

**A NEW HISTORY OF BANKING PANICS IN THE UNITED STATES, 1825-1929:  
CONSTRUCTION AND IMPLICATIONS\***

By

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**Abstract**

There are two major problems in identifying the output effects of banking panics of the pre-Great Depression era. First, it is not clear when panics occurred because prior panic series—lists of when panics occurred—combine panics with other developments in financial markets, fail to distinguish among different types of financial panics, and employ unreliable strategies to identify panics. Second, establishing the direction of causality is tricky: are panics causing downturns or are downturns causing panics? This paper addresses these two problems (1) by deriving a new panic series for the 1825-1929 period—one that rectifies many of the problems of earlier series—and (2) by studying the output effects of major banking panics via both narrative and VAR-based methods. My paper derives four major empirical findings: (1) major banking panics have large and strongly negative effects on both output and prices, (2) panics were a substantial source of economic instability prior to the founding of the Federal Reserve, (3) on average, downturns with major banking panics were more severe than downturns without them and output recoveries were longer for downturns with major banking panics than output recoveries for downturns without them and (4) panics can have persistent level and trend effects. Moreover, using my new series, I find that much of the conventional wisdom on the causes, effects and frequency of panics of the pre-Great Depression era was based on unreliable evidence—and in particular, on biased and inconsistent panic series.

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The general absence of banking panics in the United States since the Great Depression means that there are few modern day equivalents to the banking crisis of 2008. Indeed, as the crisis was unfolding, there was a growing sense that the developing recession might more closely resemble the downturns of the 19<sup>th</sup> and early 20<sup>th</sup> centuries that accompanied banking crises than the recessions of the postwar period. As Paul Krugman speculated, “this may be your great-great-grandfather’s recession.”<sup>1</sup>

Surprisingly, the effects of financial panics of this era are not very well understood. Economists have recently arrived at contradictory conclusions. DeLong and Summers (1986), in studying the period 1890-1910, do not find a link between panics and real recessions, leading them to conclude that “the effects of financial panic upon the rest of the real economy are smaller than is usually realized.”<sup>2</sup> By contrast, over roughly the same period, Miron (1986) finds a clear correlation between panics and downturns. However, even with this finding, Miron cautions that his results do not prove that panics have real output effects since “panics might be the result of negative output shocks”<sup>3</sup> rather than direct causes of downturns.

The inconclusive nature of this debate reflects the two major problems in identifying the effects of financial panics of the pre-Great Depression era. First, it is not clear when panics occurred because prior panic series—lists of when panics occurred—differ in their identification of panic episodes. Some series document panics occurring at a rate of more than one per year, whereas other series identify recurring periods of ten to twenty years without a panic. Indeed, DeLong and Summers (1986) and Miron (1986) arrive at contradictory conclusions because they rely on different panic series to identify when panics occurred.

Second, even if the timing of when panics occurred is consistent with panics having real output effects, establishing the direction of causality is inherently difficult. Are panics causing downturns or are downturns causing panics? There are two schools of thought. According to one view, panics are shocks to the real economy that cause downturns, but according to the alternate view, panics are consequences of

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<sup>1</sup> Krugman, Paul. “Who’ll Stop the Pain?” *New York Times*. Feb 19, 2009.

<sup>2</sup> Page 689.

<sup>3</sup> Page 137.

major recessions. Under this latter specification, even if a correlation between downturns and panics exists, it would be misleading to attribute output declines to panics since panics would be products of downturns rather than causes.

This paper seeks to identify the macroeconomic effects of a main class of financial panics of the pre-Great Depression era: banking panics. It accomplishes this by addressing these two major problems. To address the first problem, this paper derives a new series on banking panics for the pre-Great Depression era. To address the second problem, this paper studies the output effects of major banking panics via both narrative and VAR-based methods. In the process, I find that much of the conventional wisdom on the causes, effects and frequency of panics of the pre-Great Depression era was based on unreliable evidence—and in particular, on biased and inconsistent panic series.

Section 1 begins by asking: when did the financial panics of the pre-Great Depression era occur? I show that—perhaps, somewhat surprisingly—answering this question is not a straightforward task. I document eight leading panic series—the (1) Bordo-Wheelock, (2) Thorp, (3) Reinhart-Rogoff, (4) Gorton, (5) Sprague, (6) Wicker, (7) Kemmerer, and (8) DeLong-Summers series—and demonstrate that each of these series would arrive at a different answer to this question. Indeed, these series differ dramatically in their identification of panic episodes. Some series—such as the Kemmerer and DeLong-Summers series—document panics occurring at a rate of roughly one per year, whereas other series—such as the Thorp and Wicker series—identify recurring periods of ten to twenty years without a panic.

Why do these series differ so dramatically? By describing each of the panic series on a case-by-case basis, I show that methodological problems behind the development of earlier series are the likely source of these extreme variations. Specifically, I find two common problems. First, many series do not explicitly define a panic, making it unclear exactly what kind of financial disturbance is being recorded. Second, most series do not adopt a systematic rule to identify panics, raising the possibility that some panic episodes might be omitted or that non-panic episodes might be mistakenly classified as panics.

Due to the numerous contradictions across these series and in light of these methodological concerns, Section 2 derives a new panic series for the 1825-1929 period—one that rectifies many of the

problems of earlier series. I begin by providing a definition of financial panic—one that distinguishes among different types of financial panics. I define a financial panic as occurring when there is a widespread rush by private agents to liquidate assets, e.g., deposits in the banking sector (a banking panic), stocks in equity markets (a stock market panic), or currency in foreign exchange markets (a currency panic). In developing the new series, however, I restrict attention to one key type of financial panic of this era: banking panics.

To identify banking panics, I adopt a systematic rule to search through more than one hundred years of contemporary financial and economic newspapers. The press of the pre-Great Depression era devoted substantial resources to covering banking panics and regularly reported incidents of bank runs, suspensions and failures. Moreover, the newspapers of that era contain detailed index pages that provide information regarding banking panics. Specifically, these index pages list reports of bank runs, suspensions, and failures and contain general entries for banking panics and financial crises. Therefore, a careful scanning of these index pages locates banking panics reported in these newspaper records. Section 2 outlines the algorithm I use to identify banking panics from these contemporaneous news reports and develops a consistent set of criteria for classifying banking panics as major or minor.

Section 3 presents the results of the new series and its implications. The new series on banking panics identifies seven major banking panics—1833, 1837, 1839, 1857, 1873, 1893, and 1907—as well as twenty minor banking panics between 1825 and 1929—thirteen of which are not listed in any of the earlier series.

