1. Introduction

> I want to talk for a few minutes with the people of the United States about banking -- to talk with the comparatively few who understand the mechanics of banking, but more particularly with the overwhelming majority of you who use banks for the making of deposits and the drawing of checks. Franklin Roosevelt, first fireside chat, March 12, 1933.

> I am by no means an alarmist. I believe that our system, though curious and peculiar, may be worked safely; but if we wish so to work it, we must study it. We must not think we have an easy task when we have a difficult task, or that we are living in a natural state when we are living in an artificial one. Money will not manage itself, and Lombard Street has a great deal of money to manage. Walter Bagehot, Lombard Street: A Description of the Money Market (1877).

When the Panic of 2007 broke out in August of that year, I was in a unique position to observe the events. For 25 years, my academic career, in the Federal Reserve System, at the Wharton School of the University of Pennsylvania, and at Yale School of Management, focused on banking, financial crises and banking panics. My 1983 PhD dissertation was on the subject of banking panics. One paper from my thesis was the first (and as far as I know the only) econometric study of panics to this day. But, starting in 1996, I also consulted for AIG Financial Products, where I worked on structured credit, credit derivatives, and commodity futures. During the panic, AIG became a focal point of anger because of its sheer size and the extent of the resources needed to maintain the company as a going concern.

When I wrote my PhD thesis in the early 1980s about banking panics, I never dreamed that I would live through one. Who could possibly have imagined what would transpire. The lived experience of the current banking panic would be surreal if it were not so tragic. Certainly the events are confusing, and the reality of what happened is hard to accept. But, what exactly did happen? How could it happen? Answering these questions is important because the narrative of what happened provides a framework for new regulations, laws, and policies, one that are relevant and effective.[1] Central bank lender-of-last-resort policies in the future need a record of what happened in the Panic of 2007. As A. Piatt Andrew argued a century ago, about the Panic of 1907: "The unique dimensions of the recent panic among the experiences of the present generation render important the preservation for future study of all records concerning its phenomena" (1908A, p. 291).[2] In this book I attempt to explain what happened. I do this from the viewpoint that the details matter, the details about certain financial markets and the certain financial products need to be understood. Although I recognize that such details are probably rather boring for most people, I argue that understanding the details of how the actual securities, structures, and markets involved are designed and intertwined is essential for addressing the most important questions. Without the details, explanations are invariably simplistic and superficial, though they may be politically expedient.

Besides articulating the details of what happened, I also view American financial and banking history as important to provide context. Crises do not just happen. Financial crises have been the norm in U.S. financial history. As I will argue, in the U.S. the period from 1934-2007 was special compared to the previous banking history. The earlier history has been forgotten, except for the Great Depression, and for many even that is a dim memory. Even professional

economists tend to focus on the post-World War II era, and on the stock market. But the earlier history offers important clues about how to think about what a "systemic event" is and to what happened in the current crisis. Indeed, another way to pose the question of "what happed?" is to ask: why was it a systemic event? Like many terms, this one has lost any precise meaning and has come to signify "bad financial events." It is important to recover some precision about this because its meaning is so closely linked to lender-of-last-resort policies, that is, what the central bank does in a financial crisis.

The modern financial system is complex, but still it is surprising that it has been so difficult to figure out what happened. One reason may well be that the events themselves were largely invisible to all but the participants in certain financial markets. I hope to convince you that the Panic of 2007 is not so different from, for example, the Panic of 1907 or that of 1893. But, there is one big difference; the earlier panics were visible to all. In the Panic of 2007, most people had never heard of the markets that were involved, didn't know how they worked or what their purposes were. Terms like subprime mortgage, asset-backed commercial paper conduit, structured investment vehicle, credit derivative, securitization, or repo market, were meaningless words. These markets were obscure and esoteric for most, including economists. In the earlier panic episodes not only could everyone see the runs on banks, most likely participated, rushing to their bank to withdraw their money.

[insert Illustration 1.1 about here]

In the earlier panics, individuals, fearing for their savings, and not knowing if their bank would survive the recession that was coming, rushed to their banks to withdraw their money. Such a

run on the bank would occur at all banks, usually starting in New York City and spreading from there. Everyone knew that the panic had happened, and then consequences would follow; firms would fail and there would be difficulties making transactions.

