal a negative and statistically significant relationship between initial filing rates (1980) and average annual bankruptcy growth rates. Bankruptcy filings are thus converging—states that had a lower level of bankruptcy in 1980 had higher average annual growth in bankruptcy filings between 1980 and 2004. The point estimate from the regression model reveals that for an increase of 1 filing per 1,000 persons in 1980, the average annual bankruptcy growth rate in a state was lower by 8.6 percentage points.

There are two possible explanations for converging bankruptcy filings. First, there are segments of each state's population that are more likely to file (e.g., lower-middle income) than other segments. Assuming the relative size of each population segment remains constant over time, there is then an upper limit on the number of people likely to file for bankruptcy. States having higher initial bankruptcy filing rates were closer to this upper limit, and thus the number of filings in these states has grown much less than in states having a larger segment of the population yet to file in the initial year.

Second, numerous studies have demonstrated the convergence of state income over time (Barro and Sala-i-Martin, 1995; Carlino and Mills, 1996; and Webber, White, and Allen, 2005).[27] Because state bankruptcy rates and per capita income are negatively correlated (correlation in 2004 = –0.453), states having a higher initial level of bankruptcy filings would have had lower income. If incomes are converging as suggested by the literature, then lower-income states would have experienced greater income growth than higher-income states, and thus the growth in bankruptcy filings in these lower-income states would have been lower.

Analysis of Counties in Eighth District States

Among Eighth District states, the counties with the 15 highest and 15 lowest bankruptcy filing rates for 2003 are shown in Table 4, along with county per capita personal income. There are 681 counties in Eighth District states, with an average

[26] The average annual percentage change in bankruptcy filing rates from 1980 to 2004 was regressed on bankruptcy filing rates in 1980 and a constant term. The coefficient on 1980 filings was –0.0855 and had a *t*-statistic of 5.91. The regression R^2 was 0.42.

[27] The standard model of income convergence has been criticized for several reasons. Quah (1993) notes that implicit in the empirical specification is the idea that each economy has a steady-state growth path that follows a time trend. Durlauf (2001) points to several problems inherent in traditional convergence models, such as the potential for spillover effects and nonlinearities, a disconnect between growth theory and empirical modeling, and heterogeneous parameters. For purposes in this paper, however, differences across states in terms of heterogeneous parameters and different growth paths are likely to be significantly less than across countries because political systems and components of government revenue and spending are much more similar across states than across countries.

Table 4

County Bankruptcies in Eighth District States: 15 Highest and 15 Lowest, 2003

County	State	Bankruptcies per 1,000 persons	Per capita income ($)
15 highest counties			
Shelby	Tennessee	20.85	34,087
Marshall	Mississippi	16.52	19,224
Haywood	Tennessee	15.82	21,792
Lauderdale	Tennessee	14.58	18,985
Crittenden	Arkansas	13.99	22,266
Hardeman	Tennessee	13.77	18,884
Jefferson	Arkansas	13.56	22,451
Tipton	Tennessee	13.36	23,787
Rhea	Tennessee	13.33	21,097
Tunica	Mississippi	13.24	19,325
Dyer	Tennessee	13.21	25,047
DeSoto	Mississippi	13.15	28,713
Gallatin	Kentucky	12.84	21,642
Marion	Indiana	12.76	33,449
Gibson	Tennessee	12.61	24,629
15 lowest counties			
Nodaway	Missouri	2.76	20,914
Putnam	Missouri	2.72	19,304
Scotland	Missouri	2.65	21,113
Texas	Missouri	2.58	17,107
Calhoun	Illinois	2.54	22,675
Elliott	Kentucky	2.47	14,633
Shannon	Missouri	2.40	17,191
Reynolds	Missouri	2.28	19,337
Sullivan	Missouri	2.27	20,855
Moore	Tennessee	2.02	23,166
Oregon	Missouri	1.93	17,523
Chariton	Missouri	1.46	24,087
Worth	Missouri	1.30	19,559
Issaquena	Mississippi	0.97	15,833

NOTE: There are 681 counties in Eighth District states. All data are from 2003.

SHELBY COUNTY, TENNESSEE

What is most interesting about Shelby County is that its demographics and economics suggest the bankruptcy rate should be much lower—per capita income in Shelby County is relatively high (about $34,000), home prices are rising, unemployment is low, and consumer loan losses are not the worst in the nation (see SMR Research Corporation, "Bankruptcy Data by County," Hackettstown, NJ, available at www.smrresearch.com/cntybkrprospectus.pdf). So why is bankruptcy in Shelby County so high? This remains a mystery, but there are several possibilities. First, county-level data is an average of all sub-jurisdictions. Detailed research at the zip code or Census tract level might reveal several pockets of extremely high bankruptcy filing rates dispersed throughout the county. Thus, several small areas might be driving the Shelby County results. Second, various community and business leaders in the Memphis area have remarked that Shelby County has an unusually high number of bankruptcy attorneys, thus suggesting more filings. But, the direction of causality is unknown. That is, do more attorneys cause more filings, or are there more attorneys because filings are higher? Third, it is possible that, for whatever reason, the social stigma associated with bankruptcy filings in Shelby County has always been low.

filing rate of 7 per 1,000 persons. The majority of the counties with the highest bankruptcy filing rates in Eighth District states are located in Tennessee (eight counties). Two counties are in Arkansas, three in Mississippi, and one each in Kentucky and Indiana. Missouri and Illinois had no counties with bankruptcy filing rates in the top 15. The average filing rate in the top 15 counties was 14.2 per 1,000 persons. In Eighth District states, 10 of the 15 lowest-ranked counties are located in Missouri. The filing rate in each of the lowest 15 counties is about one-seventh that of the top 15 counties, with the lowest 15 counties having an average filing rate of 2.0 per 1,000 persons.

Table 5 presents 2003 data on county bankruptcy filings for each of the Eighth District states along with county per capita income. County rankings within each Eighth District state as well as for all counties in Eighth District states are also shown. The data in Table 5 reveal large differences in county bankruptcy filing rates within states as well as across states. In most cases, the five highest bankruptcy counties in each state had filing rates roughly three to four times that of the lowest bankruptcy counties in the state. Although filing rates in the bottom five counties of each state are similar, there is quite a large difference in the filing rates of the top five counties in each state. For example, St. Louis City (an independent jurisdiction) in Missouri had the highest bankruptcy filing rate in the state (9.54 per 1,000), but this rate was the lowest of all top counties in other states. Also, Shelby County had the highest filing rate (nearly 21 per 1,000 persons) in Tennessee; but the county with the highest filing rate in Illinois is Knox County, with a rate of 10.5 per 1,000 persons, or nearly half that of the Shelby County rate. (See boxed insert.).

The data in Table 4 reveal that county per capita income is higher for the 15 highest bankruptcy counties in Eighth District states than for the lowest 15 bankruptcy counties. Average county per capita income for the top 15 counties is $23,692, and average county per capita income for the bottom 15 counties is $19,521.[28] Notice also that Issaquena County in Mississippi had the lowest per capita income in the sample, but it also had the lowest bankruptcy filing rate: less than 1 per 1,000 persons. This visual positive relationship between per capita income and bankruptcy filings lends support to the findings of past research on bankruptcy filings that the

[28] These averages are statistically different (*t*-statistic = 3.25).

Table 5

County Bankruptcy Statistics in Eighth District States, 2003

County	State rank	Eighth District rank	Bankruptcies per 1,000 persons	Per capita income ($)
Arkansas				
Highest 5 counties				
Crittenden	1	5	13.99	22,266
Jefferson	2	7	13.56	22,451
Arkansas	3	16	12.51	26,489
Pulaski	4	18	12.17	33,620
Mississippi	5	21	12.04	21,738
Lowest 5 counties				
Marion	71	599	4.50	18,579
Searcy	72	613	4.26	16,793
Fulton	73	621	4.12	18,485
Newton	74	662	3.02	16,765
Sevier	75	663	3.02	19,926
Illinois				
Highest 5 counties				
Knox	1	47	10.53	24,382
Vermilion	2	52	10.45	23,283
Winnebago	3	53	10.45	27,051
Franklin	4	59	10.35	21,599
Marion	5	85	9.64	23,920
Lowest 5 counties				
DuPage	98	641	3.64	44,739
Woodford	99	647	3.49	28,585
Pope	100	648	3.47	19,325
Jo Daviess	101	667	2.84	30,401
Calhoun	102	672	2.54	22,675
Indiana				
Highest 5 counties				
Marion	1	14	12.76	33,449
Jennings	2	30	11.33	22,910
Scott	3	31	11.24	22,145
Madison	4	33	11.16	27,207
Jackson	5	37	11.01	25,476
Lowest 5 counties				
Monroe	88	558	5.04	25,162
Lagrange	89	596	4.55	20,668
Dubois	90	605	4.44	32,448
Adams	91	612	4.27	24,114
Daviess	92	619	4.13	24,088
Kentucky				
Highest 5 counties				
Gallatin	1	13	12.84	21,642
Hopkins	2	20	12.07	23,368
Grant	3	35	11.10	21,468
Simpson	4	41	10.81	24,146
Muhlenberg	5	71	10.15	20,658
Lowest 5 counties				
Wayne	116	642	3.60	17,748
Clay	117	653	3.34	14,874
Green	118	655	3.31	18,257
Washington	119	666	2.84	21,708
Elliott	120	673	2.47	14,633

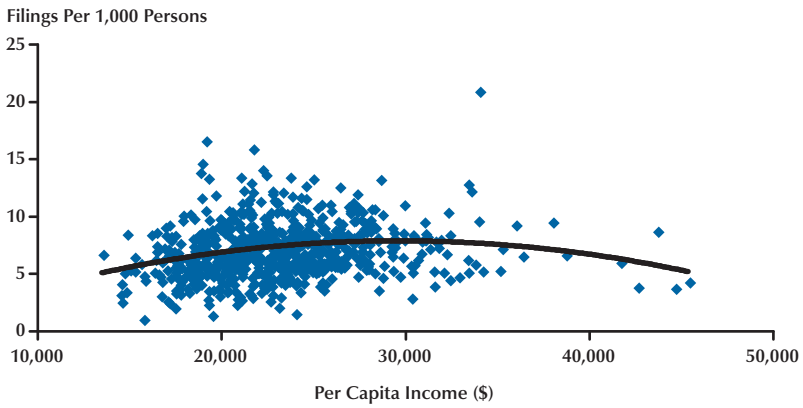
Table 5, cont'd

County	State rank	Eighth District rank	Bankruptcies per 1,000 persons	Per capita income ($)
Missouri				
Highest 5 counties				
St. Louis City	1	93	9.54	27,236
Callaway	2	117	9.02	21,562
St. Louis	3	144	8.61	43,766
Jackson	4	221	7.91	31,966
Madison	5	257	7.63	19,309
Lowest 5 counties				
Reynolds	111	675	2.28	19,337
Sullivan	112	676	2.27	20,855
Oregon	113	678	1.93	17,523
Chariton	114	679	1.46	24,087
Worth	115	680	1.30	19,559
Mississippi				
Highest 5 counties				
Marshall	1	2	16.52	19,224
Tunica	2	10	13.24	19,325
DeSoto	3	12	13.15	28,713
Clay	4	17	12.22	21,241
Tate	5	23	11.91	22,818
Lowest 5 counties				
Kemper	78	601	4.48	17,711
Neshoba	79	624	4.05	25,687
Wayne	80	629	4.01	18,926
Smith	81	633	3.85	22,783
Issaquena	82	681	0.97	15,833
Tennessee				
Highest 5 counties				
Shelby	1	1	20.85	34,087
Haywood	2	3	15.82	21,792
Lauderdale	3	4	14.58	18,985
Hardeman	4	6	13.77	18,884
Tipton	5	8	13.36	23,787
Lowest 5 counties				
Hancock	91	623	4.06	14,610
Williamson	92	635	3.77	42,694
Clay	93	645	3.52	19,576
Van Buren	94	656	3.28	21,530
Moore	95	677	2.02	23,166

NOTE: There are a total of 681 counties in Eighth District states. All data above are for 2003.

Figure 5

Eighth District Counties: Per Capita Income and Personal Bankruptcy Filings, 2003



majority of bankruptcy filers are not lower income. However, this research has also established that filings are highest for individuals of lower-middle income—something that cannot be discerned from the raw data in Table 4.

County Income and Bankruptcy

A scatter plot of 2003 county per capita income and bankruptcy filing rates for all 681 counties in Eighth District states is shown in Figure 5.[29] Included in this scatter plot is a regression line obtained from regressing bankruptcies per 1,000 persons on a constant, per capita income, and the square of per capita income. The relationship between county bankruptcy filings rates and income, at least in Eighth District states, is nonlinear—bankruptcy filing rates increase with income up to a certain income level, then filing rates decrease with further increases in county per capita income.[30]

Figure 5 reveals that middle and lower-middle income counties have the highest filing rates, and bankruptcy filing rates for the highest income counties are very similar to the filing rates for the lowest income counties. This is likely reflective of the fact that the poorest of the poor cannot acquire credit or other assets, thus there is no chance of accumulating too much debt that filing for bankruptcy may alleviate. Wealthier individuals, on the other hand, have greater incomes and more financial diversification that shield them from negative income shocks, and their higher levels of education make it more likely they better understand the risks of acquiring debt, are less likely to do so, and are thus less likely to file for bankruptcy.

In addition to the full sample of counties, the same regression was estimated for each of the Eighth District states. These results, along with the coefficients from the full sample regression, are shown in the first two data columns of Table 6. In general, there appears to be a similar nonlinear relationship between county income and county bankruptcy filings within each Eighth District state (as seen by the positive coefficient on income and the negative coefficient on the square of income). However, not all income coefficients are statistically significant.[31]

[29] The regression line is almost identical if Shelby County, Tennessee, is removed from the sample.

[30] The results are very similar when median county household income is used rather than per capita personal income. These results will be provided upon request.

[31] The adjusted R^2 from each regression is also relatively low. The inclusion of other (possibly) relevant variables proved difficult at the county level, given that debt and savings figures are not readily available at this level of disaggregation. In addition, many demographic variables, such as ethnicity and population density, are commonly correlated with income.