Using my new series, I then assess the reliability of earlier series. By comparing my new series to earlier series and by reading contemporary news reports surrounding every panic episode on all eight series, I find that earlier series have some severe problems. Some series combined panics with other developments in financial markets. Others failed to distinguish among different types of financial panics. Indeed, several series lumped together different types of financial disturbances—banking panics, stock market disturbances, increases in interest rates—under the common heading of panic. Moreover, a few series even went so far as to incorrectly identify foreign banking panics as domestic ones.

Next, armed with the new series, I document the frequency of banking panics prior to the Great Depression. The orthodox view in the literature is that the frequency of financial panics was high before 1914 and that the frequency dramatically decreased between 1914 and 1929—that is, during the first fifteen years of the existence of the Federal Reserve. Using my new series, however, I show that contrary to the conventional wisdom, there is no evidence of a decline in the frequency of panics during the first fifteen years of the existence of the Federal Reserve. Why do my findings differ from those of the literature? As it turns out, prior studies used the Kemmerer series—a series that the analysis in this paper shows to be severely flawed—to document the pre-1914 frequency of panics, leading to spurious conclusions regarding the historical frequency of panics.

Equipped with the new panic series, section 4 presents the empirical test I conduct to identify the real output effects of major banking panics. I begin by documenting a correlation between major banking panics and downturns. However, the primary problem in identifying the output effects of banking panics is the possibility that panics might be consequences—rather than causes—of downturns. To address this concern, I study the output effects of major banking panics via both narrative and VAR-based methods.

The narrative test that I conduct is straightforward. I read the newspaper records surrounding every major banking panic between 1825 and 1929 to identify those panics that the reports of contemporary observers suggest were the result of idiosyncratic disturbances, as opposed to declining output conditions. I then use these episodes to empirically identify the output effects of panics. The test of whether panics have real output effects is simply to see if real economic activity declines following the outbreak of these panics.

Methodologically, this test is similar in approach to the work of Romer and Romer (1989, 2004) to identify the effects of monetary policy, Romer and Romer (2010) to identify the effects of changes in taxes, and Ramey and Shapiro (1998) and Ramey (2011) to identify the effects of changes in government spending. To deal with issues of reverse causality and anticipatory policy actions, Christina D. Romer and David H. Romer utilize narrative sources—the legislative record, minutes of Federal Open Market Committee meetings, presidential speeches, and policy statements—to identify policy actions that are

uncorrelated with other forces likely to affect output. Likewise, in their work, Valerie A. Ramey and Matthew D. Shapiro use news reports in *Business Week* and other sources to identify large military build-ups that occurred for reasons unrelated to the state of the U.S. economy. Because these changes in government spending were the result of forces independent of prospective macroeconomic developments, they can be used to estimate the effects of changes in government spending.

Similar to Ramey and Shapiro (1998) and Ramey (2011), the narrative sources used in this study are contemporary financial and economic news reports. Section 4.1 describes in greater detail how I use the reports of contemporary observers to separate banking panics that might have been caused by downturns from those that were the result of other disturbances. I then present the empirical findings of this test. I find that major banking panics have large and strongly significant effects on both output and prices. My results indicate that major banking panics cause declines of 9 to 13 percentage points in output growth in the year following a panic and declines of 11 to 13% in the price level within one year. The results are robust to a variety of specifications.

As a useful check on the findings from the narrative test, Section 4.2 presents the VAR-based results. The basic VAR that I estimate has two variables: a panic dummy series and output growth. The impulse response function implied by the VAR of the panic dummy series to an output shock is insignificant, indicating that the panics are unrelated to past output movements. By contrast, the impulse response function of output to a unit shock in the panic dummy is large, significant, and similar to the results from the narrative test. Thus, the findings from both the narrative approach and the VAR corroborate one another: they indicate that panics cause output declines.

Armed with a reliable listing of when panics occurred, Section 4.3 then investigates three related macroeconomic issues. First, I investigate whether banking panics were a significant source of output volatility prior to the founding of the Federal Reserve. I find that nearly half of all business cycle downturns between 1825 and 1914 contained major banking panics. If wartime cycles are excluded, then 58% of business cycle downturns contained major banking panics. According to the estimates I derive in sections 4.1 and 4.2, banking panics have large output effects. Thus, even if banking panics did not initiate

all of these downturns, they amplified them. These findings suggest that banking panics were a substantial source of economic instability throughout much of US history and that major banking panics either caused or amplified nearly half of all business cycle downturns between 1825 and 1914. These results contradict those of DeLong and Summers (1986), who argue—using their panic series—that financial panics were not a principal cause of economic instability before the Second World War.

Second, I examine how downturns with major banking panics differed from downturns without major banking panics. I find that in the post-Civil War era, downturns with major banking panics were slightly longer and substantially more severe than downturns without major banking panics on average, and that output recoveries for downturns with major banking panics were two-to-three times the length of output recoveries for downturns without them.

Third, I analyze the behavior of output in the aftermath of major banking panics. Following three of the four major banking panics of the post-Jacksonian period, output did not rapidly revert back to its pre-panic trend. Moreover, following two of these panics, trend output growth declined substantially. These results are consistent with the growing consensus in the literature that banking crises can have highly persistent and lingering effects on output. They also reveal that the sluggish output growth the U.S. economy has experienced in the aftermath of the Great Recession is consistent with the U.S. historical experience following major banking panics.

## **Part I. Prior Panic Series**

### **1.1. When did Financial Panics Occur?**

When did financial panics occur before the Great Depression? Surprisingly, answering this question is not a simple task. Table 1 presents eight different panic series: the (1) Bordo-Wheelock, (2) Thorp, (3) Reinhart-Rogoff (two versions), (4) Gorton, (5) Sprague, (6) Wicker, (7) Kemmerer, and (8) DeLong-

Summers series.<sup>4</sup> Each panic series comes from a different study and covers a different period, noted in the first and third rows of Table 1, respectively. A perusal of table 1 quickly reveals that there is substantial disagreement across these series regarding the timing, incidence, and frequency of panics throughout U.S. history. Each empty cell represents a panic noted in at least one series that is not contained in the series corresponding to that column.

Consider first the period between 1825 and the end of the Civil War. The three series that span the 1825-1864 period—the Thorp, Bordo-Wheelock, and Reinhart-Rogoff series—identify 1825 and 1857 as panics.<sup>5</sup> However, there is significant disagreement regarding other episodes. The Bordo-Wheelock and Thorp series identify 1833 as a panic, while both versions of the Reinhart-Rogoff series omit 1833. The Bordo-Wheelock and Thorp series identify 1837 and 1839 as two distinct panics, whereas one version of the Reinhart-Rogoff series combines the financial disturbances of the late 1830s into one panic, beginning in 1836, while the other version identifies a sole panic from March 1837 to 1838. The Thorp series identifies 1847 as a panic, whereas the other series do not identify 1847 as a panic. One version of the Reinhart-Rogoff series identifies December 1861 and April 1864 as banking crises, whereas the other series do not contain these episodes.