The visibility of earlier panics did not make the event itself explicable, but it did provide clarity about what had happened in a direct sense. In the Panic of 2007 the "bank run" was invisible to almost everyone because it was a run by banks and firms on other banks. These interbank markets are the markets that were invisible to the public, journalists, and politicians. Without observing the bank run, what became visible were only the effects of the run and, in many cases, the effects were mistaken for the cause. Without the details of what happened, new policies may end up addressing effects rather than the cause.

If we think about a 19th century bank run, like the one on the Seaman's Savings Bank in 1857, shown above, we can get a sense of the problem. When everyone runs to their banks and demands to withdraw cash from their banks, then it is not possible for the banking system to meet these demands. The money has been lent out and banks do not hold enough cash (which does not earn a return). The banking system is insolvent because it cannot meet the contractual demands of the depositors, that is, banks just cannot pay back all the cash that depositors want. Because the banks have lent the money out there is easy way to get it back. All the banks cannot sell their loans—the assets of the banking system are simply too large for anyone to buy. This is what makes a banking panic a systemic event. One bank could possibly sell its loans and pay off its depositors. But, when all banks have to sell loans, there are no other banks to buy the loans.

Banks understood that panics were systemic events. Trying to sell the loans of the bank system would be a disaster, so banks, as a group, would suspend convertibility. In other words, they

would refuse to give back the cash to their depositors. This saved the bank system from destruction, since with suspension of convertibility banks would then not have to sell their loans. But, when suspension happened bank checks were no longer accepted at store and to meet payrolls. There was a "currency famine," the term that contemporary observers coined to describe a situation where there is no transaction medium to use to buy goods or pay employees. Bank checks were no longer acceptable and cash was hoarded. The inability to transact was a big problem, as you might imagine.

So, what caused people to run to their banks and demand their cash? People were rational but lacked some important information. As I documented in my thesis (see Gorton (1988)), people learned that a recession was coming, and if they learned that the recession was going to be particularly bad, then they would panic. "Panic" meaning that they would want to protect their savings, so that they would have the money during the recession. If you become unemployed, for example, you would spend your savings. Withdrawing from the bank was rational because the bank might fail during the recession. You could lose all your savings in that event. The problem was that no one outside the banking system knew which banks were the weak banks, which banks were riskier. Even other banks might not have known. Without knowing which specific banks were the riskiest, depositors were cautious and withdrew their cash from all banks. But, the banks did not fail because convertibility was suspended. Over time the panic subsided and convertibility would resume. In the Panic of 2007, this concern about bank risk will be described as "counterparty risk."

Now comes a crucial issue, which will reappear later in the Panic of 2007 aftermath. One way of addressing the depositors' information problem, that they lacked precise bank-specific information, would be to try to provide that information. The viewpoint of modern finance

theory would argue that there is a lack of market discipline, and information is needed. For example, the government could dictate that bank information be disclosed. But, that was already happening during the 19th century and there will still panics. And, there is another problem. Bank deposits are not like stocks (equities) because checks are used for transactions. Imagine trying to buy things with shares of stock. Go to the store and imagine paying with ABC Company shares. The question would first arise of what the stock was worth on that day and time. Second, the question could arise of whether one party to the transaction had secret information about ABC Company, information unknown to the other party. It would be difficult to transact with stock. Perhaps the stock is actually worth more than the value of the goods you are buying. Transactions are best conducted with some security that has a known value, easy to determine, and immune to gaming by one side of the transaction. In particular, a security where no one can profitably find secret information, so they don't bother trying. Securities like demand deposits are *informationally-insensitive*, while securities like equities are *informationally-sensitive*.

The idea of deposit insurance, passed in the U.S. in 1934, is that bank runs and the currency famine would not arise if people never had to worry about their money in their banks. Government deposit insurance made checks completely informationally-insensitive. If there is no uncertainty about the value because of the government guarantee, then no one would ever run on banks and banking crises would be a thing of the past. And that is what happened until 2007.