Table 6

County Bankruptcy and Income

	Per capita income			Percent in poverty		
State	Variable	Coefficient	*t*-Statistic	Variable	Coefficient	*t*-Statistic
Arkansas	Constant	–11.233	1.31	Constant	10.909***	2.71
	Income	0.0014*	1.85	Poverty	–0.419	1.01
	Income^2	–0.216e–7	1.41	Poverty^2	0.0138	1.35
	Adjusted R^2	0.205		Adjusted R^2	0.026	
	H_0: $\beta_2 = \beta_3 = 0$	10.53***		H_0: $\beta_2 = \beta_3 = 0$	1.99	
Illinois	Constant	–0.203	0.07	Constant	3.715***	3.32
	Income	0.00052***	2.70	Poverty	0.378**	2.12
	Income^2	–0.967e–8***	3.33	Poverty^2	–0.0095	1.44
	Adjusted R^2	0.051		Adjusted R^2	0.064	
	H_0: $\beta_2 = \beta_3 = 0$	3.73**		H_0: $\beta_2 = \beta_3 = 0$	4.45**	
Indiana	Constant	0.732	0.14	Constant	2.914	1.29
	Income	0.00051	1.45	Poverty	1.011**	2.01
	Income^2	–0.897e–8	1.55	Poverty^2	–0.0479*	1.74
	Adjusted R^2	–0.006		Adjusted R^2	0.026	
	H_0: $\beta_2 = \beta_3 = 0$	0.69		H_0: $\beta_2 = \beta_3 = 0$	2.22	
Kentucky	Constant	–5.283	1.62	Constant	7.256***	5.11
	Income	0.00093***	3.22	Poverty	0.0552	0.34
	Income^2	–0.170e–7***	2.76	Poverty^2	–0.0051	1.16
	Adjusted R^2	0.144		Adjusted R^2	0.147	
	H_0: $\beta_2 = \beta_3 = 0$	11.00***		H_0: $\beta_2 = \beta_3 = 0$	11.23***	
Missouri	Constant	–1.174	0.57	Constant	8.343***	5.49
	Income	0.00034**	2.22	Poverty	–0.426*	1.77
	Income^2	–0.318e–8	1.14	Poverty^2	0.012	1.29
	Adjusted R^2	0.191		Adjusted R^2	0.047	
	H_0: $\beta_2 = \beta_3 = 0$	14.47***		H_0: $\beta_2 = \beta_3 = 0$	3.84**	
Mississippi	Constant	–1.670	0.39	Constant	9.769**	2.15
	Income	0.00075**	2.17	Poverty	–0.135	0.31
	Income^2	–0.142e–7**	2.10	Poverty^2	0.0014	0.14
	Adjusted R^2	0.016		Adjusted R^2	0.0003	
	H_0: $\beta_2 = \beta_3 = 0$	1.66		H_0: $\beta_2 = \beta_3 = 0$	1.01	
Tennessee	Constant	–4.090	0.88	Constant	1.577	0.49
	Income	0.00089**	2.37	Poverty	0.931**	2.14
	Income^2	–0.145e–7*	1.91	Poverty^2	–0.031**	2.14
	Adjusted R^2	0.052		Adjusted R^2	0.020	
	H_0: $\beta_2 = \beta_3 = 0$	3.55**		H_0: $\beta_2 = \beta_3 = 0$	1.96	
Eighth District	Constant	–1.813	1.33	Constant	6.056***	11.00
	Income	0.00064***	6.00	Poverty	0.135*	1.86
	Income^2	–0.108e–7***	5.19	Poverty^2	–0.0042*	1.93
	Adjusted R^2	0.051		Adjusted R^2	0.001	
	H_0: $\beta_2 = \beta_3 = 0$	19.29***		H_0: $\beta_2 = \beta_3 = 0$	1.48	

NOTE: The dependent variable is bankruptcies per 1,000 persons. Sample sizes: AR = 75, Il = 102, IN = 92, KY = 120, MO = 115, MS = 82, TN = 95, Eighth District = 681. *F*-statistic presented for tests of joint significance. */**/*** denote significance at the 10/5/1 percent levels. Standard errors are corrected for heteroskedasticity.

Table 7

County Income and Bankruptcy Filings

State	Level of per capita county income that maximizes bankruptcy filings ($)	Number of counties below maximizing income level	Number of counties above maximizing income level	Average county per capita income, 2003 ($)
Arkansas	31,692	74	1	21,452
Illinois	26,901	74	28	25,335
Indiana*	28,726	72	20	26,137
Kentucky	27,327	104	16	22,040
Missouri	53,572	115	0	22,846
Mississippi	26,442	75	7	20,870
Tennessee	30,434	89	6	23,330
Eight District	29,698	631	50	23,197

NOTE: The above values are estimated using the coefficient estimates from a regression of county bankruptcy filing rates on income and income squared. See Table 6 for coefficient estimates. *For Indiana, the slope coefficients (see Table 6) used to compute maximum income are neither individually significant nor jointly significant at conventional levels.

The empirical results shown in Table 6 can be used to determine the level of county per capita income for which bankruptcy filings are the highest.[32] With this information, the number of counties in each state that are above and below this maximum value can be computed. For the full sample of Eighth District states and each individual Eighth District state, the level of county per capita income that maximizes personal bankruptcy filings and the number of counties above and below this value are shown in Table 7.[33]

For all Eighth District states, the level of county per capita income that maximizes bankruptcy filings is relatively high, as can be seen by the fact that all bankruptcy-maximizing income values are above the average county per capita income. What this reveals is that there is generally a positive relationship between county per capita income and bankruptcy filings for all but the wealthiest counties in each state; and, for the wealthiest counties, the relationship between per capita income and bankruptcy filings is negative. It is interesting to note that this relationship holds, in general, for states having relatively significant differences in per capita income.

Per capita income provides a measure of average county income and thus does not provide any insights into the distribution of income. The previous analysis of county bankruptcy filings using per capita county income is therefore redone using the percent of the population below poverty. For each state in the Eighth District as well as the full sample of counties, county bankruptcies per 1,000 persons in 2003 is regressed on the percent of the population in poverty in 2003 and this percent squared. Conducting such an analysis provides insights into how county bankruptcy filings

[32] Using the estimates from each state and the full sample shown in Table 6, the level of per capita income that maximizes personal bankruptcy rates is found by differentiating bankruptcy filings with respect to income, setting this expression equal to zero, and solving for income. The second derivatives are negative, thus confirming a maximum.

[33] Several caveats are worth mentioning. First, the values in Table 7 are based solely on the estimates shown in Table 6 and not the statistical significance of these estimates. Second, although county data is much more disaggregated than state or national data, it is still relatively aggregate data. The analysis here attempts to make inferences about individual level behavior using county-level data. Similarly, county boundaries are political boundaries, not necessarily economic boundaries; that is, local economic conditions are not contained within county boundaries. Third, counties in Eighth District states are only a subsample of all U.S. counties, and counties in Eighth District states have per capita income below U.S. per capita income. For example, in 2003, U.S. per capita income was $31,484; in Eighth District states it was $23,197. Thus, the sample of counties used here was of relatively poorer counties compared with the U.S. average.

differ across counties with different percentages of their populations below the poverty level.[34]

The empirical results from the regression models are also shown in Table 7. The results are statistically weaker than the results from the per capita income models, but there is some evidence of a similar relationship with bankruptcy filings. That is, bankruptcy filings generally increase with poverty, but at a decreasing rate. A rationale for this finding is the same as that for the per capita income results—namely, that the poorest individuals cannot acquire credit or other assets and thus gain little or nothing by filing for bankruptcy because no assets are held. Note, however, the estimated poverty coefficients for Missouri (statistically significant) and Arkansas (not statistically significant) suggest that, in those states, county bankruptcies decrease as the percent of the population in poverty increases, but at a decreasing rate.

The results from the full sample of counties reveal that bankruptcy filings increase with poverty at a decreasing rate, although the two poverty coefficients are not jointly significant at conventional levels. The level of poverty that maximizes filings for the full sample is 16.2 percent. Of the 681 counties in Eighth District states, 208 counties (about 31 percent) had poverty levels greater than 16.2 percent. As cautioned earlier, however, the poverty results are generally less robust across the sample of states and, thus, conclusions are less definitive than those obtained from the per capita income models.

CONCLUDING COMMENTS

The rapid rise in bankruptcy filings can be attributed to numerous economic and institutional factors. Increased consumer debt as a percentage of income, decreased savings, and widespread credit card availability and usage have all made individuals more vulnerable than in the past. Consumers today face an increased probability of bankruptcy when hit with negative income shocks, such as divorce, job loss, and medical expenses. Legal changes have also contributed to the rise in bankruptcy by making it less costly (or more attractive) for individuals to file for bankruptcy. Greater access to credit by lower and middle income households that may not have adequate financial education is another cited factor. Finally, there has been a decrease in the social stigma associated with filing for bankruptcy.

The analyses presented in this article reveal some interesting insights into bankruptcy filing rates. At the national level, filing rates are 14.9 percentage points higher during the first quarter of a recession compared with non-recession quarters. However, bankruptcy filing rates are 9.2 percentage points lower in the second quarter of a recession compared with non-recession quarters. The net effect of the first quarter and second quarter of a recession are not statistically different, however, thus suggesting that a recession has no net effect on bankruptcy filing rates. Recessions appears to cause, at least as indicated in national-level data, a so-called housecleaning effect on bankruptcy filings. However, despite the short-run shocks to bankruptcy filings from recessions, the upward trend in bankruptcy filings has continued.

Personal bankruptcy rates are quite different across states, especially those states in the Eighth Federal Reserve District. These states, as a whole, have a filing rate that is greater than the U.S. average filing rate. An analysis of state-level bankruptcy filings revealed that states with higher levels of bankruptcy filings in 1980 experienced slower annual bankruptcy growth rates through 2004. There thus appears to be convergence in state bankruptcy filings.

An analysis of bankruptcy filing rates and income in those counties located in Eighth District states revealed a nonlinear relationship between the two variables. Bankruptcy filings were found to increase with county income, but only to a certain point. After a certain income level, it was found that bankruptcy filings decrease with income. It was shown that for most states in the Eighth District, the bulk of each state's counties had a level of per capita income that was below

[34] Models were also estimated that included both income variables and both poverty variables. Some of the results were quite different from those presented in Table 6. This is likely the result of a high degree of colinearity between per capita income and the percent of the population below the poverty level (average $\rho = 0.65$). These results will be provided upon request.

the bankruptcy-maximizing level. Thus, for most counties in Eighth District states, bankruptcy filing rates increase with county income. This nonlinear relationship between income and bankruptcy filings reflects the fact that those individuals with the lowest incomes are likely to have few assets and limited access to credit, thus making it unlikely that they could incur debt, default, and file for bankruptcy. Empirical evidence also revealed a nonlinear relationship between county bankruptcy filings and the percent of the county population in poverty, but this relationship was statistically weaker than the relationship between per capita income and personal bankruptcy filings. However, the overall finding that personal bankruptcies increase with income at a decreasing rate within counties located in Eighth District states is supportive of earlier research that suggests that individuals with lower-middle incomes are more likely to file for bankruptcy than individuals of other income groups.

Financial education is likely the key to reversing the decreasing social stigma associated with bankruptcy and thus reducing the demand for personal bankruptcies. Community groups and educators are best to decide how this is achieved. Even a strong public mission of financial education will not eliminate all bankruptcies, however, and that is why bankruptcy laws still need to be in place. Some individuals will have no choice but to file for bankruptcy despite responsible financial management.

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The Varying Effects of Predatory Lending Laws on High-Cost Mortgage Applications

Giang Ho and Anthony Pennington-Cross

Federal, state, and local predatory lending laws are designed to restrict and in some cases prohibit certain types of high-cost mortgage credit in the subprime market. Empirical evidence using the spatial variation in these laws shows that the aggregate flow of high-cost mortgage credit can increase, decrease, or be unchanged after these laws are enacted. Although it may seem counterintuitive to find that a law that prohibits lending could be associated with more lending, it is hypothesized that a law may reduce the cost of sorting honest loans from dishonest loans and lessen borrowers' fears of predation, thus stimulating the high-cost mortgage market. (JEL G21, C25)

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Documents that discuss predatory lending begin with a statement similar to that found in a report by the Department of Housing and Urban Development (HUD) and the Department of the Treasury (HUD and Treasury, 2000, p. 17): "Defining the practices that make a loan predatory, however, is problematic." This difficulty arises because predatory lending depends on the inability of the borrower to understand the loan terms and the obligations associated with them. The amorphous nature of predation has made it very difficult for federal, state, and local authorities to craft laws to stop or at least retard predation without also hindering legitimate lending. However, following the lead of federal regulations, state and local authorities have passed laws that have made it illegal to provide certain types of high-cost loans that have been associated with predation. Implicitly, lawmakers have determined that the benefit of stopping predation outweighs the costs associated with restricting some legitimate high-cost loans.

This paper provides a framework for considering some of the potential ways that a law could affect the flow of high-cost or subprime mortgage credit. The specific provisions of the laws vary state by state, and this creates the possibility that each law may affect mortgage applications, originations, and rejections in different ways. For example, the first state-level predatory lending law (in North Carolina) did significantly reduce applications and originations of high-cost mortgages, whereas some other laws subsequently passed were associated with increases in applications and originations.

TYPES OF PREDATORY LENDING

HUD and the Treasury published an influential report in 2000 entitled "Curbing Predatory Home Mortgage Lending." The report organized lending abuses or predatory practices into four groups:

- Loan flipping: Loans were being repeatedly refinanced in a short period of time (loan flipping). With each refinance, high fees were wrapped into the new loan amount,

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thus reducing the equity left in the home. In some instances, fees exceeded $5,000 or as much as 10 percent of the loan amount.

- Imposition of excessive fees and "packing": Fees were found to be very large at times. Typically, fees were added to the financed amount (wrapped) instead of being paid upfront. Perhaps most importantly, the consumers often were not aware of the fees, which could be charged by many different sources, including the mortgage broker, home improvement contractor, lender, or other third parties. In addition to normal closing fees,[1] some of the borrowers were sold single-premium credit life insurance, which was included in the loan amount and not used in the calculation of the annual percentage rate (APR).
- Lending without regard for the ability to repay: Loans were originated under terms that the borrower would never be able to meet. This problem was exacerbated when the lender did not try to verify income, which may have been falsified by a broker. Examples were found of elderly households on fixed incomes where the new mortgage payment exceeded their income. Once the borrower failed to make payments, the lender foreclosed on the property. Clearly, this practice is profitable only when the amount of equity in the home exceeds the cost of foreclosure and the borrower does not exercise the option to sell the home and prepay the mortgage before foreclosure.
- Fraud: Appraisers and brokers conspired to inflate prices or property values above the market price.

Based on these findings, the report recommended improved consumer literacy and disclosures, as well as prohibitions on loan flipping, lending without regard for the ability to repay, and the sale of insurance and other similar products. The report also recommended that potentially abusive terms and conditions such as balloon payments, prepayment penalties, excessive fees, and "points" be restricted.[2]

STATE PREDATORY LENDING LAWS

During this period of increased public attention, Congress strengthened the Home Ownership and Equity Protection Act (HOEPA, Regulation Z) that focuses on high-cost refinance loans.[3] For loans that meet the HOEPA definition of high-cost loans, the provisions restrict short-term balloon notes, prepayment penalties, non-amortizing schedules, loan documentation requirements, the ability to refinance into another HOEPA loan, and other factors.

Following the lead of federal regulations, by the end of 2004, at least 23 states had put into effect predatory lending laws that regulated the provision of high-cost credit.[4] In general, these state laws extend HOEPA's definition by expanding the definition of high-cost credit by lowering the factors that trigger the coverage of a law and by more aggressively restricting some types of loans and lending practices. For example, the Illinois law moves the APR trigger for first liens from 8 percent (the HOEPA trigger) above comparable-term Treasury yields to 6 percent.[5] As a result, the

[1] Typical closing fees include items that all real estate transactions must pay such as transfer taxes, appraisal fees, recording fees, title search fees, and other processing fees.

[2] Balloon payments have a large, lump sum payment at the end of the life of the loan.

[3] Home purchase loans and other types of lending backed by a home, such as lines of credit, are not covered by HOEPA. The original version, in 1994, set out the framework and defined the triggers and restrictions. The second version, in 2002, adjusted some of the triggers and restricted some additional practices. In the 2002 version, HOEPA protections were triggered in one of two ways: (i) if the loan's APR exceeded the rate for Treasury securities of comparable maturity by 8 percentage points or more on the first lien and 10 percentage points or higher on higher liens or (ii) if finance charges, including points and fees paid at closing for optional insurance programs and other debt protection programs, were greater than 8 percent of the loan amount or a fixed $480 amount indexed annually to the consumer price index.

[4] Arkansas, California, Colorado, Connecticut, Florida, Georgia, Illinois, Kentucky, Maine, Maryland, Massachusetts, Nevada, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Texas, Utah, and Wisconsin.

[5] The APR is a uniform measure of true or full annual borrower cost. For example, the APR includes annualized costs associated with upfront fees in addition to the periodic interest rate.