Similar discrepancies extend into the post-Civil War period. From 1864 to 1929, the eight series concur in classifying 1873, 1893 and 1907 as panics; however, they disagree on other episodes. Some series list 1884 and 1890 as panics, whereas other series either omit these episodes or classify them as incipient panics, financial distress, or financial stringency, as opposed to full-scale panics. Some series also identify panics in 1896 and 1914, whereas other series omit these episodes. The Kemmerer series identifies three additional major panics (Dec 1899, May 1901, and Mar-Aug 1903) and twenty-one minor

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<sup>4</sup> The series come from the following studies: (1) Bordo and Wheelock (1988), (2) Thorp (1926), (3) Reinhart and Rogoff (2008c), (4) Gorton (1988), (5) Sprague (1910), (6) Wicker (2000), (7) Kemmerer (1910), DeLong and Summers (1986). Reinhart and Rogoff (2008c) provide two versions of their panic series. They list one version in Table A3 and another version in Table A5. The two versions occasionally contradict one another. As a consequence, I provide both versions in Table 1.

<sup>5</sup> The Reinhart-Rogoff series uses the term crisis rather than panic.

panics—the vast majority of which are not noted in any of the other series. The DeLong-Summers series also contains additional panic episodes that are not noted in any of the earlier series.

## **1.2 Studies on the Output Effects and Causes of Panics Depend on the Panic Series**

An understanding of when panics occurred is critical to studies on the real output effects and causes of panics. Studies on the real output effects of panics depend on the panic series to identify the timing of panics in relation to changes in output. Studies on the causes of panics depend on the panic series to identify the timing of panics in relation to forces that may have increased the susceptibility of the financial system to a panic.

First, consider studies that examine the real output effects of panics of the pre-Federal Reserve era. In assessing the determinants of historical changes in business cycles, DeLong and Summers (1986) conclude that financial panics were not a principal source of economic instability in the prewar period. They compare the behavior of output surrounding their twelve panic periods with the behavior of output in non-panic periods from 1890-1910. They conclude that no more than a small portion of the variance in output from 1890-1910 can be attributed to these panics, and that as a consequence, panics did not have significant real output effects. DeLong and Summers write,

This suggests that financial and monetary shocks are less important sources of depression than we had suspected...Is there any way to rationalize the apparent lack of strong links between financial uproar and real recession? We believe that the conclusions of the exercise above are reasonable, because the effects of financial panic upon the rest of the real economy are smaller than is usually realized.<sup>6</sup>

On this basis, DeLong and Summers conclude that the real output effects of panics are small.

However, their results critically depend on their panic series. If the DeLong-Summers series accurately reflects the incidence of panics from 1890 to 1910, then their conclusion that there is not a strong link between financial panics and real downturns might be well supported. However, if their series mischaracterizes non-panic episodes as panics, then they would be attributing the behavior of output in non-panic episodes to the behavior of output in panic episodes, rendering their conclusions regarding the

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<sup>6</sup> Page 689.

output effects of panics spurious. That the DeLong-Summers series includes panics not noted in other series raises this concern.

By contrast, Miron (1986) comes to a different conclusion using the Kemmerer series of major panics for the 1890-1908 period—roughly the same period studied by DeLong and Summers. Miron notes that the average level of GNP growth almost doubles when panic years are excluded—a finding much more consistent with panics having real effects. Romer (1999), also using the Kemmerer series, reaches a similar conclusion, noting a strong correlation between recessions and panics. However, the Kemmerer series also includes many episodes not noted in other series, rendering its reliability questionable.

Studies on the causes of panics also depend on the panic series. Miron (1986) argues that seasonal monetary forces caused recurring panics prior to the founding of the Federal Reserve. Increased demand from the agricultural sector for currency and credit in the spring planting season and fall crop-moving season generated seasonal “stringencies” in the money market, forcing interest rates up and bank reserve-to-deposit ratios down. These forces weakened the nation’s banking system and caused a contraction in the money supply in the fall and spring, precisely when the demand for money increased—a phenomenon known as ‘the perverse elasticity’ of the money supply. Relying on the Kemmerer series to document the incidence of panics from 1890 to 1908, Miron argues that panics of the pre-Fed era had a tendency to recur during those seasons characterized by stringent monetary conditions: two-thirds of Kemmerer’s 21 panics of this period occurred during the fall or spring. Miron then claims that by contrast, no panics occurred between 1914 and 1929, the first fifteen years of the existence of the Federal Reserve. On this basis, Miron concludes both that the panics of the pre-Fed period were products of seasonal monetary forces and that the establishment by the Federal Reserve of an elastic currency—one that could expand and contract when needed—dramatically reduced the frequency of panics between 1914 and 1929. However, Miron’s conclusions—both in terms of the seasonality of panics prior to 1914 and the reduction in the frequency of panics between 1914 and 1929—hinge on the Kemmerer series.

### **1.3 Methodology Behind the Eight Panic Series**

Why do these panic series differ so dramatically? This section describes the methodologies behind each of the eight panic series on a case-by-case basis. I find that methodological problems behind the development of earlier series are the likely source of these extreme variations. Specifically, I find two common methodological problems. First, several series do not explicitly define a panic, making it unclear exactly what kind of financial disturbance is being recorded. Second, most series do not adopt a systematic rule to identify panics, raising the possibility that some important panic episodes might be omitted or that non-panic episodes might be mistakenly classified as panics.

### **Kemmerer**

Kemmerer (1910) identified financial panics by reading the *Commercial and Financial Chronicle*, the leading economic newspaper of the late 19<sup>th</sup> and early 20<sup>th</sup> centuries, from 1873 to 1908. He found eight major and twenty-one minor panics. However, he provided almost no explanation for his methodology. He did not provide a clearly defined criterion for selecting major and minor panic episodes, nor did he provide a definition of panic. For the major panics, he chose periods that were “financial disturbances”<sup>7</sup> without explaining what that term encompassed, and for minor panics, he did not provide any rationale for his selection process.

Moreover, when describing his panics, Kemmerer wrote, “the word panic has been used here to cover several financial disturbances for which many would not use so strong a word, i.e., the disturbances of 1884, 1890, 1899, and 1901.”<sup>8</sup> In this quote, he openly acknowledged that his decision to classify several of these episodes as panics was questionable. Furthermore, in a footnote, Kemmerer provided a cautionary message regarding the methodology he used to identify his minor panics, noting that such a list was created after “a rather hasty perusal of the [*Commercial and Financial*] *Chronicle*” and that “this list

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<sup>7</sup> Page 223.