The alternative policy that could have been adopted in 1934 would have been one that was aimed at more transparency about bank balance sheets, so that depositors would know which banks were weakest. The government could have decided that efficient markets would work if checks were more informationally-sensitive. Then, when depositors learned that a recession was coming, they would –in theory -- only run on the weakest banks. This is the idea of "market

discipline," that is, that depositors with precise information would accurately run only on the weakest on banks and leave the other banks alone. The experience of the 19th century suggests that the needed precision for such transparency was not possible. Not only are today's banks much more complicated and opaque, but the problem of transacting with stock-like securities would be present. Informationally-sensitive securities are not good for transacting. Speculators would have an incentive to produce secret information and trade on this information. This is what made the Free Banking Era in the U.S. problematic. During that period, 1837-1862, banks issued private (paper) money (there was no government money). So, imagine a person carrying money issued by a bank in New Haven, Connecticut goes to visit Boston. This person's New Haven Savings Bank ten dollar bill would not be worth ten dollars in Boston, but would be discounted.[3] The discount changed so store owners had to determine the market value of the money, which they did by referring to newspapers that printed the local prices. Transacting with such private money was similar to what it would be like to transact with stock.

Today, it seems clear that deposit insurance was overall a good idea, rather than the alternative of using informationally-sensitive securities to transact. Today, deposit insurance is not as controversial as it was when it was proposed in the 1930s.[4] In fact, it is astounding that deposit insurance passed. At the time, for example, Senator Robert Bulkley (D, Ohio) said of deposit insurance: "Such a guarantee as that would indeed have put a premium on bad banking. Such a guarantee as that would have made the Government pay substantially all losses which had been accumulated, whether by misfortune, by unwise judgment, or by sheer recklessness, and it might well have brought an intolerable burden upon the Federal Treasury."[5] The arguments of opponents and proponents were moralistic. Opposition came largely from bankers who were blamed for the Great Depression and vilified. Opponents included the Roosevelt Administration,

segments of the banking industry and from some members of Congress. The issues were framed in terms of the small naive depositors against the sophisticated bankers. See Flood (1992) and FDIC (1998).

The events of 2007 are essentially a repeat of the problem of the 19th century bank runs, only in 2007 some firms ran on other firms. What has become known as the "shadow banking system" is, in fact, genuine banking, and it turns out, was vulnerable to the same kind of bank runs as in previous U.S. history. While the details are provided later, here is a short summary. Where do firms and institutional investors save their money when they do not want to make long-term investments? In other words, what is the counterpart of a checking account for firms? There are no insured deposit accounts large enough for these depositors. But, they have large amounts of money that they would like to deposit safely and with easy access, like a checking account. Over the last 25 years a number of forces led to a banking solution. The solution is banking, but does it does not happen is the familiar form of a depository institution.

Firms "deposit" in the sale and repurchase market (the "repo") market, a short-term market for firms, banks, and institutional investors. Here's how it works. Imagine a large institutional investor wants to save $500 million dollars short-term. The investor wants to earn some interest, wants the money to be safe (no risk) and wants to have access to the money easily. One thing this investor could do would be to buy U.S. Treasury bonds. But, there are many demands for U.S. Treasury bonds. Not only do foreign governments and foreign investors want to invest in U.S. Treasury bonds, but there are many domestic demands for these bonds. As discussed later, the demands for this type of (informationally-insensitive) bond are enormous. U.S. Treasury bonds are used as collateral for derivatives positions and in clearing systems.[6] There is a shortage of such collateral. So, our institutional investor may well engage in the following transaction. The

$500 million is “deposited” overnight with a bank (investment bank or commercial bank, foreign or domestic). The institutional investor will receive bonds (not necessarily government bonds) with a market value of $500 million, in other words, he receives collateral. In the panic, the collateral most likely will be securitization-related bonds. That is, bonds that represent claims on the portfolios of loans held by special legal entities, which only hold that portfolio – all of which will be discussed later. The institutional investor will earn interest on the deposit. The bonds have to be given back when the institutional investor withdraws his money by not renewing (not “rolling”) the transaction. Note that the firm receiving the deposit of $500 million has just financed the bonds that were given as collateral.

This transaction has some notable features. It resembles checking in that it is short-term, often overnight; it is backed by the collateral; and the bond received as collateral can be “spent,” that is, it can be used as collateral in some other transaction that the institutional investor may undertake. And that party can pass it on, as well. This process of re-using the collateral repeatedly is called “rehypothecation.”[7] In short, repo is banking. You can see why the Federal Reserve System counted these transactions as “money” when they computed a measure of money called M3, now discontinued.[8]

The problem that will arise, in part, concerns the demands for collateral and the private sector’s response to this, by producing and supplying collateral. Simply put, there is a shortage of informationally-insensitive collateral that can be used in repo. For various reasons, to be discussed later, the financing of bank loans began to move out of the regulated bank sector into capital markets. There were many important forces leading to the evolution of the banking system, but related to this, the private sector began to produce bonds that could be used as collateral in repo.