Illinois predatory regulations cover a larger segment of the mortgage market than do federal regulations. However, not all states extend regulations in the same manner. For example, the laws in Indiana and Kentucky do not lower the APR trigger below the federal 8 percent level. However, both the Indiana and Kentucky laws include loans used to purchase a home in addition to just refinances. Similar to federal regulations, the Illinois law covers only refinance loans (loans not for purchase of a new home). In general, each law has its own nuances. For example, the laws in Illinois, Indiana, and Kentucky all restrict the use of balloon payments. However, Kentucky prohibits all balloon payments on high-cost loans, whereas Indiana and Illinois prohibit balloons within the first 10 years of a loan's life and for all loans that last 15 years or less, respectively.

The appendix provides some of the details associated with the 10 laws that are used in the empirical analysis discussed below.[6] As with Illinois, Indiana, and Kentucky, the law can vary substantially among states. For example, 6 of the 10 states (Connecticut, Florida, North Carolina, Ohio, Pennsylvania, and Texas) specify the same trigger as HOEPA: For first (second) liens, an APR 8 (10) percent or higher than comparable-term Treasury yields will activate coverage of the loan by the law. California and Massachusetts reduce the APR trigger for either first or second liens, thus making the law cover more of the market. Georgia uses a different approach and instead defines the trigger relative to the prime rate instead of Treasury yields.

There is also substantial variation in what types of loans are prohibited by the law. For example, Georgia, Massachusetts, and North Carolina prohibit all balloon payments on covered loans, whereas Maryland has no provision covering balloons. The remaining states tend to restrict the availability of balloons for the first 5 to 10 years of a loan.

[6] See Ho and Pennington-Cross (2005) for details on all 23 state-level laws in effect before the end of 2004.

A SIMPLE MODEL OF APPLICATION OUTCOMES

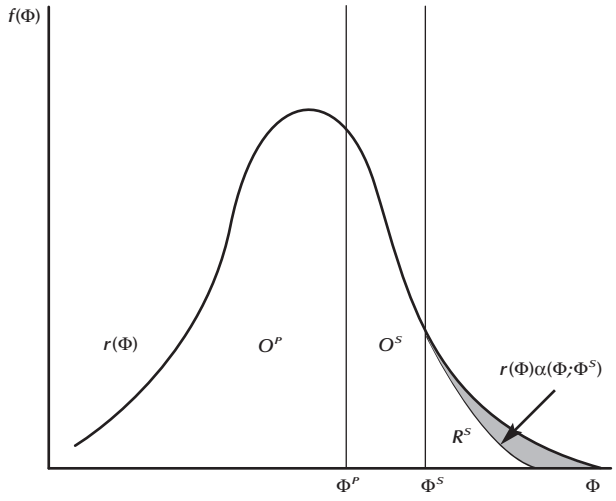
Although the minute variations in the laws are almost limitless, it is helpful to illustrate some of the potential effects of a predatory lending law using a highly stylized model of mortgage application outcomes (subprime applications, subprime originations, and subprime rejections). We assume that applicants understand that a subprime mortgage costs more than a prime mortgage and self-select to the appropriate market.[7] Following the approach of Ferguson and Peters (1995) and Ambrose, Pennington-Cross, and Yezer (2002), we assume that all of the information included in the application can be summarized by a single number (mortgage credit score or credit risk). Each loan applicant has a credit risk represented by $0 \leq \Phi \leq 1$. We interpret Φ as a monotonically increasing function of the borrower's likelihood of default, and we designate the marginal probability density function of credit risk as $r(\Phi)$. Assuming mortgage lenders can observe the true credit risk of borrowers, they approve all loan applications with credit risk lower than a uniform underwriting cut-off, which we denote as Φ^P for the prime market and Φ^S for the subprime market, with $\Phi^P < \Phi^S$.

In this model, the prime market is perfectly sorted; everyone who applies for a prime mortgage has credit risk $\Phi \leq \Phi^P$ and therefore is approved for a loan. Although we do observe in the marketplace some rejections of prime applications, empirical research has shown that subprime loans are rejected at a much higher rate than prime loans: 33 percent versus 9 percent (Scheessele, 1998). In addition, the assumption of perfect sorting, or borrower self-selection, does not affect the suggested impact of predatory lending laws on the outcome of subprime mortgage applications. In Figure 1, prime applications and originations are given by the same integral of the marginal density function and are represented by the area O^P:

[7] In essence we are assuming that no unqualified households apply for a prime loan (i.e., self-select themselves out of that market) or that the lender presorts potential applications to reduce rejections in the prime market. Therefore, there are no rejected prime loans.

Figure 1

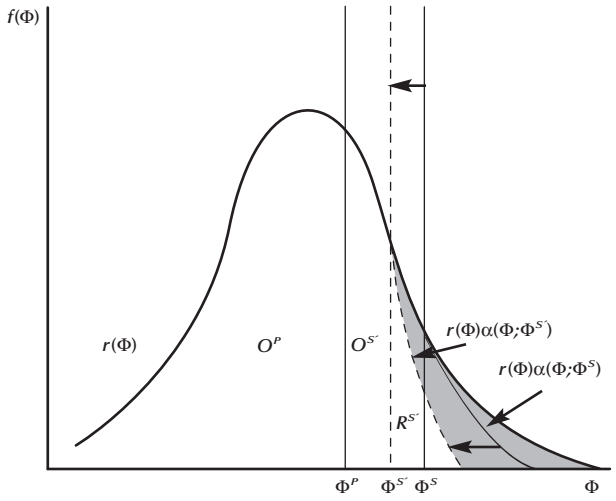
Prime and Subprime Mortgage Outcomes



NOTE: $r(\Phi)$ = marginal probability function of credit risk; $\alpha(\Phi; \Phi^S)$ = subprime application rate; Φ^P = prime underwriting standard; Φ^S = subprime underwriting standard; O^P = prime originations; O^S = subprime originations; R^S = subprime rejections.

Figure 2

Post-Law Scenario: Tightening Subprime Underwriting Standards



NOTE: $r(\Phi)$ = marginal probability function of credit risk; $\alpha(\Phi; \Phi^{S'})$ = subprime application rate; Φ^P = prime underwriting standard; Φ^S = pre-law subprime underwriting standard; $\Phi^{S'}$ = post-law subprime underwriting standard; O^P = prime originations; $O^{S'}$ = post-law subprime originations; $R^{S'}$ = post-law subprime rejections.

$$(1) \qquad A^P = O^P = \int_0^{\Phi^P} r(\Phi)d\Phi.$$

Applicants with credit risk higher than the prime underwriting standard, Φ^P, are subprime applicants. However, assuming there is a cost associated with applying for a loan, an individual will apply only if he/she thinks the chance of being accepted is sufficiently high. This borrower self-selection implies that a fraction of individuals with credit risk higher than a certain level—we refer to these as the "marginal applicants"—will opt out of the subprime market, effectively altering the risk distribution. We define $\alpha(\Phi; \Phi^S)$ as the share of actual subprime applicants in the potential applicant universe; α is indexed by Φ, given the current subprime underwriting standard (Φ^S). For potential subprime applicants with $\Phi \leq \Phi^S$, $\alpha(\Phi; \Phi^S)$ equals unity. The probability of applying, $\alpha(\Phi; \Phi^S)$, is continuous and decreasing for $\Phi > \Phi^S$ until it equals zero at some value Φ', where $\Phi^S < \Phi' \leq 1$. The applicants who opt out and do not apply are shown as the shaded area in Figure 1 and would be rejected if they did apply.

Given the current subprime underwriting standard, Φ^S, and the risk distribution, $r(\Phi)$, the number of applicants, A^S, originations, O^S, and rejections, R^S, are shown in Figure 1 and given by

$$(2) \qquad \begin{aligned} &\text{Applications } A^S = \int_{\Phi^P}^{1} r(\Phi)\alpha(\Phi;\Phi^S)d\Phi; \\ &\text{Originations } O^S = \int_{\Phi^P}^{\Phi^S} r(\Phi)d\Phi; \text{ and} \\ &\text{Rejections } R^S = \int_{\Phi^S}^{1} r(\Phi)\alpha(\Phi;\Phi^S)d\Phi. \end{aligned}$$

The number of applicants can also be represented as the sum of originations and rejections, $A^S = O^S + R^S$.

Assume that a predatory lending law imposes restrictions on subprime mortgage lenders in terms of information disclosure, allowable loan

types, and required lending practices. To comply with the law's restrictions, lenders must tighten underwriting standards from Φ^S to $\Phi^{S'}$. This post-law scenario is illustrated in Figure 2. The law results in fewer subprime loans being originated, because of the tighter minimum lending standards required to comply with the predatory lending law:

$$(3) \qquad \int_{\Phi^P}^{\Phi^{S'}} r(\Phi)d\Phi = O^{S'} < O^S = \int_{\Phi^P}^{\Phi^S} r(\Phi)d\Phi.$$

The total number of subprime applicants also decreases after the law is implemented because more "marginal applicants," fearing higher probability of rejection, self-select out of the subprime market. For all values of $\Phi > \Phi^{S'}$, $r(\Phi)\alpha(\Phi; \Phi^S) > r(\Phi)\alpha(\Phi; \Phi^{S'})$, and, as a result, $A^S > A^{S'}$.

Depending on the functional form of $\alpha(.)$, the number of rejected applications could increase or decrease if lending standards are tightened, especially if the likelihood of applying is affected by the level of credit risk[8]:

$$(4) \qquad \int_{\Phi^{S'}}^{1} r(\Phi)\alpha(\Phi;\Phi^S)d\Phi = R^{S'} >,=,< R^S = \int_{\Phi^S}^{1} r(\Phi)\alpha(\Phi;\Phi^S)d\Phi.$$

In addition, the rejection rate or the ratio of rejections to applications could either increase or decrease—again, depending on the function of $\alpha(.)$.

This analysis allows us to develop testable hypotheses regarding the impact of a predatory lending law on subprime mortgage outcomes. Specifically, we expect that the introduction of a law that tightens lending standards will reduce (relative to the prime market) the number of subprime applications and originations. In addition, the impact of a law that tightens lending standards on subprime rejection rates should be indeterminate.

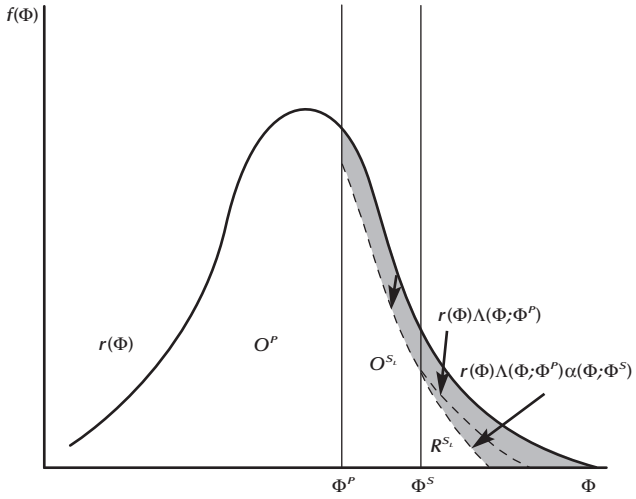
Finally, we introduce what we call the "lemons effect," as pioneered by Akerlof (1970), into the subprime mortgage market. In this type of market, loans can be sold honestly or dishonestly. The borrower attempts to sort the honest loans from the dishonest loans. Unfortunately, regulatory agencies (HUD and the Treasury) and the Board of Governors of the Federal Reserve System did find some evidence from task-force interviews and open meetings that some subprime borrowers, typically elderly or poorly educated households, have had difficulty sorting the honest loans from the dishonest loans (HUD and the Treasury, 2000, and Board of Governors, 2002).

In a market with some dishonest loans, all borrowers must exert extra effort and time to screen the lender and loan documents (higher transaction costs). The press, government reports, and local nonprofit agencies have informed the public about the presence of predatory lending, or dishonest loans, in the subprime market. This uncertainty in loan quality, the lemons effect, can deter subprime applications and is illustrated in Figure 3.

Here we introduce a shift function $\Lambda(\Phi; \Phi^P)$ that equals zero for $\Phi \leq \Phi^P$ and a constant k,

Figure 3

The "Lemons Effect"



NOTE: $r(\Phi)$ = marginal probability function of credit risk; $\Lambda(\Phi; \Phi^P)$ = lemons shift function; $\alpha(\Phi; \Phi^S)$ = subprime application rate; Φ^P = prime underwriting standard; Φ^S = subprime underwriting standard; O^P = prime originations; O^{S_L} = subprime originations under the lemons effect; R^{S_L} = subprime rejections under the lemons effect.

[8] However, if $\alpha(.)$ is a linear decreasing function of $(\Phi - \Phi^j)$, where j indexes the lending standards S and S', the number of rejected applications will increase when lending standards are tightened.

$0 < k < 1$, for $\Phi^P < \Phi \leq 1$. $\Lambda(.)$ can be interpreted as the fraction of potential subprime applicants that are deterred from applying for fear of falling prey to predatory lending or because of the additional transaction costs associated with identifying the dishonest loan or lender. Therefore, the risk distribution becomes kinked at Φ^P and shifts down for all applicants with credit risk above Φ^P. The resulting subprime originations and rejections are represented in Figure 3 by areas O^{S_L} and R^{S_L}, respectively, and subprime applications equal $O^{S_L} + R^{S_L}$.

Given the perception that predation has occurred in the subprime market and not in the prime market, the volume of lending as measured by the number of originations and applications may be lower than expected, given the distribution of credit risk, $r(\Phi)$. One of the primary purposes of predatory lending laws is to weed out the "lemons" in the subprime mortgage market. If households feel that the predatory lending law has been successful, there may be less need to spend time and energy to identify the dishonest loans; they may feel more comfortable applying for a mortgage. In this scenario $\Lambda(.)$ is reduced to zero or is much closer to zero. Therefore, if the subprime market is operating as a lemons market, the introduction of the predatory lending law should have two countervailing effects. First, as illustrated in Figures 1 and 2, the law should reduce applications and originations because of tighter lending standards. Second, as illustrated in Figure 3, if the law removes or heavily regulates the dishonest loans, it should induce potential applicants to return to the market. Therefore, in markets with a substantial lemons problem, or big $\Lambda(.)$, the impact of a predatory lending law could be neutral or could increase the rate of subprime applications and originations. In addition, if $\Lambda(.)$ is not strictly proportional, but has a larger impact on potential borrowers closer or farther away from Φ^S, then the introduction of a predatory lending law could increase or decrease rejection rates.

In summary, in the absence of a lemons problem, the introduction of a law that tightens lending standards should be associated with lower originations and applications for subprime loans. However, if the market suffers from a lemons problem, a new law can actually be associated with more applications and originations. Lastly, this simple model provides no guidance regarding potential effects of the law on rejections.

UNIVARIATE EVIDENCE: PREDATORY LENDING LAWS AND THE FLOW OF CREDIT

The first empirical test examines the laws' impact on the volume of lending. If volume is unaffected, then the aggregate flow of and the supply of credit to potential consumers has not been affected in the aggregate. This method generally follows Harvey and Nigro's (2004) research on the North Carolina predatory lending law, which found that this law significantly reduced subprime applications and originations but had no measurable impact on the rates of rejection. In particular, this section extends prior research by examining the effects in a variety of locations and seeing whether the North Carolina experience is representative for other states.

In each state, we examine the change in originations for subprime loans under the prescribed loan limits in the year before and the year after the predatory lending law is introduced; we use publicly available Home Mortgage Disclosure Act (HMDA) data.[9] Growth rates are calculated for loans associated with a list of subprime lenders as identified by the HUD subprime lender list.[10] Any loan application or origination associated with a lender on the list is identified as a subprime loan. All other loans are treated as non-subprime—that is, conventional loans. In an attempt to create comparison groups that are as similar as possible,

[9] The results are very similar if we do not apply loan limits (to reduce the sample).