<sup>8</sup> Page 223.

is probably not complete, and there may be room for doubt as to the inclusion of some of the dates mentioned.”<sup>9</sup>

### **Thorp**

Thorp (1924), in his classic work *Business Annals*, one of the early pioneering studies on the history of business cycles, identified twelve panics in his yearly headings of major economic events from 1790 to 1925. He assembled his list by reading newspapers; however, he failed to explain his rationale in identifying those twelve episodes as panics. He provided no explanation of his methodology, nor did he provide a definition of panic.

### **DeLong and Summers**

DeLong and Summers (1986) identified twelve panics from 1890 to 1910, with a panic being defined as a period when the average commercial paper rate increases by more than one percentage point from quarter-to-quarter or when banks stop paying deposits at par. Eight of these panics satisfy the first criterion, a quarter-to-quarter increase in the average commercial paper rate of more than one percentage point. They are 1890:4, 1893:2, 1893:3, 1896:1, 1896:3, 1898:2, 1899:4, and 1905:4. The remaining four episodes were, presumably, classified as panics on the basis of the second criterion. DeLong and Summers likely chose to classify panics accordingly because increases in the commercial paper rate suggest tight monetary conditions, while the cessation of paying out deposits at par indicates a degree of caution on the part of banking authorities. However, such conditions do not necessarily translate into bank failures, bank runs or stock market crashes, making it unclear whether the episodes identified by DeLong and Summers were in fact panics.

To illustrate this point, consider extending the DeLong-Summers series beyond the 1890-1910 period to the 1875-1889 and 1911-1983 periods on the basis of the first criterion, which identifies a panic by a quarter-to-quarter increase of one percentage point or more in the average commercial paper rate.

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<sup>9</sup> Page 223.

This methodology finds the following additional panics: 1875:4, 1876:4, 1877:3, 1878:4, 1881:1, 1886:4, 1887:3, 1889:4, 1914:3, 1931:4, 1958:4, 1973:2, 1974:2, 1974:3, 1978:4, 1979:4, 1980:1, and 1980:4. This list omits several of the banking panics of the Great Depression—the banking panic in the fall of 1930, the banking panic in the spring of 1931, and the banking panic of 1933—as well as the Stock Market Crash of 1929. By contrast, this list contains several episodes from the 1950s, 1970s, and early 1980s that are not generally regarded as panics. Given that a quarter-to-quarter increase of one percentage point or more in the average commercial paper rate fails to identify several of the major financial panics of the Great Depression, but does identify several dubious cases from the postwar period, it is unlikely that this criterion is an effective way to identify panics. Moreover, this criterion also would not have identified the panic of 1907.<sup>10</sup>

### **Sprague**

Sprague (1910) described five episodes of financial unrest during the National Banking era—three crises (1873, 1893, 1907), one panic (1884), and one episode of monetary stringency (1890). His classification suggests that he regarded the disturbances of 1884 and 1890 as of a different nature from the disturbances of 1873, 1893 and 1907, and yet he did not explicitly describe why he labeled each episode accordingly, nor did he provide a precise definition of crisis, panic or monetary stringency. In addition, Sprague did not provide an explanation of how he assembled his listing of panics.

### **Gorton**

Gorton (1988) identified a banking panic as occurring “when depositors demand such a large-scale transformation of deposits into currency that...the banking system can only respond by suspending convertibility of deposits into currency, issuing clearinghouse loan certificates, or both.”<sup>11</sup> Using this definition, Gorton found seven disturbances from 1863 to 1914 that fit this definition: suspension of

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<sup>10</sup> The commercial paper rate data come from Table 2 - Appendix B of Gordon (1986).

<sup>11</sup> Page 223.

convertibility occurred in five episodes (1873, 1890, 1893, 1907 and 1914) and the issuance of loan certificates occurred in six episodes (1873, 1884, 1890, 1893, 1907 and 1914). To this list, Gorton added 1896, writing that the issuance of Clearing House loan certificates was authorized even though none were actually issued. However, it is not clear how Gorton identified his panic observations nor whether he adopted a systematic methodology to identify panics.<sup>12</sup>

### **Reinhart and Rogoff**

Reinhart and Rogoff (2008c) identified banking crises if one of two events occurred:

- “(1) bank runs that lead to the closure, merging, or takeover by the public sector of one or more financial institutions
- (2) if there are no runs, the closure, merging, takeover, or large-scale government assistance of an important financial institution (or groups of institutions), that marks the start of a string of similar outcomes for other financial institutions.”<sup>13</sup>

To find banking crises from 1800 to 2008, they “rely on existing studies of banking crises and on the financial press.”<sup>14</sup> A potential weakness of their methodology involves their dependence on previous studies. Any errors embedded in earlier studies would simply be transplanted over to their series. Moreover, while Reinhart and Rogoff mention that they used the financial press, it is unclear how they used it.

Even putting these issues aside, Reinhart and Rogoff provide two—at times, contradictory—versions of their series on banking crises. One version of their series is presented in Table A3 of their paper, whereas the other version is presented in Table A5. While the two versions agree on many crises, they disagree on several episodes.

### **Bordo and Wheelock**

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<sup>12</sup> For example, according to the December 1899 edition of the *Commercial and Financial Chronicle*, the Boston Clearing House issued loan certificates to the Globe National Bank in the midst of a minor disturbance. Gorton did not classify that episode as a panic even though clearinghouse loan certificates were issued, raising the possibility that Gorton might have missed other important episodes.

<sup>13</sup> Page 57.

<sup>14</sup> Page 57.

Bordo and Wheelock (1988) identified banking panics on the basis of previous studies by Schwartz (1988), Thorp (1926), Sprague (1910), and Friedman and Schwartz (1963). The main concern with the Reinhart-Rogoff series reoccurs with the Bordo-Wheelock series. Any errors embedded in earlier studies would simply be transplanted over to their series.

## **Wicker**

Between the end of the Civil War and the founding of the Federal Reserve, Wicker (2000) identifies three major banking panics—1873, 1893, and 1907—and two incipient banking panics—1884 and 1890. He classifies 1884 and 1890 as incipient rather than full banking panics because, he argues, policy intervention—on the part of the New York Clearing House—acted to “forestall a banking panic.”<sup>15</sup> However, the counterfactual—whether a panic would have occurred in the absence of policy intervention and hence, whether these disturbances really were incipient panics—is unobservable. Moreover, it also seems likely that Wicker intended his work as a set of individual case studies on the five most cited banking disturbances of this era, rather than as a complete series that lists when every banking panic occurred between 1865 and 1914.