You can see the possibility of a panic, it could occur if the depositors in the repo market decide not to renew (roll) their deposits and withdraw instead. Once a panic occurs things get complicated fast. Transactions, or liquidity, are best accomplished with informationally-insensitive securities, like demand deposits or repo with collateral. These markets are defined by the fact that no one does due diligence on the credit risk precisely because they have confidence in the value of the securities and because they are sure the other side does not know more than they do about the security's value. Common knowledge that this is the case is called "confidence in the system." No one needs to know the details of the securities precisely because they don't matter.

It's a bit like electricity. When you wake up in the morning, you put your lights on. And when you leave for work, you turn them off. Return from work, turn them on; go to sleep, turn them off. You don't need to know anything about electricity for this system to work. In fact, the idea is that you shouldn't have to know; you don't need to be an electrician. But, if it happens that there is a black-out in which the whole electrical grid breaks down (this came close to happening in August 2003), then there is a problem. No one saw what happened to the grid and many people do not actually know what "electricity" is. For the consumers of electricity, thinking about electricity for the first time, it seems incredibly complicated. And it is. Of course, the solution is not for everyone to become an electrician, rather it is to restore the credibility of the system so that no one has to think about electricity.

Once the Panic of 2007 happened, the complexity was slowly revealed. Once in the panic, when we start to probe into the underlying chains of securities and structures, the complexity can be dizzying. But, that is not the point. It is not that financial wizards have created some complex house of cards, anymore than the electrical grid is one. That complexity is what confronted

market participants when securities that they took as informationally-insensitive became informationally-sensitive due to the panic. Again, think of a 19th century panic. Suppose there had not been suspension of convertibility and all the banks tried to sell their loans. Potential buyers do not know anything about the loans or the borrowers. Even at very low prices no one may want to buy the loans. The complexity of loan terms and information about borrowers would overwhelm the potential buyers of the loans. But, no one other than banks needed to know all this in the 19th century, even when there was a panic. That was why banks suspended convertibility. Similarly, the repo markets involve counterparties and complex structured bonds. Much of that was designed to be informationally-insensitive, but the design is very complicated.

How the repo market is related to the subprime housing market, and how that led to a panic in the modern wholesale banking (repo) market, is what this book is about. The book is based on three papers, two were written during the crisis for two Federal Reserve System conferences, and the third paper was written in the early 1990s. The third paper expresses concerns about the shadow banking system, although it had not yet developed fully. Still, the problems were already apparent. For the most part little about the papers has been changed or rewritten. Each is a document of its moment.

The papers are presented in reverse chronological order. The oldest paper, Chapter 5, published in 1994, was written over 15 years ago when it was clear to me that what is now called the "shadow banking system" had developed and was presenting serious issues with regard to bank regulation. It seemed to me clear then that the evolution of the banking system was challenging the regulatory paradigm of bank regulation. My academic work described these changes – loan sales, securitization, and the rise of derivatives.

The second paper was written for the Federal Reserve Bank of Kansas City's Jackson Hole Conference in August 2008. I was commissioned to write this paper some months prior to the conference. The crisis was full blown at the time of the writing, having started in August 2007. By late 2007 it was clear that the crisis was going to lead to a recession or depression. When I started writing in 2008, I wanted to write down everything I knew that I thought was relevant to understanding the complexity of the financial nexus that was the panic. I also wanted to convey a sense of financial history, that panics are not events that are completely unfamiliar – we have been through this before. I viewed writing this paper as producing a record for posterity. When I was writing my PhD thesis I read many old academic articles about the earlier panics in U.S. history. Many of these were written by the eminent economists of that age, and a lot of what they wrote was narrative. O.M.W. Sprague, one of the most famous of these, wrote the classic History of Crises under the National Banking System. Sprague was the first chaired professor at Harvard Business School. Another famous chronicler of panics was Alexander Dana Noyes, a reporter and editor.[9] There are many more that could be mentioned.[10] Fifty to one hundred years later I found their articles very enlightening and I set out to write a paper that someone could read in one hundred years and get a sense of the events of August 2007 to August 2008. Here, this paper has been split into two parts, Chapters 3 and 4.