[10] The source is www.huduser.org/datasets/manu.html, accessed on 2/1/05. HUD generates a list of subprime lenders from industry trade publications, HMDA data analysis, and phone calls to the lender to confirm the extent of subprime lending. Because this list is defined at the lender level, loans made by the subprime lender may include both prime and subprime loans. In addition, subprime loans made by predominately prime lenders will also be incorrectly identified as prime lending. Therefore, an alternative interpretation of the loans identified using the HUD subprime lender list is that it identifies the extent of specialized subprime lending, not full-service lending.

only counties that border other states without a state predatory lending law are used for the treatment group. The control group includes only counties in neighboring states that border the treatment state and do not have a predatory lending law in effect during the observed time period (the year before and after the introduction of the predatory lending law). This contrasts with other studies (Harvey and Nigro, 2004, and Elliehausen and Staten, 2004) that have used whole neighboring states or regions to define both control and treatment groups. Our approach should help to increase the comparability of the treatment group and the control group because they are geographically closer and, as a result, likely to be more economically similar than full state and region comparisons.

Beginning with North Carolina in 1999, at least 23 states have passed predatory lending laws that are currently in effect. However, the empirical approach combined with the availability of HMDA data reduces the sample to 10 states with predatory lending laws: California, Connecticut, Florida, Georgia, Maryland, Massachusetts, North Carolina, Ohio, Pennsylvania, and Texas.

Table 1 reports the percent change in loan originations. Using North Carolina as an example, the results show that, from 1999 through 2001, subprime originations decreased by 35.8 percent in the treatment counties while subprime originations decreased by 18.9 percent in the control counties. In other words, consistent with prior research on the North Carolina predatory lending law, subprime originations decreased substantially more than would be expected given the performance of the control counties. This is also true in four other states (Florida, Georgia, Massachusetts, and Ohio). However, in five states (California, Connecticut, Maryland, Pennsylvania, and Texas), subprime originations increased more in the treatment locations.[11] These results indicate that the experience in North Carolina may not extend to all other states with predatory lending laws and that there may be sufficient variation in the laws that may increase or decrease the flow of credit.

The second and third columns examine the relative growth rates in originations for minority and low-income applicants.[12] Again, the results are mixed: Some locations experienced a relative increase and others a relative decrease in subprime originations.

Table 2 examines the relative growth in applications for subprime credit, and Table 3 examines the relative change in subprime rejection rates. Again the application results are mixed and very similar to the origination results. For example, four states experienced a relative increase and six states experienced a relative decrease in applications. However, the rejection rates tell a more consistent story. In most states, rejection rates declined more in the treatment locations than in the control locations, indicating that the introduction of predatory lending laws was associated with a disproportionate reduction in the rejection rate for subprime applications.

Multivariate Evidence: Predatory Lending Laws and the Flow of Credit

The previous section provided a univariate analysis showing that predatory lending laws are associated with reductions in rejection rates of subprime applications, but have no consistent effect on the volume of subprime credit. This section extends this analysis by estimating the probability of originating a subprime versus prime loan, the probability of applying for a subprime versus a prime loan, and the probability of being rejected in a subprime application in probit model specifications. The main additional benefit of conducting a multivariate analysis is the ability to control for multiple characteristics at once. The previous univariate tables control only for time and location through the construction of the data set. This regression will be able to simultaneously

[11] The Texas sample consists of counties on the Texas-Louisiana border. Because all sampled Texas counties (Harrison, Marion, Newton, Orange, Panola, Sabine, and Shelby) are rural, few subprime lenders were identified in the data and, hence, the number of subprime loans might be deceptively small, especially in 2000. This might explain the unusually large percentage increases in applications and originations for Texas.

[12] "Low income" includes households with income less than or equal to 80 percent of the county median household income as reported in the 2000 Census. "Minority" includes black and Hispanic applicants as reported in HMDA.

Table 1

Pre- and Post-Law Percent Change in Originations

	All loans	Minority	Low-income
California, 2001-03			
Treatment group	177.3	344.7	148.7
Control group	53.1	71.1	17.8
Difference	124.2	273.6	130.9
Connecticut, 2000-02			
Treatment group	87.8	127.7	67.9
Control group	80.6	107.3	28.2
Difference	7.2	20.3	39.7
Florida, 2001-03			
Treatment group	55.5	101.0	8.8
Control group	59.9	125.2	2.3
Difference	–4.3	–24.3	6.5
Georgia, 2001-03			
Treatment group	18.9	87.5	–14.0
Control group	46.2	108.1	29.6
Difference	–27.3	–20.6	–43.6
Maryland, 2001-03			
Treatment group	129.4	256.5	140.6
Control group	57.6	165.4	84.6
Difference	71.8	91.0	55.9
Massachusetts, 2000-02			
Treatment group	56.4	134.8	17.1
Control group	69.6	107.4	8.2
Difference	–13.2	27.4	8.9
North Carolina, 1999-2001			
Treatment group	–35.8	–35.7	–50.2
Control group	–18.9	–30.1	–31.6
Difference	–16.9	–5.6	–18.5
Ohio, 2001-03			
Treatment group	3.2	4.2	–23.3
Control group	8.4	47.0	4.0
Difference	–5.3	–42.8	–27.3
Pennsylvania, 2000-02			
Treatment group	–5.8	–48.4	–38.0
Control group	–30.7	–59.1	–45.9
Difference	24.9	10.7	7.9
Texas, 2000-02			
Treatment group	3,069.2	—	—
Control group	–12.6	–53.0	–46.3
Difference	3,081.8	—	—

Table 2

Pre- and Post-Law Percent Change in Applications

	All loans	Minority	Low-income
California, 2001-03			
Treatment group	110.0	268.1	81.3
Control group	43.3	123.4	31.5
Difference	66.7	144.6	49.8
Connecticut, 2000-02			
Treatment group	43.4	51.9	29.1
Control group	59.8	34.7	35.4
Difference	–16.4	17.2	–6.3
Florida, 2001-03			
Treatment group	21.0	137.4	3.3
Control group	76.0	156.3	23.4
Difference	–55.0	–18.9	–20.1
Georgia, 2001-03			
Treatment group	–16.2	72.1	–29.8
Control group	27.7	116.4	7.4
Difference	–43.9	–44.3	–37.2
Maryland, 2001-03			
Treatment group	77.2	258.7	71.0
Control group	33.3	238.5	32.7
Difference	44.0	20.1	38.4
Massachusetts, 2000-02			
Treatment group	45.4	84.1	24.1
Control group	60.2	42.7	36.2
Difference	–14.8	41.4	–12.1
North Carolina, 1999-2001			
Treatment group	–25.9	–37.9	–35.7
Control group	16.1	–28.3	3.3
Difference	–42.0	–9.6	–39.0
Ohio, 2001-03			
Treatment group	–9.5	7.0	–27.5
Control group	–2.8	52.8	–15.1
Difference	–6.6	–45.7	–12.5
Pennsylvania, 2000-02			
Treatment group	11.0	–42.8	–1.2
Control group	–12.5	–57.3	–11.3
Difference	23.5	14.5	10.1
Texas, 2000-02			
Treatment group	5,480.0	—	6,014.3
Control group	–12.2	–53.6	–31.8
Difference	5,492.2	—	6,046.1

Table 3

Pre- and Post-Law Percent Change in Rejection Rates

	All loans	Minority	Low-income
California, 2001-03			
Treatment group	–33.4	–26.1	–25.0
Control group	–13.3	10.9	–2.3
Difference	–20.0	–37.0	–22.7
Connecticut, 2000-02			
Treatment group	–19.5	–17.0	–13.6
Control group	–19.7	–23.7	2.2
Difference	0.2	6.7	–15.9
Florida, 2001-03			
Treatment group	–12.2	2.3	–3.5
Control group	2.8	1.9	–1.0
Difference	–15.0	0.4	–2.6
Georgia, 2001-03			
Treatment group	–23.2	–13.0	–15.1
Control group	–8.3	1.1	–10.8
Difference	–14.9	–14.0	–4.3
Maryland, 2001-03			
Treatment group	–25.7	–6.9	–21.9
Control group	–15.7	24.6	–20.5
Difference	–9.9	–31.5	–1.3
Massachusetts, 2000-02			
Treatment group	–19.4	–25.5	–8.0
Control group	–13.6	–18.8	9.7
Difference	–5.7	–6.6	–17.7
North Carolina, 1999-2001			
Treatment group	20.0	9.7	24.4
Control group	37.0	6.2	28.0
Difference	–17.0	3.5	–3.6
Ohio, 2001-03			
Treatment group	–6.6	–1.2	–4.3
Control group	–2.0	–4.5	–5.8
Difference	–4.6	3.3	1.5
Pennsylvania, 2000-02			
Treatment group	2.4	7.0	18.6
Control group	3.4	1.6	16.8
Difference	–1.1	5.4	1.8
Texas, 2000-02			
Treatment group	72.7	—	4.8
Control group	–9.8	–7.9	–2.2
Difference	82.5	—	7.0

Table 4

Identification Strategy and Control Variable Definitions

Variable	Definition	Source
Outcome		
Application	Indicator variable = 1 for subprime application and 0 for prime	HMDA & HUD subprime lender list
Origination	Indicator variable = 1 for subprime origination and 0 for prime	HMDA & HUD subprime lender list
Rejection	Indicator variable = 1 if subprime loan is denied and 0 if accepted	HMDA & HUD subprime lender list
Identification		
Law	Indicator variable = 1 if borrower is from a location with a law at some point and 0 otherwise	Ho and Pennington-Cross (2005)
Postlaw	Indicator variable = 1 for post-legislation time period and 0 otherwise	Ho and Pennington-Cross (2005)
Ineffect	Interaction of *Law* and *Postlaw* indicators indicating that the borrower is from a location with a law currently in effect	Ho and Pennington-Cross (2005)
Control variables		
Income	Borrower's gross annual income ($ thousands)	HMDA
Loan2inc	Ratio of requested loan amount to borrower's income	Calculated from HMDA
Relinc	Ratio of tract median family income to MSA median family income	HMDA
Minority	Tract's minority population percentage	HMDA
Vacant	County's percentage of vacant housing units	Census 2000
Population	County's population growth from the calendar year before and after the law went into effect	Census Bureau
Unemployment	County's unemployment rate	Bureau of Labor Statistics

control for law characteristics, borrower characteristics, location, and economic conditions on both the control group (no law introduced) and the treatment group (law introduced).

The basic data design is the same as in the univariate analysis and includes only counties in treatment states that border other states without any treatment (control group) and subprime loans under the loan limits indicated by the law.

Identification and Probit Estimation

Identification Strategy. To identify the effect of a state predatory lending law, we include data on the location and timing of the law as well as borrower and location characteristics. Table 4 describes the variables and data sources. Similar to Harvey and Nigro (2003 and 2004), three separate dependent variables are tested to measure the effects of state predatory lending laws—the probability of applying for a subprime loan (application), the probability of originating a subprime loan (origination), and the probability of being rejected on a subprime application (rejection).

The key variable shown in Table 4 is *Ineffect*. This variable indicates that a loan was made in a location when and where a predatory lending law was in effect. It is defined as zero before the law went into effect, even in the treatment location, and is always zero in the control location. *Ineffect* is constructed by multiplying the variable *Law*, which indicates locations where the law will eventually be in effect, and *Postlaw*, which indi-

cates the time period after a law has been put into effect. Therefore, *Law* identifies the treatment location and *Postlaw* identifies the time period the law went into effect in that location. The reference group comprises locations where the predatory lending laws will not be in effect in either time period. There are no priors regarding the coefficients on *Law* or *Postlaw*, because they will capture prevailing probabilities associated with location and time that are not controlled for by other variables. Given the results from prior research, we would expect *Ineffect* to be negative for the application and origination outcomes and potentially insignificant for the rejection outcome.

Both Harvey and Nigro (2003 and 2004) and Elliehausen and Staten (2004) include a series of control variables associated with the location of the loan or loan application and the borrower because they may affect the demand or supply of subprime credit. In general, we expect that borrowers will be more likely to use/apply for subprime loans, and perhaps be rejected by subprime lenders, in locations with difficult economic conditions and when borrowers have lower income or are in minority areas (Calem, Gillen, and Wachter, 2004, and Pennington-Cross, 2002). Economic conditions are proxied by the county-level unemployment rate, housing vacancy rate, and population growth rate. Borrower characteristics are proxied by the percent of minority population in the census tract and borrower income. In general, we expect that applicants with more income relative to their loan amount will have an easier time meeting prime underwriting requirements. Underwriting requirements are proxied by the loan-to-borrower income ratio. One important caveat to this analysis is that the borrower's credit history, or credit score, which has been shown to be a very important determinant of mortgage performance for both subprime and prime loans (Pennington-Cross, 2003), is not reported in the HMDA data and therefore cannot be included in this analysis. Lastly, perhaps because of minimum scale requirements, prime lending may be more available in locations with more households. As a result, subprime may be more prevalent in locations with a smaller population.

Probit Estimation

A probit model is estimated for each outcome and for each "law sample" (which includes the treatment and control groups). Therefore, for each sample, three probit models are estimated and a total of 30 model estimates are generated that include 10 explanatory variables each, for a total of 300 estimated coefficients excluding intercepts. The probit specification is given by

$$\Pr(Y = 1 \mid x) = \Phi(x'\beta), \tag{5}$$

where Y is the outcome (application, origination, or rejection), x is a vector of explanatory variables, β is a vector of parameters, and $\Phi(.)$ denotes the standard normal distribution. The log-likelihood for the probit model is

$$L = \sum_{y_i=0} \ln\left[1 - \Phi(x_i'\beta)\right] + \sum_{y_i=1} \ln \Phi(x_i'\beta), \tag{6}$$

where y_i and are x_i, respectively, the observed values of outcome Y and explanatory variables x for observation i.

Because of the large number of coefficient estimates, instead of reporting all coefficients, we provide summary information.[13] Table 5 provides context for the marginal effects by reporting the mean of the dependent variables for each of the law samples. It shows that there is a wide variety in subprime application, origination, and rejection rates. For example, subprime applications ranged from almost 25 percent in California to just over 15 percent in Maryland. The relative magnitude of application and origination rates provides indirect support for the high rates of rejection on subprime applications. In fact, in some of the law samples, over 50 percent of subprime applications were rejected.

Table 6 reports the marginal impact of a state predatory lending law for each state while evaluating all other variables at their means for each law sample. Consistent with prior literature, the results indicate that the North Carolina law did reduce the flow of subprime credit through a reduction in both application and origination probabilities. But the experience in terms of

[13] Detailed results are available upon request.

Table 5

Mean of Dependent (Outcome) Variables (percent)

Law sample (treatment and control groups)	Application	Origination	Rejection
California	0.249	0.153	0.354
Connecticut	0.245	0.119	0.397
Florida	0.177	0.063	0.574
Georgia	0.224	0.097	0.505
Massachusetts	0.174	0.080	0.357
Maryland	0.153	0.064	0.439
North Carolina	0.233	0.111	0.484
Ohio	0.241	0.092	0.551
Pennsylvania	0.261	0.109	0.476
Texas	0.242	0.104	0.550

Table 6

Marginal Effects of *Ineffect* Variable

Law sample (treatment and control groups)	Application	Origination	Rejection
California	0.032***	0.067***	–0.258***
Connecticut	0.014**	0.023***	0.013
Florida	–0.030***	0.008*	–0.057***
Georgia	–0.056***	–0.007**	–0.110***
Massachusetts	–0.074***	–0.032***	–0.030***
Maryland	0.029***	0.018***	–0.066***
North Carolina	–0.069***	–0.042***	–0.048***
Ohio	–0.005	–0.004	–0.022**
Pennsylvania	0.037***	0.032***	0.032***
Texas	0.189***	0.107***	0.148*

NOTE: */*/*** indicate that the marginal effect is significantly different from zero at the 90/95/99 percent levels. All other variables are evaluated at the mean for each law sample.

originations and applications in North Carolina is replicated in only one-half of the other state laws examined. In the other half, the introduction of the law was associated with an increase in the flow (originations) of subprime credit. The results are also mixed in terms of applications, with some laws being associated with higher and other laws associated with lower probabilities of application. The effects of the state laws on the probability of being rejected are a little more consistent, with 7 of the 10 laws being associated with lower rejection rates.