### **1.4 Necessity of a New Panic Series**

The numerous contradictions across these series and the potential flaws that underpin the methodology behind many of these series necessitate the development of a new panic series and a reexamination of many of the leading arguments on the effects and causes of financial panics that have been formulated using these series. What are the macroeconomic effects of the financial panics of the pre-Great Depression era? Can financial panics account for a significant fraction of the volatility in output in the 1800s and early 1900s? Were panics of the pre-Federal Reserve era caused by seasonal agricultural shocks? Or did other forces cause them? Is the claim that the frequency of financial panics decreased during the first fifteen years of the existence of the Federal Reserve accurate? Or is it a spurious

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<sup>15</sup> Page xv.

conclusion drawn from a biased panic series? The development of a new, consistent series on panics will be more than an important exercise in taxonomy; it will serve as a crucial tool for analyzing the causes, effects, and frequency of panics throughout US history.

## **Part II. Development of a New Series on Banking Panics**

This section develops a new series on banking panics. I begin by providing a definition of financial panic—one that distinguishes among different types of financial panics. I then describe the methodology I use to compile the new series on banking panics. In particular, I develop a clearly defined rule to identify banking panics from 1825 to 1929.

### **2.1 Definition of Financial Panic**

A financial panic occurs when there is a widespread rush by private agents to liquidate assets, e.g., deposits in the banking sector (a banking panic), stocks in equity markets (a stock market panic), or currency in foreign exchange markets (a currency panic). The principal characteristic of any financial panic—the rush to liquidate assets—is driven out of fear that a particular type of asset will suddenly decline in value or be rendered illiquid.

My definition of financial panic distinguishes among different types of financial panics: banking panics, stock market panics, and currency panics. A banking panic occurs when there is an increase in the demand for currency relative to deposits that sparks bank runs and bank suspensions. A stock market panic occurs when there is a rush to liquidate stocks in equity markets, resulting in sharp declines in stock prices. A currency panic occurs when agents sell currency in foreign exchange markets out of fears of devaluation. In each of these types of financial panics, there is a rush by private agents to dispose of a particular kind of asset—bank deposits in the case of banking panics, stocks in the case of stock market panics, and currency in the case of currency panics.

In developing a new panic series, however, I restrict my attention to one type of financial panic: banking panics. I leave the development of a series on stock market or currency panics for later work.

## 2.2 Identifying Banking Panics

Quantitative sources are not sufficient to identify banking panics. Consistent data series on bank suspensions and failures are not readily available throughout much of the 19<sup>th</sup> century. Beginning in 1865, a consistent series on national bank failures—provided by the Comptroller of the Currency—exists. However, the Comptroller’s series is available at a yearly frequency, making it difficult to determine whether bank failures were clustered together—as would be the case in a banking panic—or whether they were spread out over the course of a year. Furthermore, even if one were to overlook this shortcoming, the Comptroller’s series on national bank failures omits state banks, private banks, and trust companies, making the series unrepresentative of the overall banking system.<sup>16</sup> Lastly, data on bank failures or suspensions, by itself, does not reveal whether there was a panic by depositors since a cluster of bank suspensions or failures can occur without runs by depositors.

To overcome these limitations, I employ other sources to identify banking panics: financial and economic newspapers from the 19<sup>th</sup> and early 20<sup>th</sup> centuries. The press of that era devoted substantial resources to covering banking panics. Incidents of bank runs, suspensions and failures were regularly reported in contemporary newspapers, regardless of place of origin. Indeed, disturbances occurring in the less populated regions of the interior as well as those occurring in more populated urban centers received significant attention by the press. Consequently, contemporary newspapers contain a detailed, comprehensive record of when and where banking panics occurred.

Therefore, to identify banking panics, I utilize contemporary newspapers. In particular, I use three newspapers: the *Niles Weekly Register*, *The Merchants’ Magazine and Commercial Review*, and *The Commercial and Financial Chronicle*. These three newspapers were among the leading economic and

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<sup>16</sup> Grossman (1993) reports that the Comptroller of the Currency provides a series on both national and state bank failures. Due to regular inspections and uniform reporting rules, the Comptroller provides consistent and detailed information on national banks. However, the same level of consistency in reporting did not apply to state banks.

financial newspapers of their day. Most importantly, they provided comprehensive coverage of developments in the banking sector, with special attention placed to reporting incidents of bank runs, suspensions and failures. I use the *Niles Weekly Register* for the period 1825 to 1849, *The Merchants' Magazine and Commercial Review* for the period 1842 to 1869, and *The Commercial and Financial Chronicle* for the period 1865 to 1929.<sup>17</sup>

These newspapers were printed on a regular basis and were bound in volumes for preservation. The *Niles Weekly Register* and *The Commercial and Financial Chronicle* were published on a weekly basis, and *The Merchants' Magazine and Commercial Review* on a monthly basis. Editions of the *Niles Weekly Register* and *The Merchants' Magazine and Commercial Review* were bound in six-month volumes. Editions of *The Commercial and Financial Chronicle* were bound in six-month volumes from 1865 to 1916 and three-month volumes from 1917 to 1929.

The bound volumes of all three newspapers contained index pages. The index pages provided detailed lists of specific information found in each volume, arranged alphabetically. Each item listed in the index was matched to its respective page number, permitting readers to quickly identify its precise location in the volume. Of particular importance, the index pages provided information regarding banking panics. Reports of bank runs, suspensions, and failures, along with general entries for banking panics and financial crises were listed in the index pages.<sup>18</sup>

Since the index pages of these newspapers provided comprehensive lists of economic, financial, and banking news, a careful scanning of these pages locates banking panics reported in the *Niles Weekly Register*, the *Merchants' Magazine and Commercial Review*, and the *Commercial and Financial Chronicle*. Therefore, to identify banking panics, I read the index pages of these newspapers—from 1825

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<sup>17</sup> *The Merchants' Magazine and Commercial Review* was first published in July 1839, but it did not contain the “Monthly Commercial Chronicle” section—the key section that covered contemporaneous economic news—until April 1842. During its early years, from July 1839 until March 1842, *The Merchants' Magazine and Commercial Review* devoted little coverage to current news.