The Jackson Hole Conference, where this paper was delivered, is attended by invitation only and the attendees consist of central bankers, bank regulators, economists from banks and academia, some members of the financial press, and bankers from the private sector. It is usually about monetary policy and topics that might impact central banks' policies.[11] I had never been to this conference before, presumably because my academic research is not on monetary policy. For the last 30 years, academic research related to central banks has concentrated almost exclusively on

monetary policy, that is, on interest rates and inflation. The lender-of-last-resort role of central banks has not really been a focus.

The conference itself was somewhat strange in a number of respects. It seemed to me that it had an undercurrent of anxiety but this appeared to me to be unspoken. On the one hand, participants did not act like we were in the middle of a terrible crisis that seemed out of control and not understood. On the other hand, the speed with which existing paradigms in economics were dropped as if they had never existed was breath-taking. In an instant Keynesianism was revived and the lender-of-last-resort was the focus of central bank policy. By the time of the conference, central bankers had a narrative for the crisis, the so-called "originate-to-distribute" story, which argued that securitization per se was bad because incentives were not aligned.[12] It is interesting that central bankers as a group all used this catch phrase, and I wondered how they had coordinated this. No serious evidence was offered for this viewpoint, and my paper critiqued it (see Chapter 4). As the crisis progressed, central bankers dropped this narrative and unfortunately they did not offer another, more accurate narrative, to explain what had happened. In that sense Jackson Hole did not produce any clarity. (In that regard, my paper did not help either.) Soon, the dominant narrative became that of the press and the politicians, in which the crisis was due to a "reckless few" who "gamed the system" and got big bonuses. The lack of visibility of the core aspect of the crisis, the run in the repo market that I will shortly describe, allowed this to happen, and so we were plunged into dangerous demagoguery. Academics later were also not able to articulate a credible narrative for what happened and tended to speak in vague generalities.

After the Jackson Hole Conference of August 2008 things did not get better. Lehman failed on September 15, 2008. Sometime thereafter I agreed to write another paper, this time for a

conference sponsored by the Federal Reserve Bank of Atlanta to take place in May 2009 on Jekyll Island, Georgia, the place where the idea for the Federal Reserve System was originally hatched in 1910 by, among a few others, Senator Nelson Aldrich, the above-mentioned A. Piatt Andrew, and J.P. Morgan and Company partner Henry Davidson. By the time of the writing of this new paper I had reflected more on what had happened and this paper tries to convey the overall picture in a clearer way, along the lines I summarized above. The clarity is no doubt due partly to work had started with academic co-authors, Tri Vi Dang, Bengt Holmström, and Andrew Metrick; the ideas from this joint work influenced my thinking.

The Jekyll Island paper also has a slightly different tone than the Jackson Hole paper. By the time of the Jekyll Island conference in May 2009, the crisis had been going on for almost two years and momentous events had occurred. The atmosphere of the Jekyll Island Conference was almost one of fatigue. There was no end in sight. Fed Chairman Ben Bernanke who had spoken at Jackson Hole about the Fed's response to the crisis, spoke again.[13] At Jekyll Island Bernanke spoke about the bank stress tests which the Fed and other regulators had recently conducted, very impressively and in a short amount of time.[14]

I have tried to preserve the feeling of the historical moment in which each of my papers was written by not re-writing them to unify the style and feel. Quite the opposite, while I have tried not to be repetitious, there is overlap, some of which I have not eliminated. For example, I did not change the opening to the Jackson Hole paper, where I tried to convey some of the raw fear that was felt on trading floors in August 2007, and the subsequent realization of what was happening.

I have included the third paper specifically to indicate that the dangers associated with the rise of the shadow banking system did not appear suddenly. They were visible a long time ago, but they were simply not noticed. I thought there was a problem, as I indicate in Chapter 5 (the third paper). The chapter title is the original title of the paper "Bank Regulation when 'Banks' and 'Banking' are Not the Same." It seemed clear then (the paper was published in 1994 and written earlier) that changes in banking were presenting dangerous challenges to the bank regulatory system. The focus of the paper is on how banks can be effectively regulated.