Table 7 provides a summary of coefficient estimates for the remaining control variables for the probit application, origination, and rejection models. The first four columns report the minimum, maximum, mean, and standard deviation of the 10 estimated coefficients. The last column reports the mean *t*-statistic associated with the coefficients. There is no expected sign or even

Table 7

Summary of Control Variable Coefficient Estimates

	Coefficient				*t*-Statistics
Variable	Minimum	Maximum	Mean	Standard deviation	Mean
Application results					
Law	–1.191	0.500	–0.032	0.447	2.621
Postlaw	–0.254	0.156	–0.078	0.120	–8.530
Ineffect	–0.288	0.765	0.031	0.299	–1.639
Income	–0.319	–0.058	–0.176	0.083	–34.463
Loan2inc	–0.001	0.032	0.012	0.012	9.622
Relinc	–0.617	–0.215	–0.431	0.165	–41.554
Minority	0.274	0.819	0.550	0.153	35.074
Vacant	–10.514	15.820	–0.207	6.704	–3.124
Population	–0.119	0.059	–0.018	0.053	–5.243
Unemployment	–5.393	16.539	7.503	6.453	13.972
Origination results					
Law	–0.807	0.230	–0.079	0.293	–1.223
Postlaw	–0.509	0.067	–0.158	0.170	–8.510
Ineffect	–0.229	0.759	0.103	0.279	1.999
Income	–0.497	–0.039	–0.213	0.159	–19.529
Loan2inc	–0.033	0.031	–0.002	0.018	–2.871
Relinc	–0.615	–0.141	–0.388	0.156	–22.270
Minority	0.384	0.820	0.605	0.141	24.624
Vacant	–9.833	4.701	–1.604	3.791	–4.108
Population	–0.128	0.026	–0.022	0.055	–2.545
Unemployment	–5.246	18.093	6.891	6.623	9.131
Rejection results					
Law	–0.377	1.837	0.197	0.599	3.088
Postlaw	–0.263	0.321	–0.006	0.168	–0.194
Ineffect	–0.469	0.373	–0.084	0.223	–3.927
Income	–0.082	0.051	–0.031	0.043	–4.660
Loan2inc	0.001	0.055	0.022	0.017	7.779
Relinc	–0.395	–0.018	–0.190	0.108	–9.553
Minority	–0.038	0.242	0.125	0.087	3.447
Vacant	–18.268	6.909	0.736	7.194	3.552
Population	–0.033	0.098	0.016	0.040	0.407
Unemployment	–7.209	26.239	1.147	9.270	–0.646

NOTE: These statistics provide a summary of the 10 models estimated. For example, the mean coefficient is the simple average of the 10 coefficient estimates for each variable and the standard deviation is the standard deviation of the 10 estimated coefficients.

significance associated with the *Law* and *Postlaw* dummy variables because they control for unobserved impacts of location and time in each law sample. There are three measures of income included in the model (borrower income, the ratio of the requested loan amount to borrower income, and the ratio of the tract to the MSA median family income). As anticipated, on average, borrowers with higher income are less likely to apply for or get a subprime loan and are less likely to be rejected on a subprime application. However, as with most of the control variables, there is substantial variation in the sign and magnitude of the coefficient estimates. Consistent with borrower income, originations, applications, and rejections are more likely in locations with relatively lower incomes. In addition, as anticipated, applicants requesting larger loans relative to their income are more likely to be rejected.

Higher unemployment rates are also associated on average with higher probabilities of application, origination, and rejection, but the signs of the coefficient estimates can be negative or positive. In addition, weaker housing markets, proxied by the vacancy rate and county population growth, are inconsistently associated with application, origination, and rejection probabilities. However, consistent with prior research, locations with more minorities are associated with higher application, origination, and rejection probabilities.

These results do not provide any indication that predatory lending laws systematically reduce the flow of subprime credit. However, the results do show that predatory lending laws may be associated with lower rejection rates of subprime mortgage applications. It can be expensive just to apply for a mortgage: The nonrefundable application fee usually runs from $200 to $300, not to mention other hidden or nonpecuniary costs. Thus, although reducing rejection rates may not have been the primary purpose of the laws, a reduction in rejections can represent substantial savings to consumers.

DISCUSSION AND CONCLUSION

The introduction of state predatory lending laws has created a situation in which a loan may be legal and available in Missouri, but the identical loan is illegal and not available just across the Mississippi River in Illinois. For example, in Illinois, high-cost loans with prepayment penalties in the first three years of the loans are prohibited, whereas Missouri has no such provision.

This paper provided a framework to consider some of the potential effects that the predatory lending laws, such as the one in Illinois, would have on the total or aggregate flow of high-cost or subprime mortgage credit. This framework indicates that laws that require tighter lending standards should be associated with fewer originations and applications. However, if households were deterred from applying for a loan because they were afraid of being taken advantage of, the introduction of a predatory lending law could lead to more applications because the fear of predation is reduced.

Consistent with this framework, univariate and multivariate empirical results confirmed that some laws were associated with increased applications (for example, California, Connecticut, Maryland, Pennsylvania, and Texas) and other laws were associated with decreased applications (for example, Florida, Georgia, Massachusetts, and North Carolina).[14] We interpret net increases in applications as being consistent with a reduction in fear of predation after the law was passed and decreases in applications as consistent with a reduction in the potential or legal size of the high-cost market as a result of tighter lending standards.

The laws in California, Connecticut, Maryland, Pennsylvania, and Texas were associated with more subprime lending when a predatory lending law was introduced into the subprime market.[15] Therefore, these locations are more likely to have been suffering from a strong lemons problem in the mortgage market. In addition, these states tend to have relatively modest restrictions on allowable lending. In particular, four of these five states have

[14] Prior research has also found this mixed reaction in the market to the introduction of regulations of high-cost mortgage lending (Ho and Pennington-Cross, 2006, and Li and Ernst, 2006).

[15] Conversely, the laws in Florida, Georgia, Massachusetts, and North Carolina were associated with declines in the volume of subprime lending.

no provision regarding mandatory arbitration relief. Four of these five states also do not require pre-purchase or post-purchase loan counseling. In addition, balloon loans are only modestly restricted or left unrestricted by these five state laws. However, there does not seem to be any pattern for these five states in how much of the subprime mortgage market the law applies to.

In future research it would be helpful to determine how product mix adjusts to the introduction of these laws. For example, the laws make no distinction between initial interest rates on fixed rate and adjustable interest rate loans. But adjustable rate loans tend to have lower initial rates, resulting in substitution rather than fewer loans, and can include teaser terms or caps on future interest rate adjustment that could reduce the rate below the benchmark or trigger. Therefore, adjustable rate loans may be one way to avoid the trigger APR levels in predatory lending laws and shift a borrower out from the protective coverage of the regulations. There also may be a regulatory burden associated with these laws that needs to be passed on to consumers through higher interest rates and upfront fees. In addition, these laws may reduce the availability of the secondary market, leading to liquidity issues in the subprime market, which may also increase the cost of credit.

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APPENDIX

Some Details of 10 Predatory Lending Laws

	California	Connecticut
Effective date	7/1/2002	10/1/2001
Covered loan type (HOEPA: closed-end, refinance)	Consumer credit transaction ≤ $250,000 (adjusted every 5 years)	Any loan or extension of credit, including an open-end line of credit but excluding a reverse mortgage transaction
APR triggers (HOEPA: APR > T-bill + 8% for first lien; + 10% for second lien)	APR > T-bill + 8% for both liens	Like HOEPA
Points and fees (P&F) trigger (HOEPA: P&F > 8% loan amount or $499 [for 2004, adjusted annually to CPI])	P&F > 6% loan amount	P&F > 5% loan amount or $2,000
Prepayment penalties	Prohibited after 36 months	Restricted to 3% balance within 1 year, 2% between 1 and 2 years, and 1% between 2 and 3 years; not allowed if debts 50% ≥ monthly gross income
Balloon	Prohibited for loans < 5 years	Prohibited for loans < 7 years
Loan counseling	Not required	Not required
Mandatory arbitration limiting judicial relief	No provision	Prohibited

SOURCE: www.butera-andrews.com/state-local/b-index.htm; www.mbaa.org/resources/predlend/; Standard & Poor's "Anti-Predatory Lending Law Update" (September 20, 2004).

Florida	Georgia	Maryland
10/2/2002	10/1/2002; amended 3/7/2003	5/16/2002
Like HOEPA	Any loan or extension of credit, including an open-end line of credit but excluding a reverse mortgage transaction	All loans
Like HOEPA	Covered loan: APR > higher of 4% (5.5% for second lien) above prime rate or 2% (3% for second lien) above 90-day standard delivery commitment with comparable term; high-cost: APR > higher of 2% (3% for second lien) above Fannie/Freddie or 4% (5.5% for second lien) above prime	APR > T-bill + 7% (first lien) or 9% (second lien)
Like HOEPA	Covered loan: P&F > 3% loan amount; high-cost: P&F > 5% loan amount for loans ≥ $20,000, 8% loan amount or $1,000 for loans < $20,000)	P&F > 7% loan amount or $499 (for 2004)
Prohibited after 36 months	Restricted to 2% loan amount during first 12 months and 1% loan amount during second year	No provision
Prohibited for loans < 10 years	Prohibited for all loans	No provision
Not required	Required	Required
No provision	Prohibited	No provision

APPENDIX, cont'd

	Massachusetts	North Carolina
Effective date	3/22/2001	10/1/1999
Covered loan type (HOEPA: closed-end, refinance)	Consumer credit transaction, excluding a reverse mortgage	Loans including open-end lines of credit but excluding reverse mortgages, amount ≤ the lesser of conforming limit or $300,000
APR triggers (HOEPA: APR > T-bill + 8% for first lien; + 10% for second lien)	APR > T-bill + 8% (1st lien); + 9% (second lien)	Like HOEPA
P&F trigger (HOEPA: P&F > 8% loan amount or $499 [for 2004, adjusted annually to CPI])	P&F > 5% loan amount or $400 (adjusted annually)	P&F > 5% loan amount if loan ≥ $20,000; 8% loan amount of $1,000 if loan < $20,000
Prepayment penalties	Prohibited after 36 months; before 36 months, restricted to balance of first year's interest or three-months' interest, whichever is less	Prohibited for all loans < $150,000
Balloon payments	Prohibited for all loans	Prohibited
Loan counseling	Required	Required
Mandatory arbitration limiting judicial relief	Prohibited	No provision

Ohio	Pennsylvania	Texas
2/22/2002	6/21/2001	9/1/2001
All loans	Loans < $100,000	Residential mortgages ≥ $20,000 and <1/2 conforming limit, excluding an open-end account or a reverse mortgage
Like HOEPA	Like HOEPA	Like HOEPA
Like HOEPA	Like HOEPA	Like HOEPA
Prohibited	Prohibited after 60 months	Prohibited
Prohibited for loans < 5 years	Prohibited for loans < 10 years	Prohibited after 60 months
Not required	Not required	Not required
No provision	No provision	No provision

Regional Business Cycle Phases in Japan

Howard J. Wall

This paper uses a Markov-switching model with structural breaks to characterize and compare regional business cycles in Japan for the period 1976-2005. An early-1990s structural break meant a reduction in national and regional growth rates in expansion and recession, usually resulting in an increase in the spread between the two phases. Although recessions tended to be experienced across a majority of regions throughout the sample period, the occurrence and lengths of recessions at the regional level have increased over time. (JEL E32, R12)

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This paper characterizes and compares regional business cycles in Japan during the period 1976-2005. As is frequently done at the national level, following Burns and Mitchell (1946), my analysis supposes that regional business cycles can be characterized as a series of distinct recession and expansion phases. Examples of this characterization of national business cycles include the recession and expansion dates for the United States produced by the National Bureau of Economic Research's Business Cycle Dating Committee and for Japan by the Economic and Social Research Institute (ESRI).[1]

I estimate region-level business cycle turning points with a Bayesian version of the regime-switching model of Hamilton (1989). As with the Burns and Mitchell view, the Hamilton model assumes that the business cycle can be split into distinct recession and expansion phases. The Hamilton model, or the related dynamic-factor Markov-switching model of Kim and Yoo (1995) and Chauvet (1998), has been applied to aggregate Japanese data by Watanabe (2003), Uchiyama and Watanabe (2004), Yao and Kholodilin (2004), and Watanabe and Uchiyama (2005). In all of these papers, the authors are able to closely mimic the ESRI recessions, although some papers find recessions that were not documented by the ESRI.

In applying the Hamilton model to subnational data, I follow Owyang, Piger, and Wall (2005a,b), who did so for U.S. states. They found substantial state-level differences in business cycles, both in terms of the growth rates in the two phases and in the timing of recessions and expansions. They also found a tendency for national recessions to follow geographic patterns. Okumura and Tanizaki (2004) performed a similar exercise using the index of industrial production (IIP) for Japanese regions for the period 1970-2000. They found that a majority of regions rarely, if ever, experienced recession during the 1980s, despite there being two relatively long national recessions during the

[1] The ESRI dates are determined using a diffusion index—the percentage of a selection of economic indicators that are rising. The last month for which the diffusion index stays below 50 percent is the last month of recession, and the last month for which this index stays above 50 percent is the last month of expansion. For details, go to www.esri.cao.go.jp/en/stat/di/di2e.html.

Howard J. Wall is an assistant vice president and economist at the Federal Reserve Bank of St. Louis. This paper was written while the author was a visiting scholar at the Institute for Monetary and Economic Studies of the Bank of Japan; he is grateful for their resources and hospitality. He also thanks Mahito Uchida, Hiroshi Fujiki, Toshiaki Watanabe, and Jeremy Piger for their helpful suggestions and Kiyoshi Watanabe for his assistance in organizing the data. Kristie Engemann provided research assistance.

period. Further, according to Okumura and Tanizaki, three regions that did not experience recession in the 1980s—Hokkaido, Chugoku, and Shikoku—did not experience recession even during the 1990s, a period often characterized as a "lost decade" for Japan. (See the appendix for a map of Japan and the assignment of the prefectures to the nine regions.)

The present analysis differs from that of Okumura and Tanizaki in two important ways, the latter of which gives rise to very different results regarding the frequency of recession across regions. First, I include data through the third quarter of 2005 so that I can examine the ESRI recession of 2001-02; second, I take into account two structural breaks in the Japanese economy. These breaks were found by Uchiyama and Watanabe (2004) and Watanabe and Uchiyama (2005) to have occurred in the mid-1970s and the late 1980s/early 1990s.[2] When these breaks are accounted for, I find that, contrary to Okumura and Tanizaki, most regions experienced recessions during the 1980s and the 1990s that were associated with national recessions. Even so, I find interesting cross-regional differences in the pattern and timing of recessions, the growth rates in recession and expansion, and the nature of the early-1990s structural break.