<sup>18</sup> The index pages are consistent over the 1825 to 1929 period in that they comprehensively report incidents of bank runs, suspensions and failures. However, the structure of these index pages changed somewhat over time and across different newspapers. For example, *The Merchants' Magazine and Commercial Review* split its listing of articles into an index page and a contents page. Even though it is not officially labeled an index page, the contents page serves in that capacity and consequently, I treat it as such. Also, the *Commercial and Financial Chronicle* split its index into several different categories that varied across years.

to 1929—for key terms that are likely to signal a banking panic. In particular, I search for any of the following terms: bank failure, bank suspension, bank run, bank closure, bank crisis, bank panic, bank disturbance, crash, crisis, financial crisis, financial disturbance, financial revulsion, panic, revulsion, run, suspension, suspension of payments and suspension of specie payments.<sup>19</sup> When I find one of these terms in an index page, I read the referenced article to see if any bank runs, suspensions or failures occurred.<sup>20</sup>

Since a banking panic occurs when there is a loss of depositor confidence that sparks runs on financial institutions and bank suspensions, I identify banking panics in these newspaper articles by the occurrence of a cluster of bank suspensions and runs. The presence of both runs and suspensions is a necessary criterion.<sup>21</sup> A wave of bank suspensions without runs would not be classified as a banking panic because a key feature of a banking panic is a rush by depositors to convert deposits into currency. Similarly, runs on institutions that did not produce bank suspensions would not be classified as a banking panic.

Moreover, to separate isolated bank runs and suspensions from banking panics, which are more generalized disturbances that extend beyond the confines of individual bank-specific problems, I identify banking panics by a cluster of bank suspensions and runs. To avoid any ambiguity, I define a cluster as three or more banks. In addition, for a bank run or suspension to be treated as part of a cluster, the report containing the bank run or suspension must contain a reference to other bank runs or suspensions or there must be reports of a general panic. This avoids classifying scattered, unconnected bank runs and suspensions as a cluster. Lastly, to partition banking panics, I implement the following rule: a panic ends if there are no reports of any bank runs or suspensions for one full calendar month.

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<sup>19</sup> In compiling this list, I chose words that describe key features of banking panics—failure, suspension, run, crisis, panic, disturbance, crash. One of the terms—revulsion—was widely used in the 19<sup>th</sup> century to denote financial panics even though it has fallen out of use today. Moreover, in scanning indexes for key terms, I take into consideration the possibility of a rearrangement of words. For example, suspension of payments could be listed as “payments, suspension of” and suspension of specie payments could be listed as “specie payments, suspension of.”

<sup>20</sup> To facilitate the process, the index pages of all three newspapers are alphabetical. The contents page of the *Merchants’ Magazine and Commercial Review* is chronological, and as a consequence, I read every entry. One of the index pages contained in the *Commercial and Financial Chronicle*—the Current Events and Discussion Page—is alphabetical, but occasionally, it listed banking panics under region; therefore, I read every entry.

<sup>21</sup> The newspapers do not need to use the word “run” if the action is described in other terms. For example, “heavy withdrawals” or “a depletion of reserves by depositors”—alternative ways of describing a sharp increased demand for currency by depositors—would be considered runs.

### 2.3 Scaling Banking Panics

To reflect varying degrees, I classify each banking panic as major or minor. A banking panic is classified as major if it meets two conditions: (1) it spans more than one geographic unit and (2) it appears on the front page of the newspaper. All other banking panics are minor. I define a geographic unit as a state and its bordering states. For example, bank runs and suspensions that occur in Ohio, Indiana and Illinois would be contained in one geographic unit, whereas bank runs and suspensions that occur in Ohio, Indiana, Illinois and Pennsylvania would not be contained in one geographic unit.

Scaling banking panics according to geographic extent serves two useful purposes. First, it separates more localized disturbances from more widespread disturbances. A banking panic that occurs in one part of the country, but does not spread to other regions would seem to be a more minor disturbance than a banking panic that involves a generalized loss of depositor confidence throughout many parts of the nation. Separating more localized disturbances from more widespread disturbances clarifies the degree of the panic. Second, geographic extent is measurable and hence, not susceptible to personal discretion. Given the lack of bank-specific data throughout the 1800s, geographic extent provides a measurable criterion for classifying panics according to degree.

However, scaling banking panics according to geographic extent is not a flawless measure of degree. It is entirely plausible that a banking panic could have spanned more than one geographic unit, but have remained a minor disturbance. Consider for example, a banking panic that spanned more than one geographic unit, but that remained confined to a few states with small banking sectors. While such a disturbance might have seriously affected the local economies of those states, a panic of that nature might have been a minor disturbance from the perspective of the overall banking system. To overcome this potential problem, I require that all major banking panics be reported on the front page of the newspaper—the *Niles Weekly Register* for 1825-1849, the *Merchants' Magazine and Commercial Review* for 1842-

1879, and the *Commercial and Financial Chronicle* for 1865-1929—to ensure that only the most serious episodes of banking distress are classified as major banking panics.<sup>22</sup>

### **Part III. The New Panic Series and Its Implications**

This section describes the new series on banking panics and presents its implications. I begin by documenting the incidence of banking panics between 1825 and 1929. I then assess the reliability of earlier series by comparing them to my new series and by reading contemporary news reports surrounding every panic episode on all eight series. Next, equipped with my new series, I document the historical frequency of banking panics. Lastly, I investigate whether banking panics displayed a seasonal tendency prior to 1914 and I examine whether banking panics were correlated with downturns.

#### **3.1 Results**

Table 2 presents the new banking panic series. The new series identifies seven major banking panics and twenty minor banking panics between 1825 and 1929. The seven major banking panics are the following: (1) Nov 1833 – Apr 1834, (2) Mar – May 1837, (3) Oct 1839, (4) Aug – Oct 1857, (5) Sep 1873, (6) May – Aug 1893, and (7) Oct – Nov 1907.

The twenty minor banking panics are the following, with location in brackets: (1) Jan-Apr 1841 [PA, DE, MD, NC, VA], (2) Mar 1842 [PA], (3) May – Jun 1842 [New Orleans], (4) Oct 1851 [NY, NJ, MD], (5) Sep 1854 – Feb 1855 [OH, IN, MI, WI, IA, MO, NY, CA], (6) Nov 1860 [suspension of specie payments by banks in the South, citywide suspensions in Philadelphia, and Baltimore], (7) Dec 1861 [generalized suspension of specie payments], (8) May 1884 [NYC, PA, NJ], (9) Nov 1890 [NYC], (10) Dec 1896 [MN, IL], (11) Dec 1899 [Boston and New York City], (12) Jun – Jul 1901 [Buffalo and NYC], (13) Oct 1903 [PA, MD], (14) Dec 1905 [Chicago], (15) Jan 1908 [NYC], (16) Aug – Sep 1920 [Boston], (17) Nov 1920-Feb 1921 [ND], (18) Jul 1926 [FL, GA], (19) Mar 1927 [FL], and (20)

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<sup>22</sup> By front page, I refer to the first page of the newspaper, with the exception of index or contents pages. If the first page of the newspaper is an index or contents page, then I treat the first page following the index or contents page as the front page.