One issue discussed in "Bank Regulation when 'Banks' and 'Banking' are Not the Same" bears highlighting. In a capitalist system firms ultimately face competition and the owners of capital make decisions about how to allocate their capital. Regulations that are inconsistent with that competition result in exit from the industry. For example, capital requirements that are too high, in the absence of any countervailing benefit, will result in exit. As I discuss (in two different chapters), the countervailing benefit historically was a valuable bank charter, which limited entry into banking and gave banks monopoly profits in exchange for abiding by regulations. If the charter becomes less valuable, there is an incentive to exit, via securitization for example. This is the tension between a capitalist system and the need for regulation. It is fine balance, which if not finely tuned can result in problems. While this paper was written over fifteen years ago, prior to credit derivatives for example, this tension was very present as the shadow banking system was emerging. It is even more pressing now. The period from 1934- 2007, which I subsequently call the "Quiet Period" in U.S. banking history was a period where this balance was achieved. Retuning the system depends on the narrative of the crisis, which sets the framework for new regulations. There is a lot at stake.

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[1] One need only recall the narrative that was put forth to justify invading Iraq to understand the importance of a narrative for policy.

[2] Abram Piatt Andrew (1873-June 1936) was a Harvard professor and later Assistant Secretary of the Treasury. He wrote frequently about panics.

[3] I studied the Free Banking Era (see Gorton (1996, 1999)). While private money markets were efficient, in the sense that the discount from par (that is, a ten dollar bill issued by a new Haven bank might be worth only $9.80 in Boston) did reflect the transportation costs of going from

Boston to New Haven, it was still hard to transact. There was widespread problem of "wildcat banking" as has often been alleged.

[4] In their monumental Monetary History of the United States, 1867-1960 (1971), Milton Friedman and Anna Schwartz wrote that: "Federal insurance of bank deposits was the most important structural change to result from the 1933 panic, and, indeed, in our view, the structural change most conducive to monetary stability since state bank notes were taxed out of existence after the Civil War" (p. 434).

[5] Address to the U.S. Chamber of Commerce, May 4, 1933. Quoted by Senator Murphy (D-Iowa) in the Congressional Record (1933), p. 3008; and quoted by Flood (1992).

[6] "Clearing" refers to the institutional process of changing ownership of a security in exchange for cash.

[7] "Hypothecation" means the pledging of securities to secure a loan. Rehypothecation is not permitted in some jurisdictions, but it common in the United States.

[8] M3 also included institutional money market mutual funds, large-denomination certificates of deposit and Eurodollars. M3 has been discontinued, as of March 23, 2006, because it "does not appear to convey any additional information about economic activity that is not already embodied in M2" (see http://www.federalreserve.gov/Releases/h6/discm3.htm).

[9] Noyes wrote books and article about banking and finance. See his memoir The Market Place: Reminiscences of a Financial Editor (Little, Brown and Company; 1938).

[10] Edwin W. Kemmerer, an economist at Princeton, is another important writer on panics and banking, as well as an important figure in the founding of the Federal Reserve System.

[11] See http://www.kc.frb.org/home/subwebnav.cfm?level=3&theID=10979&SubWeb=10660 .

[12] A firm be financed by issuing securities that are claims on the general credit of the corporation, that is, they are backed by the assets of the company, or the firm can finance itself by segregating specified cash flows and selling claims specifically linked to these specified cash flows. The latter strategy is accomplished by setting up another company, called a Special Purpose Vehicle (SPV) or Special Purpose Entity (SPE), and then selling the specified cash flows to this company; the SPV in turn issues securities into the capital market to finance the purchase of the cash flows from the company (called the "sponsor"). The sponsor services the cash flows, that is, makes sure that the cash flows are arriving, etc. The SPV is not an operating company in the usual sense. It is more of a robot company in that it is a set of rules. It has no employees or physical location. As we will see, an SPV has some special properties that make it different in other ways as well. The latter process is called *securitization*.

[13] See http://www.kc.frb.org/home/subwebnav.cfm?level=3&theID=10976&SubWeb=10660 for Bernanke's Jackson Hole speech.

[14] See http://www.kc.frb.org/home/subwebnav.cfm?level=3&theID=10976&SubWeb=10660 for Bernanke's Jekyll Island speech.