The next section outlines briefly the model and data. In the third section, I apply the model to the national IIP to show the effect of the structural break and to obtain recession dates from the IIP comparable to those from the ESRI. In the fourth section, I provide and compare the results for the regions. The fifth section describes the concordances of the regional business cycles, while the sixth section discusses the sensitivity of the results to the timings of the structural breaks.

MODEL AND ESTIMATION

In Hamilton's (1989) Markov-switching model, the business cycle consists of two distinct phases—recession and expansion—that the economy switches between, each with its own growth rate. Let μ_0 be the mean growth rate in expansion and μ_1 be the difference between the mean growth rates in recession and expansion. Specify the growth rate of some measure of economic activity, y_t, as

$$(1) \qquad y_t = \mu_0 + \mu_1 S_t + \varepsilon_t, \;\; \mu_1 < 0.$$

The mean growth rate in (1) switches between the two phases, where the switching is governed by a state variable, $S_t = \{0,1\}$: When S_t switches from 0 to 1, the growth rate switches from μ_0 (expansion) to $\mu_0 + \mu_1$ (recession).

Assume that the process for S_t is a first-order two-state Markov chain, meaning that any persistence in the phase is completely summarized by the value of S_t in the last period. Specifically, the probability process driving S_t is captured by the transition probabilities, $\Pr[S_t = j \mid S_{t-1} = i] = p_{ij}$. I estimate the model using the multi-move Gibbs-sampling procedure for Bayesian estimation of Markov-switching models implemented by Kim and Nelson (1999).[3,4]

My data are quarterly observations of the national and regional IIPs for 1976:Q1–2005:Q3 produced by the Ministry of Economy, Trade, and Industry. I exclude Okinawa from the analysis because its data are incomplete, and I begin my dataset in 1976 to take account of the mid-1970s break found by Uchiyama and Watanabe (2004).[5] Unfortunately, because the data for the regional IIPs are available only beginning in 1968, there are insufficient data to include the pre-1976 period in the present analysis.

[2] See Yao and Kholodilin (2004) for another analysis of structural breaks in Japan using Markov-switching models.

[3] The Gibbs sampler draws iteratively from the conditional posterior distribution of each parameter, given the data and the draws of the other parameters. These draws form an ergodic Markov chain whose distribution converges to the joint posterior distribution of the parameters, given the data. To ensure convergence, I discard the first 2,000 draws when I simulate the posterior distribution. The sample posterior distributions are then based on an additional 10,000 draws.

[4] The prior for the switching mean parameters, $(\mu_0,\mu_1)'$, is Gaussian with mean vector $(1,-1)'$ and a variance-covariance matrix equal to the identity matrix. The transition-probability parameters for phases 0 and 1 have Beta prior distributions, given by $\beta(9,1)$ and $\beta(8,2)$, implying means of 0.9 and 0.8 and standard deviations of 0.09 and 0.12, respectively.

[5] Watanabe and Uchiyama (2005) account for the break by beginning their dataset in 1980. As discussed below, my results are not very sensitive to the choice of 1976 or 1980 as a starting point.

Table 1

Quarterly Growth Rates of IIP: Japan

	Actual average growth rate	Estimated average growth rate in expansion	Estimated average growth rate in recession	Expansion – recession
1976-2005	0.57	1.11 (0.84, 1.40)	–1.23 (–1.80, –0.66)	2.34
1976-1991	1.04	1.87 (1.54, 2.18)	0.01 (–0.34, 0.37)	1.87
1992-2005	0.04	0.76 (0.31, 1.18)	–1.52 (–2.19, –0.75)	2.28
Change	–1.00	–1.11	–1.53	0.41

NOTE: The 90 percent coverage intervals are in parentheses.

There are not nearly as many different measures of economic activity at the regional level as there are at the national level, so I am limited in the series that I can use. An alternative to the IIP is the regional coincident indicator (CI) produced by the Cabinet Office, which combines six series—the IIP, wholesale electricity consumption, construction starts, sales at large retailers, the ratio of job offers to applicants, and overtime working hours—into one. I use the IIP instead of the CI because the IIP has been used previously to examine the timing of regional business cycles and its success at the national level in timing recessions has already been established.[6]

My first step is to use the Hamilton model and the Japanese IIP to obtain a description of the national business cycle. The first purpose of this exercise is to demonstrate the effect that accounting for the early-1990s structural break has on the model. The second purpose is to show that the national IIP is useful for mimicking the ESRI recession dates, as shown previously by Watanabe and Uchiyama (2005). The third purpose is to provide recession dates from the national IIP for comparison with the recession dates that I obtain using regional data.

THE NATIONAL BUSINESS CYCLE

Recall that, according to the Hamilton model, the average growth rate is the average of the recession and expansion growth rates, weighted by the frequencies of the two business cycle phases. The model provides estimates of the average growth rates in each of the two phases and, for each observation, the probability that the economy is in the recession phase.

For the time being, assume, as in Okumura and Tanizaki (2004), that there were no structural breaks in the aggregate IIP growth series. When the model is applied to the data, for which the average growth rate is 0.57 percent, the estimated average growth rate in expansion is 1.11 percent, while the estimated average growth rate in recession is –1.23 percent (see Table 1).[7] Figure 1 illustrates the actual growth rate series relative to the estimated average growth rates for the two phases. In determining the probability of recession, the model considers the proximity of the actual growth rate to the two average growth rates, while also considering the persistence of the relative proximity.

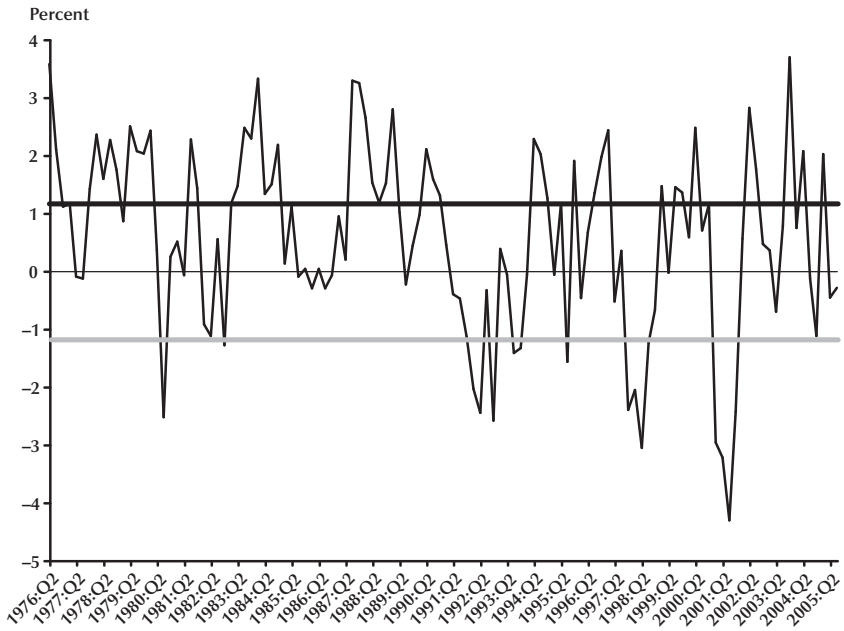
The probability of recession is provided by Figure 2, for which the shaded area indicates periods of national ESRI recessions. When the probability of recession rises and falls rapidly as the economy switches in and out of recession, the model is able to cleanly separate the data into

[6] Preliminary analysis indicates that, at least for the post-1990 period, the CI is not on the whole superior to the IIP in detecting regional business cycles. For some regions, the CI is much less responsive to the business cycle than is the IIP, while for other regions it is somewhat more responsive. The main difference in results between the two series is that use of the CI results in fewer region-level recessions. There are also differences in the timing of recessions, most notably for the Kanto region, although a comparison is difficult because the regions are defined differently in the two series.

[7] Growth rate estimates are the means of their respective posterior distributions.

Figure 1

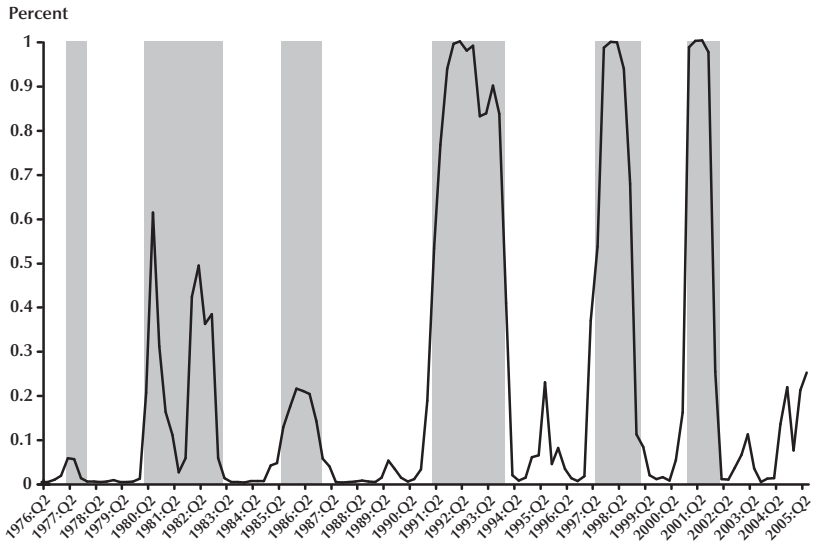
Growth of IIP: Japan, No Structural Break



NOTE: Thick black line is expansion growth rate; thick gray line is recession growth rate.

Figure 2

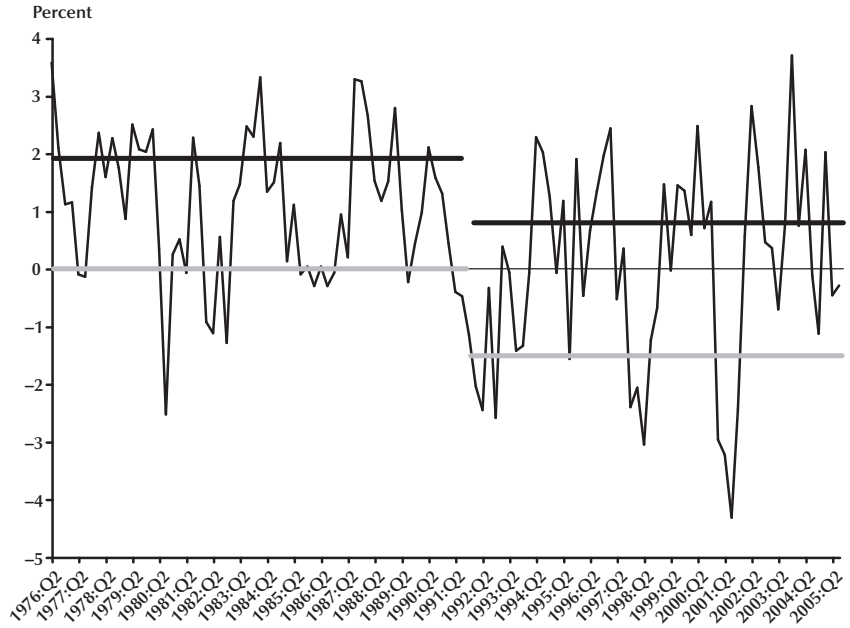
Probability of Japanese Recession, No Structural Break



NOTE: Shaded areas indicate ESRI recessions: 1977:Q2–1977:Q4, 1980:Q2–1983:Q1, 1985:Q3–1986:Q4, 1991:Q2–1993:Q4, 1997:Q3–1999:Q1, 2001:Q1–2002:Q1. IIP recessions: 1980:Q3, 1991:Q2–1993:Q4, 1997:Q3–1998:Q4, 2001:Q1–2001:Q4.

Figure 3

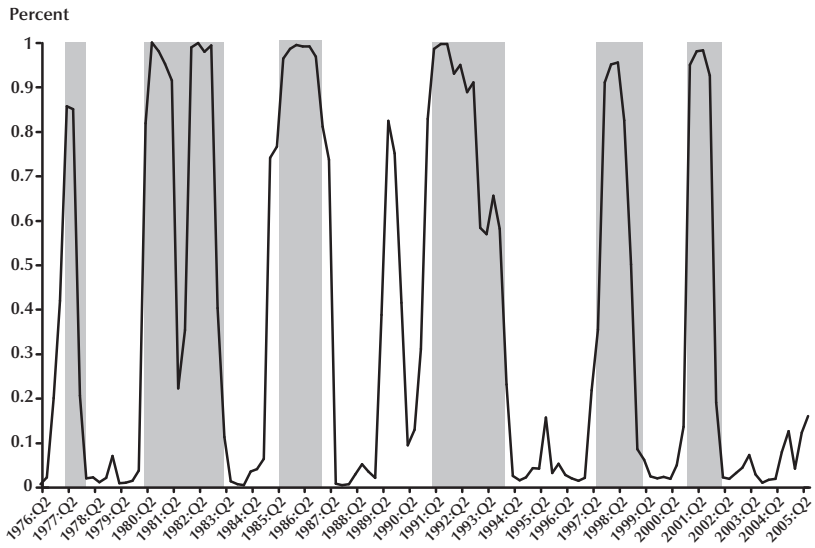
Growth of IIP: Japan, with Structural Break



NOTE: Thick black line is expansion growth rate; thick gray line is recession growth rate.

Figure 4

Probability of Japanese Recession, with Structural Break



NOTE: Shaded areas indicate ESRI recessions: 1977:Q2–1977:Q4, 1980:Q2–1983:Q1, 1985:Q3–1986:Q4, 1991:Q2–1993:Q4, 1997:Q3–1999:Q1, 2001:Q1–2002:Q1. IIP recessions: 1977:Q2–1977:Q3, 1980:Q2–1981:Q2, 1982:Q1–1982:Q4, 1985:Q1–1987:Q2, 1989:Q3–1989:Q4, 1991:Q1–1993:Q4, 1997:Q4–1998:Q3, 2001:Q1–2001:Q4.

recession and expansion phases. This occurs only for the post-1990 period, for which the recession probability approaches 1 during each of the three ESRI recessions and is close to 0 during the ESRI expansion periods. On the other hand, for the pre-1990 period, the probability of recession exceeds 0.5 (the traditional cutoff for recession) for only one quarter in 1980, even though there were three ESRI recessions during the period.

A visual examination of Figure 1 reveals the reason that the model "misses" the pre-1990 recessions. Most obviously, the growth troughs that the economy experienced before 1990 tended to occur at higher growth rates than did those after 1990. In addition, the earlier period's growth peaks were more persistently higher than were those for the later period. In other words, the economy experienced a structural break sometime around 1990 following the bursting of the so-called bubble economy. The break included a change in the average growth rates for the two phases. When no such break is allowed for, the troughs of the 1980s are given a low probability of recession because the determination of the recession growth rate is dominated by the post-1990s data.

To account for this break, I split the sample using the January 1992 break found by Watanabe and Uchiyama (2005) and apply the model independently to the two time periods.[8] The effects of the break are illustrated by Figures 3 and 4. Notice first that the actual average growth rate was much lower in the post-break period, falling by a full percentage point, from 1.04 percent to 0.04 percent (see Table 1). Also, the estimated average growth rates for both phases are lower for the post-break period. The expansion growth rate fell by 1.11 percentage points, while the recession growth rate fell by 1.53 percentage points. Thus, the gap between expansion and recession was larger after the break.

As Figure 4 shows, the occurrence of recession and expansion is much clearer when the break is allowed for. The IIP recessions are fairly closely in line with the ESRI recessions, although there are interesting differences. According to the IIP, there was a brief expansion in 1981 between two recessions, but the ESRI determined that there was one long recession. Also, according to the IIP, there was a brief recession in 1989 that was not indicated by the ESRI. This anomalous recession was detected also by Watanabe and Uchiyama, although it was absent when they used a composite index instead of the IIP. It is possible that the recession is an artifact of the statistical uncertainty surrounding the exact break date, which Watanabe and Uchiyama place in April 1989 using their composite index.