Jul – Aug 1929 [FL]. Descriptions of each of these banking panics—with citations to the contemporary news articles reporting them—are contained in the companion appendix to this paper.<sup>23</sup>

The new series contains many banking panics not noted in earlier series. While most of the major banking panic episodes from the new series are noted in earlier series, thirteen of the twenty minor banking panics are not listed in any of the earlier series. Moreover, the new series differs from earlier series in another notable respect: it classifies two of the most commonly cited banking panics—1884 and 1890—as minor. Both the 1884 and 1890 banking panics were localized disturbances confined primarily to New York City.

### 3.2 Inconsistencies in Earlier Series

A comparison of my new series with earlier series reveals some major inconsistencies. Some series combined panics with other developments in financial markets. Others failed to distinguish among different types of financial panics. A few series even went so far as to incorrectly identify foreign banking panics as domestic ones.

To demonstrate this, consider table 3, which presents the new series on banking panics alongside the eight earlier series for the period 1825-1929. This is a particularly useful comparison since four of the panic series—Bordo-Wheelock, Reinhart-Rogoff, Gorton, and Wicker—explicitly refer to themselves as series on banking panics or banking crises. Entries with strikes through them are panic episodes noted in one of the eight earlier panic series not included in the new series on banking panics. These episodes do not contain banking panics. To verify this, I read the contemporary news reports surrounding each of these episodes. I consider them one at a time.

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<sup>23</sup> Because I am using three different newspapers over the 1825 to 1929 period, a useful check to make sure that the reporting is consistent across newspapers is to see if different newspapers in overlapping periods—periods in which more than one newspaper were in operation—identify the same banking panics. There are two overlapping periods: (1) April 1842 to 1849 (*Niles Weekly Register* and *Merchants' Magazine*) and (2) 1865 to 1869 (*Merchants' Magazine* and *Commercial and Financial Chronicle*). In the two overlapping periods, I arrive at the same results, regardless of which newspaper I use. Between April 1842 and 1849, both the *Niles Weekly Register* and the *Merchants' Magazine* identify just one minor banking panic: the minor banking panic in New Orleans in 1842. Between 1865 and 1869, both the *Merchants' Magazine* and the *Chronicle* do not identify any banking panics.

**1825 and 1847:** In both 1825 and 1847, a banking panic occurred in England—not in the United States. The Bordo-Wheelock, Thorp, and Reinhart-Rogoff series list 1825 as either a U.S. panic or crisis date and the Thorp series lists 1847 as a U.S. panic date. While serious banking panics did occur, they were confined to England in both cases. The reporting of the *Niles Weekly Register* in 1825 contains only a few reports of isolated bank failures in the U.S and the reporting of the *Merchants' Magazine and Commercial Review* in 1847 does not contain any accounts of bank runs, suspensions or failures in the U.S. There was no generalized panic in the U.S. in either year.

**April 1864:** One version of the Reinhart-Rogoff series lists April 1864 as a banking crisis; however, no banking panic occurred. Instead, a serious disturbance on stock markets erupted following the passage of a law in the U.S. senate designed to force a reduction in the price of gold.<sup>24</sup> According to the press, the measure “excited the liveliest fears...the stock market, under the immense pressure...underwent a severe revulsion.”<sup>25</sup> In reporting the events of April 1864, the editors of the *Merchants' Magazine* described “one of the most severe revulsions of late years in the stock market.”<sup>26</sup> However, the crisis appears to have been confined to the stock market: there were no reports of any bank runs, suspensions, or failures in April of 1864.

**Oct 1896:** The Gorton series lists October 1896 as a banking panic; however, no banking panic occurred then. The *Commercial and Financial Chronicle* did not report any banking panics in October 1896. Instead, a minor banking panic—confined entirely to Chicago, St. Paul and West Superior—occurred in December of that year. The panic was small in scope; only 4 banks suspended.<sup>27</sup>

**1914:** Even though serious financial instability occurred, the events of the summer of 1914 do not constitute a banking panic—according to my definition—since bank runs, suspensions, and failures were

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<sup>24</sup> Due to increased borrowing to finance wartime expenditures, the price of gold had seriously increased.

<sup>25</sup> *Merchants' Magazine and Commercial Review*, May 1864, “Commercial Chronicle and Review,” p. 365.

<sup>26</sup> *Merchants' Magazine and Commercial Review*, May 1864, “Commercial Chronicle and Review,” p. 363.

<sup>27</sup> Gorton included Oct 1896 as a panic because the issuance of Clearing House loan certificates was authorized, even though none were actually issued. However, a reading of the *Chronicle* reveals that the issuance of loan certificates was authorized ten months earlier in Dec 1895: “The action taken by the Clearing-House Association on Monday, providing for the issuance of Clearing-House loan certificates was a strong factor in producing the change in sentiment which took place early in the week. The measure was entirely a precautionary one, looking to the possibilities of the future rather than to the needs of the present, and no certificates have been applied for” (*Commercial and Financial Chronicle*, Dec 28, 1895, “The Money Market and Financial Situation,” p. 1144).

avoided. The outbreak of war in Europe dramatically increased the demand for specie and caused a worldwide rush to liquidate stocks, resulting in the closing of the New York Stock Exchange on July 31, 1914. A few days later in early August, fears of a run on the U.S. banking system led to the issuance of emergency currency under the Aldrich-Vreeland Act. The Act flooded the country's banking system with additional currency. The measure appears to have been successful: no banking panic materialized in 1914.<sup>28</sup>

**Five DeLong-Summers Panics:** Five of the twelve DeLong-Summers panic quarters do not contain banking panics: 1896:01, 1896:03, 1898:02, 1903:02, and 1909:04. To verify this, I read the *Commercial and Financial Chronicle* during all of the DeLong-Summers panic quarters. Since no banking panics occurred, why were these five episodes classified as panics? Several of them satisfy the DeLong-Summers panic criterion of a quarter-to-quarter increase of one percentage point or more in the average commercial paper rate—a potentially important development in financial markets, but not necessarily an indicator of a financial panic.

**Twenty-One Kemmerer Panics:** Table 3 makes it clear that the Kemmerer series should never be used or interpreted as a series on banking panics: more than two-thirds of Kemmerer's panic episodes do not contain banking panics. Eight of the twenty-nine Kemmerer panic episodes contain banking panics—Sept 1873, May 1884, Nov 1890, May-Aug 1893, Dec 1896, July 1901, and Oct 1907—whereas the remaining twenty-one do not contain banking panics. To verify this, I read the *Commercial and Financial Chronicle*—Kemmerer's source in identifying panics—during all of Kemmerer's panic episodes. Since no banking panics occurred, why did Kemmerer classify these twenty-one episodes as panics? A reading of the *Chronicle* provides a hint: many of Kemmerer's episodes coincided with reports of instability in the stock market. This raises the possibility that Kemmerer combined banking panics with stock market disturbances in one series or that Kemmerer's panic series was intended to serve as a series on stock market panics, with these eight banking panic episodes simply coinciding with stock market panics.