Comparing the IIP recessions with those of the ESRI, there are relatively small differences in the timing of the switches between phases. Because the differences are typically only of one quarter, one can conclude that the model applied to the IIP provides a reasonably good approximation of ESRI recessions. On this basis, I use regional IIPs to examine regional recession and expansion phases.

REGIONAL BUSINESS CYCLES

The results from applying the model to regional IIP growth for pre- and post-break data are summarized in Table 2. As with the aggregate data, I apply the model to the data for each region for each time period: 1976:Q1–1991:Q4 and 1992:Q1–2005:Q3. The table includes the actual average growth rates, the estimated expansion and recession growth rates, the gaps between expansion and recession, and the changes wrought by the break. This information is illustrated by Figure 5, which provides for each region the plots of regional IIP growth and the two phase-specific growth rates for each period.

In terms of average growth, there were three groups of regions during the pre-break period: high growth (Tohoku, Kanto, and Chubu), medium growth (Kinki, Chugoku, and Kyushu), and low growth (Hokkaido and Shikoku). There are some

[8] Note that I do not test for statistical importance of the breaks that I have assumed for the aggregate IIP, nor do I do so for the regional IIPs that I use in the next section. Because I have imposed two breaks, one in 1976 and one in 1992, a minimally meaningful analysis would test for both of these breaks simultaneously. A serious analysis would allow for the two possible breaks to differ in timing across regions. Such an analysis, however, deserves a paper of its own and is beyond the objective of this paper.

Table 2

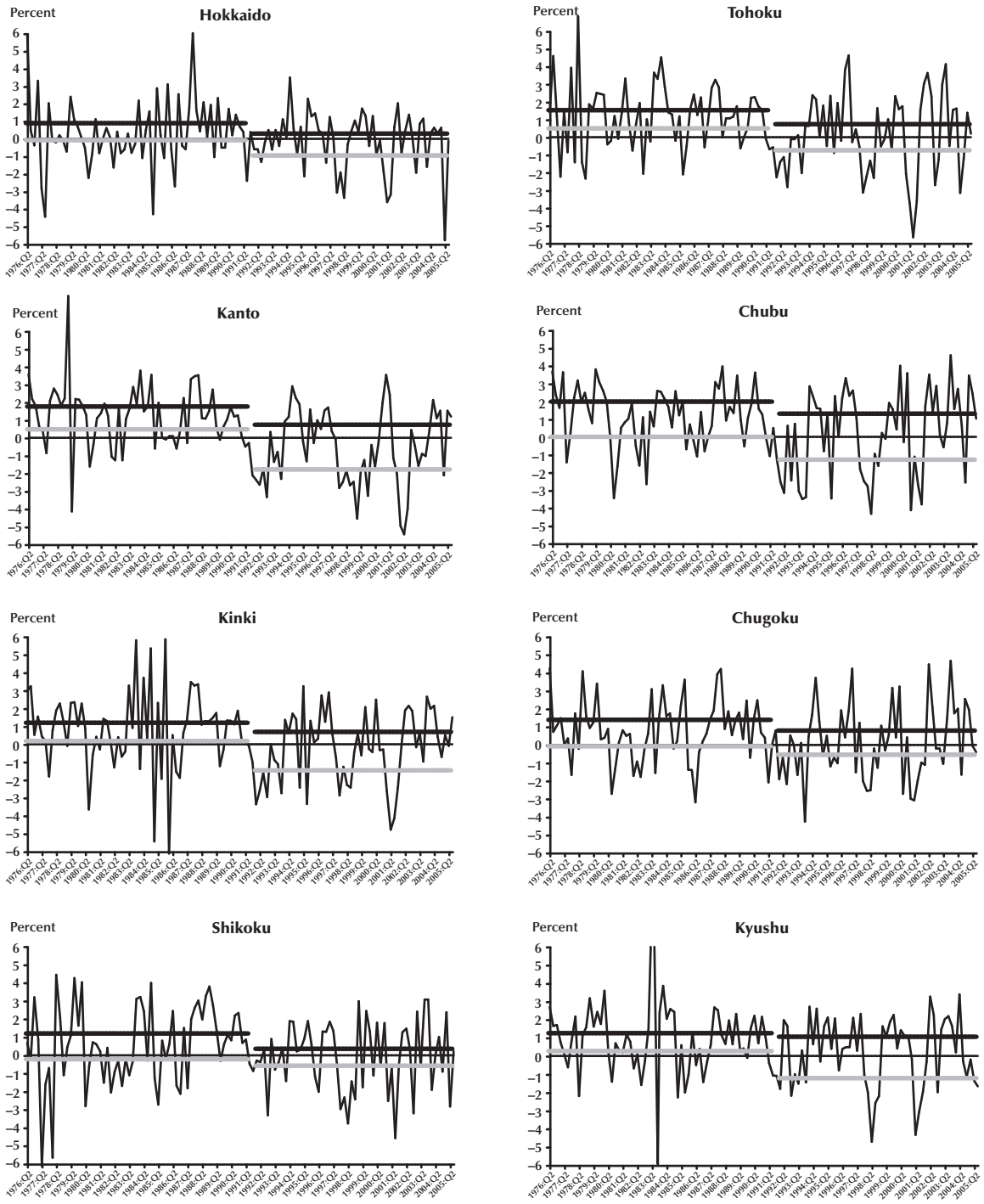
Quarterly Growth Rates of IIP: Japanese Regions

	Actual average growth rate	Estimated average growth rate in expansion	Estimated average growth rate in recession	Expansion—recession
Hokkaido				
1976-1991	0.33	0.82 (0.10, 2.23)	–0.14 (–1.00, 0.48)	0.97
1992-2005	–0.15	0.23 (–0.31, 0.80)	–1.03 (–2.35, –0.09)	1.25
Change	–0.48	–0.60	–0.88	0.28
Tohoku				
1976-1991	1.17	1.47 (0.88, 2.47)	0.43 (–0.66, 1.21)	1.04
1992-2005	0.09	0.67 (–0.09, 1.57)	–0.81 (–1.83, 0.13)	1.48
Change	–1.08	–0.80	–1.24	0.44
Kanto				
1976-1991	1.17	1.69 (0.98, 2.72)	0.41 (–0.57, 1.14)	1.28
1992-2005	–0.60	0.66 (0.01, 1.27)	–1.85 (–2.44, –1.24)	2.51
Change	–1.77	–1.03	–2.26	1.23
Chubu				
1976-1991	1.13	1.92 (1.37, 2.39)	–0.08 (–0.65, 0.57)	2.00
1992-2005	0.21	1.23 (0.25, 1.92)	–1.35 (–2.27, –0.08)	2.58
Change	–0.92	–0.68	–1.27	0.59
Kinki				
1976-1991	0.80	1.12 (0.50, 2.00)	0.10 (–0.96, 0.87)	1.02
1992-2005	–0.20	0.61 (–0.05, 1.15)	–1.55 (–2.30, –0.54)	2.16
Change	–1.00	–0.51	–1.65	1.14
Chugoku				
1976-1991	0.76	1.32 (0.68, 2.02)	–0.15 (–0.94, 0.65)	1.47
1992-2005	0.12	0.71 (–0.08, 1.75)	–0.63 (–1.46, 0.15)	1.34
Change	–0.64	–0.60	–0.48	–0.12
Shikoku				
1976-1991	0.53	1.12 (0.34, 2.08)	–0.30 (–1.24, 0.52)	1.43
1992-2005	–0.08	0.29 (–0.31, 1.05)	–0.67 (–1.64, 0.08)	0.95
Change	–0.61	–0.84	–0.36	–0.47
Kyushu				
1976-1991	0.85	1.18 (0.52, 2.26)	0.19 (–0.84, 0.95)	0.99
1992-2005	0.20	0.99 (0.35, 1.53)	–1.29 (–2.03, –0.23)	2.28
Change	–0.65	–0.19	–1.48	1.29

NOTE: The 90 percent coverage intervals are in parentheses. Numbers may not add up because of rounding.

Figure 5

Actual and Average IIP Growth Rates: Regions, with Structural Break



NOTE: Thick black lines are average expansion growth rates; thick gray lines are average recession growth rates.

deviations from this grouping when growth is separated into expansion and recession growth rates. For expansion growth rates, the grouping of regions is similar to that above, although Shikoku is in the medium-growth group, and perhaps Chubu can be placed into a very-high-growth group of its own. Recessions during the period were very mild for all regions. In fact, the recession growth rates for Tohoku, Kanto, Kinki, and Kyushu were all positive, with Tohoku and Kanto being the best recessionary performers. The gaps between expansion and recession were not very large for most regions, with Chubu as the notable exception. As a consequence, for some regions it is difficult to separate quarters into particular phases.

The effect of the break on the regions was similar to the effect it had at the national level: lower average growth, lower growth in both expansion and recession, and larger gaps between expansion and recession growth rates. The only exceptions were Chugoku and Shikoku, which saw their gaps between expansion and recession shrink. There was a good deal of variation, however, in the sizes of these changes across regions.

Four regions (Hokkaido, Kanto, Kinki, and Shikoku) had negative average growth rates during the post-break period. For Kanto, in particular, this was a dramatic change from the earlier period in that this represented a decrease in average growth of 1.77 percentage points. Large decreases in average growth (near or above a percentage point) also occurred for Tohoku, Chubu, and Kinki. Even when regions were in expansion, growth was sluggish, with Chubu and Kyushu as the high performers during expansion. Recession hit all regions hard, with five regions experiencing growth of worse than –1.0 percent per quarter. This represented large changes for Kanto and Kinki: Both had positive recession growth rates in the pre-break period that fell by 2.26 percentage points and 1.65 percentage points, respectively.

Although both expansion and recession growth rates fell across the board, it was typical for recession growth rates to fall by more, thereby increasing the gap between the two phases. This means that for most regions, the incidence of expansion and recession was much easier to determine during the post-break period. This is apparent from Figure 6, which presents the recession probabilities for the eight regions for the entire sample period.

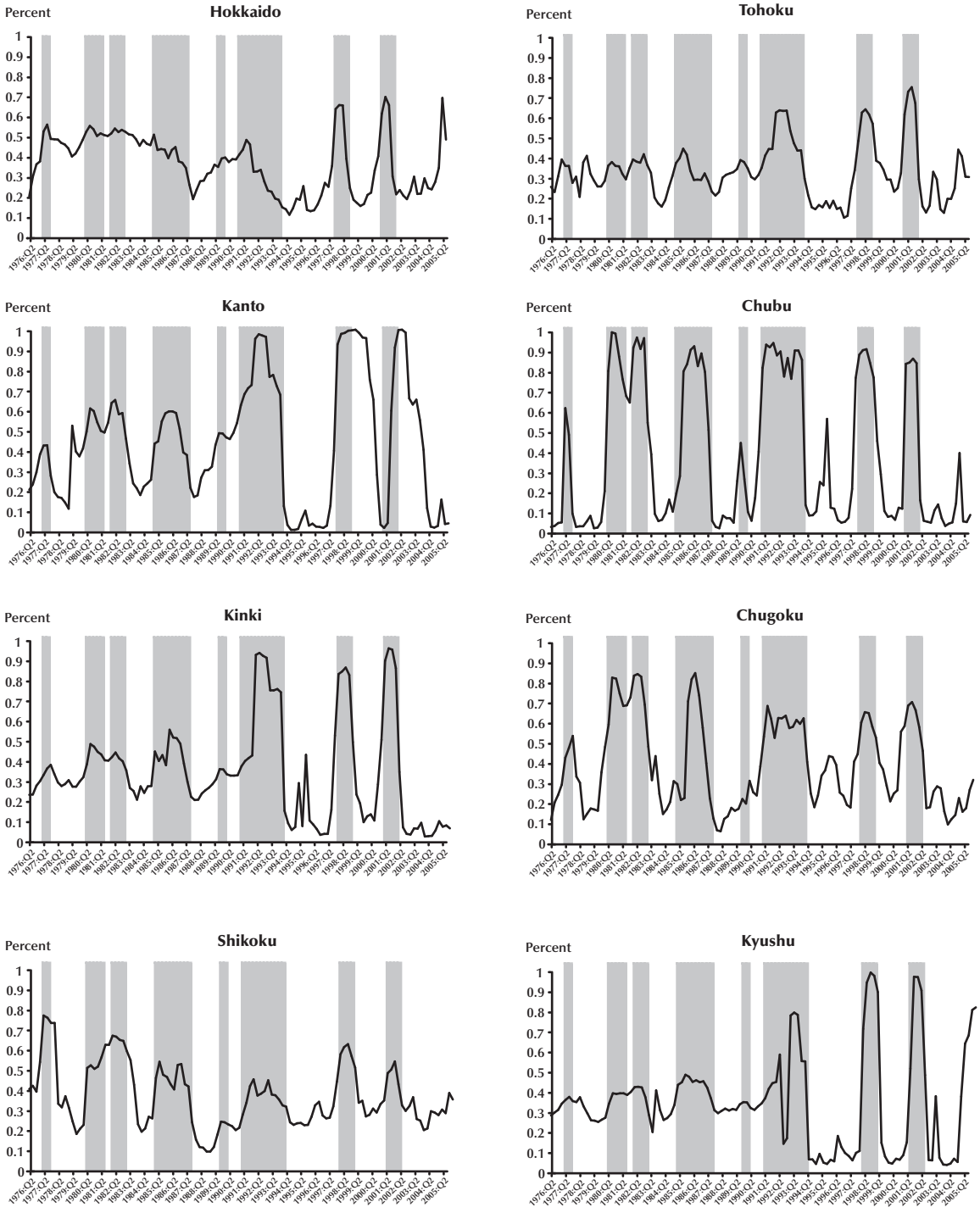
Except for Chubu, Chugoku, and Shikoku, there are marked differences in the clarity of the business cycle between the pre- and post-break periods. For Chubu, the distinction between phases is clear for both periods, while it is not terribly clear in either period for Chugoku and Shikoku. For the other five regions, the post-break period provides very clear distinctions between phases, as indicated by rapid changes in the probability of recession at turning points, and regional recessions were widespread during the period. On the other hand, the pre-break picture is more muddied.

Although changes in economic conditions are usually apparent through changes in the probability of regional recession, the probabilities of recession typically do not become close to zero in expansion nor close to one in recession. Even so, there are enough instances for which the probability of recession crosses the 0.5 threshold to indicate that regional recessions were quite common in the 1980s. Admittedly, for some regions, the simple application of the arbitrary 0.5 threshold gives the misleading impression that there is a clear delineation between recession and expansion phases. Nevertheless, even for these regions, the implication of Figure 6 is very different from the findings of Okumura and Tanizaki (2004), who found that the probability of recession usually remained very close to zero for several regions for the entire post-1976 period. Here, at least, the regional probabilities of recession usually do fluctuate in tandem with the national business cycle.

Figure 7 summarizes the occurrence of regional recessions over the entire sample period. In the figure, a "■" indicates that a region was in recession during the quarter, while the shaded areas indicate periods of national recession as determined above (using the national IIP). As shown in the figure, most regions experienced three or four recessions during the pre-break era, although Tohoku and Kyushu experienced none. This is in contrast with the findings of Okumura and Tanizaki (2004), who found regional reces-

Figure 6

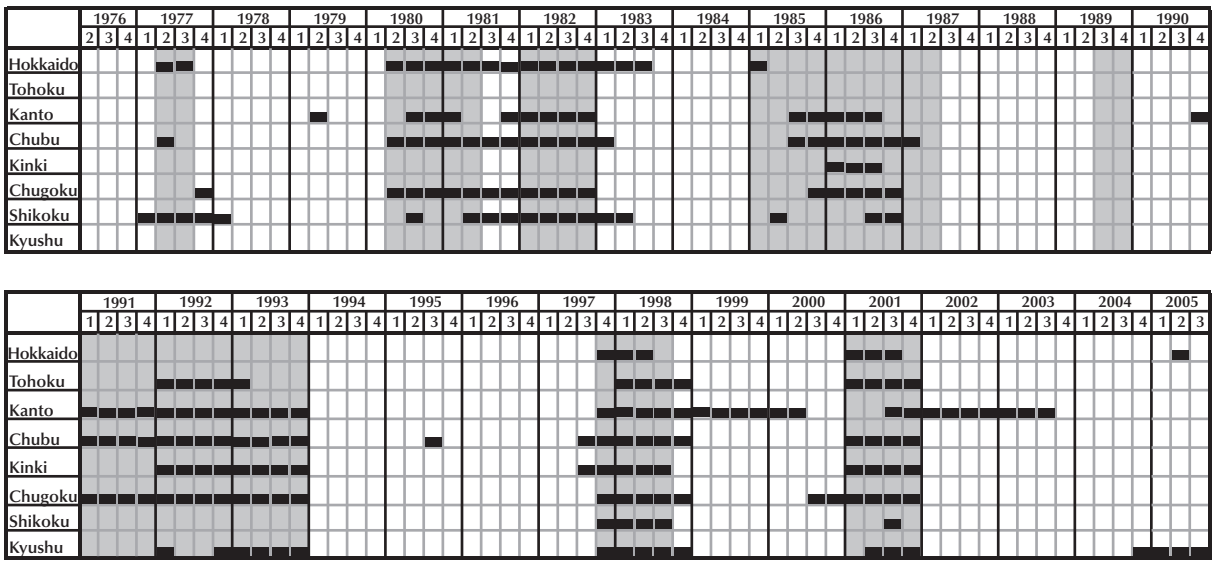
Regional Recession Probabilities



NOTE: Shaded areas indicate national IIP recessions.

Figure 7

Regional Recessions



NOTE: Shaded areas indicate national IIP recessions. A "■" indicates a quarter during which a region was in recession.

sions to be rare during the period. Also in contrast with Okumura and Tanizaki, Figure 7 shows that nearly every region experienced every recession during the post-break period, with the exceptions being Hokkaido and Shikoku, which did not experience the 1991-93 recession. I attribute the difference between my results and those of Okumura and Tanizaki to the fact that I allowed for a structural break while they assumed that a single model applied to the entire sample period.

Although there were interesting differences in the occurrence of regional recessions, for the most part, regional recessions were associated with national recessions. I find that only four regions went into recession around the period of the 1977 national recession, although the briefness of the recession and the relative noisiness of region-level data might make it too difficult for the model to pick up any regional recessions. Recall that the years of 1980-82 saw two recessions according to the IIP, although there was one long recession according the ESRI. I find that five regions went into recession during the period; two of them had two separate recessions, while the others had one long recession. The three regions for which the model does not indicate recession during 1980-82 did experience slowdowns, but the slowdowns did not reach the level of recession.

The purpose of this paper is to document, rather than to explain, differences in regional business cycle phases in Japan. Nevertheless, it is possible to suggest some reasons for the differences in regional business cycle performance. For example, industry composition probably matters a great deal. Most obviously, the recession pattern for Kanto is driven by its relatively high reliance on the financial sector; the region kept expanding through the nationwide recession of 2001 as equity markets rose, only to enter into its own nine-quarter recession following the financial market collapse in the summer of 2001. Also, Chubu's very clear recession and expansion pattern is probably due in large part to the heavy presence of auto manufacturers, whose fortunes are closely linked to the overall business cycle.

Differences in policy effectiveness across regions and over time may also explain some of the findings. As has been documented for the United States by Carlino and DeFina (1998) and Owyang and Wall (2006), among others, monetary policy can have very different effects across regions within a country, perhaps because of differences in the channels of monetary policy and/or industrial composition. Fujiki (2006) provides several examples of Japanese regional heterogeneity that matter for monetary policy. Regional differences might also be the result of the heavy use of fiscal policy in Japan to dampen the business cycle. A great deal of the fiscal policy stimulus was directed at infrastructure and construction projects, which might have had disproportionate effects in some regions.

Finally, changes in the effectiveness of monetary and fiscal policy over time probably contributed to the increasingly widespread nature of Japanese recessions. By the mid- and late 1990s, it was becoming increasingly difficult for the central government to maintain the costs of huge infrastructure projects meant to boost aggregate demand. At the same time, the Bank of Japan was finding it increasingly difficult to use its policy levers to stimulate the economy and head off deflation.

CONCORDANCE

Although regions have tended to experience recessions that were associated with national recessions, regional recessions have differed from the nation's and from each other in length and timing. Harding and Pagan (2002) measure the degree to which two business cycles are in sync by their degree of concordance—defined as the proportion of time that the two economies were in the same regime. Expressed in probabilities, the degree of concordance between two business cycles is

$$C_{ij} = \frac{1}{T}\sum_{t=1}^{T}\left[P_{it}P_{jt} + \left(1 - P_{it}\right)\left(1 - P_{jt}\right)\right], \quad (2)$$

where P_{it} is the probability of recession in i during time t and T is the total number of periods. The set of region-Japan and region-region degrees of concordance are in Table 3 and are for the entire sample, the pre-break period, and the post-break period.

For the entire sample period, the business cycles of the regions were relatively in sync with the national business cycle, although only Chubu, with a degree of concordance of 0.79, stands out as having been highly synchronous. Similarly, although the regional business cycles were related to each other, the degrees of concordance do not stand out as being particularly high.

Note, however, the differences before and after the break. All but one of the post-break degrees of concordance between the regions and Japan are higher, and some are much higher. Chubu, Kinki, and Kyushu, for example, all had degrees of concordance of 0.75 or greater for the post-break period. For Kinki and Kyushu, this represents increases of 0.22 and 0.19, respectively, relative to the pre-break period. The region-region degrees of concordance also tended to be higher for the post-break period. In particular, Kinki and Kyushu both became much more in sync with other regions.

SENSITIVITY TO BREAK DATE

As discussed above, the significant differences between my results and those of Okumura and Tanizaki (2004) are due primarily to my allowances for structural breaks. My sample begins with 1976 so as to avoid the break that Uchiyama and Watanabe (2004) found for 1975, while I simply impose the 1992 break date of Watanabe and Uchiyama (2005). Other options include: beginning my sample later, perhaps in 1980, as did Watanabe and Uchiyama; or choosing a 1989 break date to coincide with the break in the coincident indicators found by Uchiyama and Watanabe (2004) and Watanabe and Uchiyama (2005). In this section, I discuss briefly how the choices of break dates affected my results. Specifically, I discuss the effects of starting my sample in 1980 and of allowing for a break in 1989.

The results for the aggregate data depend very little on the choice of 1976 or 1980 as a starting point. The general pattern of recession changes

Table 3

Business Cycle Concordance

	Hokkaido	Tohoku	Kanto	Chubu	Kinki	Chugoku	Shikoku	Kyushu
1976-2005								
Japan	0.59	0.62	0.63	0.79	0.68	0.66	0.61	0.65
Hokkaido		0.57	0.52	0.58	0.58	0.56	0.56	0.58
Tohoku			0.57	0.61	0.61	0.57	0.57	0.61
Kanto				0.63	0.59	0.57	0.55	0.56
Chubu					0.67	0.66	0.60	0.63
Kinki						0.61	0.58	0.63
Chugoku							0.58	0.58
Shikoku								0.58
1976-1991								
Japan	0.54	0.56	0.62	0.78	0.58	0.66	0.60	0.56
Hokkaido		0.53	0.52	0.54	0.53	0.54	0.54	0.53
Tohoku			0.55	0.57	0.57	0.56	0.56	0.57
Kanto				0.62	0.55	0.58	0.54	0.54
Chubu					0.58	0.67	0.60	0.57
Kinki						0.57	0.56	0.56
Chugoku							0.58	0.56
Shikoku								0.55
1992-2005								
Japan	0.66	0.69	0.65	0.79	0.80	0.66	0.63	0.75
Hokkaido		0.60	0.52	0.61	0.63	0.58	0.60	0.64
Tohoku			0.59	0.66	0.67	0.59	0.59	0.65
Kanto				0.64	0.64	0.56	0.55	0.59
Chubu					0.77	0.64	0.60	0.71
Kinki						0.65	0.61	0.71
Chugoku							0.57	0.61
Shikoku								0.61

only marginally, and the anomalous 1989 recession arises in either case. In addition, my general conclusions about the prevalence of regional recessions during the pre-break period are the same, although the region-level results differ somewhat. For example, if I had used 1980 as my starting point, the probability of recession for Hokkaido would have been lower throughout the period. As a consequence, Hokkaido would have not been in recession at any time during the 1980s, while my results indicate long recessionary periods. On the other hand, although my results indicate that Tohoku avoided recession throughout the 1980s, if I had used 1980 as my starting point, the results would have had Tohoku in recession frequently during the period. Finally, a 1980 starting point would have put Shikoku into recession more often than what I found with my sample.

Of course, the structural break following the burst of the so-called bubble economy did not occur dramatically from one quarter to the next. If, instead of a 1992 break date, I had imposed a 1989 break date, there would only have been marginal differences in my results. The most signifi-

cant difference would have been that the model would not have indicated the anomalous national recession of 1989. Also, it would have produced closer fits for the starts of the 1991-93 recession for several regions (Kanto, Kinki, and Kyushu). Finally, it would have meant that no recessions would have been indicated for Kinki in the 1980s.

Taken together, the most important consequences of my handling of the structural breaks were at the regional level. The fact that regions are affected differently by the timings of structural breaks suggests that future research might take into account the possibility of region-specific breaks occurring at different times around the occurrence of an aggregate break.[9]

CONCLUDING REMARKS

In this paper, I applied a Markov-switching model with a structural break to Japanese IIP data for 1976-2005. The purpose of the exercise was to determine and compare the national and regional patterns of recession and expansion phases. The methodological contributions of the paper relative to previous analyses of the Japanese business cycle are (i) the addition of five recent years of data and (ii) the allowance for structural breaks in the mid-1970s and the early 1990s.

The early-1990s structural break meant a reduction in national and regional growth rates in both expansion and recession, usually resulting in an increase in the gap between the growth rates of the two phases. Also, there were interesting differences in the occurrence of recession across regions. For example, although recessions tended to be experienced across a majority of regions in both the pre- and post-break periods, the occurrence and lengths of recessions were much greater after the break. In addition, the region-level recession experiences became much more similar over time, especially during the post-break period.

[9] In fact, there might even be regional structural breaks that are unassociated with an aggregate break, a possibility that was suggested to me by Mahito Uchida for Tohoku in the mid-1990s.

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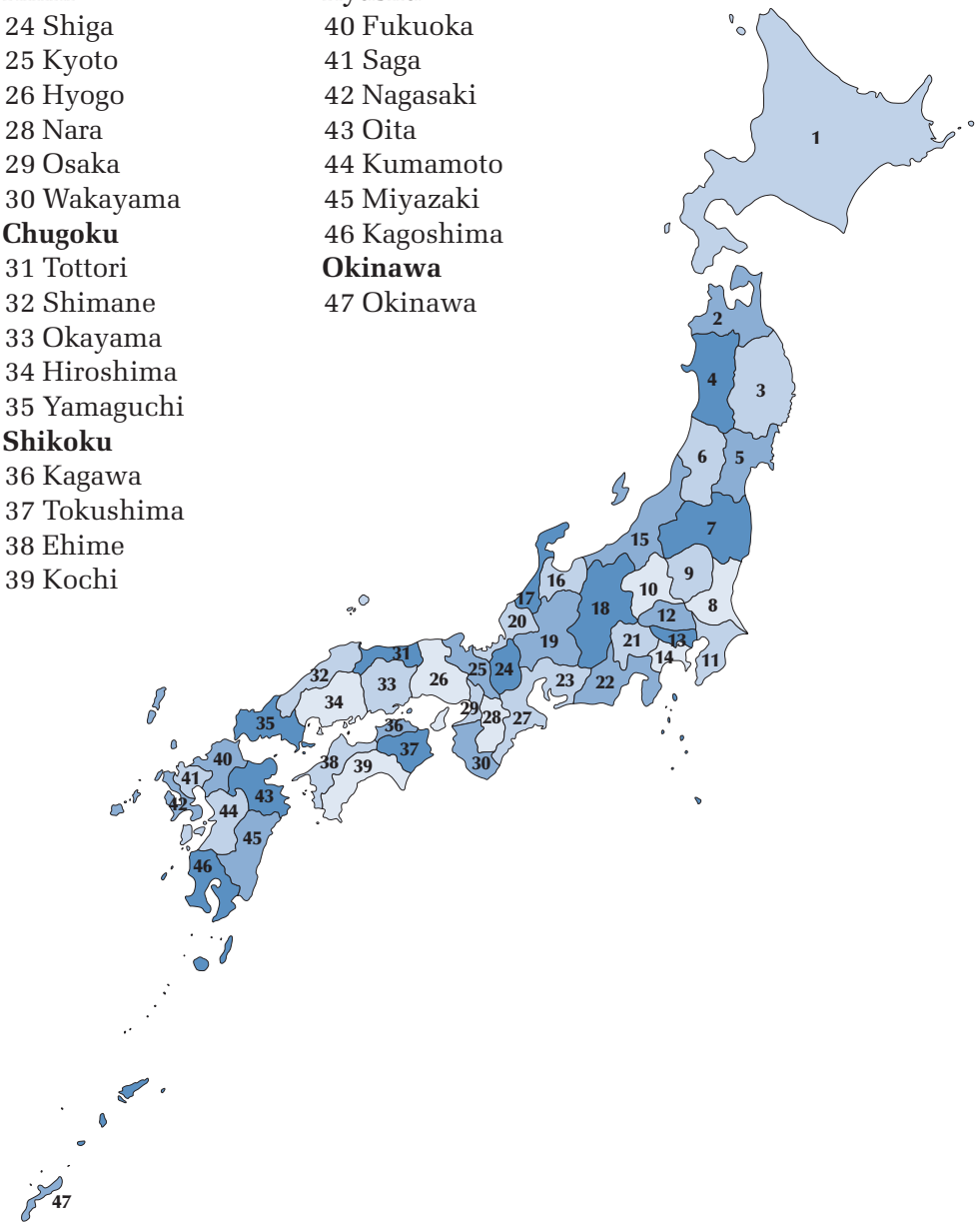
APPENDIX

Japanese IIP Regions and Their Prefectures

Hokkaido
1 Hokkaido
Tohoku
2 Aomori
3 Iwate
4 Akita
5 Miyagi
6 Yamagata
7 Fukushima
Kanto
8 Ibaraki
9 Tochigi
10 Gumma
11 Chiba
12 Saitama
13 Tokyo
14 Kanagawa
15 Niigata
18 Nagano
21 Yamanashi
22 Shizuoka
Chubu
16 Toyama
17 Ishikawa
19 Gifu
20 Fukui
23 Aichi
27 Mie

Kinki
24 Shiga
25 Kyoto
26 Hyogo
28 Nara
29 Osaka
30 Wakayama
Chugoku
31 Tottori
32 Shimane
33 Okayama
34 Hiroshima
35 Yamaguchi
Shikoku
36 Kagawa
37 Tokushima
38 Ehime
39 Kochi

Kyushu
40 Fukuoka
41 Saga
42 Nagasaki
43 Oita
44 Kumamoto
45 Miyazaki
46 Kagoshima
Okinawa
47 Okinawa



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