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<sup>28</sup> This episode is contained on the Gorton and Reinhart-Rogoff series. However, Reinhart and Rogoff acknowledge in a brief summary of the episode that a banking crisis was avoided in 1914: “a banking crisis was avoided by flooding the country with emergency currency to prevent hasty withdrawals” (Reinhart and Rogoff, p. Table A5-18).

However, because Kemmerer never clearly explained what kind of financial disturbance he included as a panic, it is unclear which of these two interpretations most accurately applies to his series. Moreover, even if Kemmerer had intended his series as a series on stock market panics, it is unlikely that he constructed it in a consistent way. Kemmerer relied on the reporting of the *Chronicle*—rather than on stock market indices or other quantitative evidence—to identify his episodes. Deciphering the magnitude of declines in stock prices or the magnitude of instability in stock markets from the qualitative reporting of the *Chronicle* is likely to be highly unreliable. This might, in part, explain the cautionary messages—outlined in section 1.3—that Kemmerer provided regarding the accuracy of his series.

### **3.3 Frequency of Banking Panics**

Table 4 presents the frequency of banking panics, implied by the new series. Frequencies are calculated by dividing number of years by number of panics. To differentiate the pre-Federal Reserve era from the post-Federal Reserve era, I calculate pre-1914 and 1914 to 1929 frequencies.

Before 1914, major banking panics occurred at a rate of one every 12.9 years and minor banking panics occurred at a rate of one every 6 years. It should be noted, however, that the occurrence of three major banking panics during the 1830's increases the rate of major banking panics—by contrast, the median number of years separating major banking panics is sixteen. Between 1914 and 1929, minor banking panics occurred at a rate of one every 3.5 years. No major banking panics occurred between 1914 and 1929.

The conventional wisdom on the historical frequency of panics is that the frequency of panics was high before 1914 and that the frequency dramatically decreased between 1914 and 1929—that is, during the first fifteen years of the existence of the Federal Reserve. However, as it turns out, much of this was based on an unreliable panic series, the Kemmerer series. According to my new series on banking panics, there is no evidence of a decline in the frequency of panics during the first fifteen years of the existence of the Federal Reserve.

These claims originate with Miron (1986), who used the Kemmerer series to document the incidence of panics prior to 1914. Between 1890 and 1908, Kemmerer identified six major panics, permitting Miron to conclude that before the founding of the Fed, the probability of having a major panic in a given year was 0.316 and that major panics occurred at a rate of roughly one every three years. If minor panics are included, then the rate—according to Miron—increases to more than one panic per year.<sup>29</sup> By contrast, Miron then claims that between 1915 and 1929, the banking system did not experience any financial panics.<sup>30</sup> Using the pre-1914 frequency of major panics derived from the Kemmerer series, Miron calculates that the probability of going fourteen years—from 1915 to 1929—without a major panic was 0.005. On the basis of this evidence, Miron concludes that the Federal Reserve’s policies of furnishing an elastic currency—one that could expand during seasons of high money demand and contract during seasons of low money demand—strengthened the nation’s banking system to ward off panics, resulting in this purported dramatic reduction in the frequency of panics between 1914 and 1929. This claim has subsequently been picked up by others and is now widely circulated in the literature.<sup>31</sup>

However, Miron’s claims hinge on the Kemmerer series. According to my new series on banking panics, it was not uncommon for fifteen consecutive years to elapse without a major panic. Eighteen years separated the major banking panics of 1839 and 1857, sixteen years separated the major banking panics of 1857 and 1873, twenty years separated the major banking panics of 1873 and 1893, and fourteen years separated the major banking panics of 1893 and 1907. Moreover, the median number of years separating major banking panics between 1825 and 1914 was 16. Therefore, the absence of a major panic for fifteen consecutive years—from 1914 to 1929—provides no support for the claim that the frequency of panics

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<sup>29</sup> Miron writes, “If only major panics are included, the frequency was slightly more than one every three years. Including minor panics raises the frequency to more than one per year” (p. 131).

<sup>30</sup> “Between 1915 and 1933, the banking system experienced financial panics only during the subperiod 1929-33” (Miron, page 131).

<sup>31</sup> For example, Meltzer (2003), in his *History of the Federal Reserve*, writes “In the 1920s, the Federal Reserve received credit for improving economic performance...Although the economy continued to experience relatively large cyclical fluctuations and many banks failed, old style financial panics did not return in the three recessions from 1920 through 1927” (page 9). Bordo (1989) also notes that, “financial panics in the United States before 1914 generally occurred at seasonal peaks in nominal interest rates...After 1914, however, the Fed extended reserve bank credit to accommodate seasonal credit demands, thereby considerably reducing the amplitude of the seasonal interest rate cycle and preventing any panics from occurring between 1914 and 1929” (page 40). Romer (1999)—also relying on Kemmerer’s listing of panics—concludes, “financial panics were ubiquitous before World War I” (p. 38).

decreased during the first fifteen years of the existence of the Federal Reserve.<sup>32</sup> Prior to 1914, recurring periods of 14 to 20 years without a major banking panic were the norm.<sup>33</sup>

### **3.4 Seasonality of Major Banking Panics**

An additional result of the new series is the seasonality of major banking panics. Consider Table 5, which documents the seasonality of banking panics before the founding of the Federal Reserve. There is a strong tendency for major banking panics of this era to break out during the fall or spring. Six of the seven major banking panics—or 86%—began in a fall or spring month. Four broke out during the fall—the Panic of 1833 (November), the Panic of 1839 (October), the Panic of 1873 (September), and the Panic of 1907 (October)—and two broke out during the spring—the Panic of 1837 (March) and the Panic of 1893 (May). The sole exception—the Panic of 1857—began during the last week of August, but became more intense during the fall months of September and October. Thus, there is strong evidence that major banking panics were more likely to occur during particular seasons: six of the seven major banking panics began during the spring or fall.<sup>34</sup> These findings lend credence to the view that before the founding of the Fed, seasonal stringencies in the money market made financial panics more likely to occur during particular seasons. By extension, they also suggest that policies designed to eliminate seasonal stringencies in the money market—such as the establishment of an elastic currency after the founding of the Fed—might have had a stabilizing influence on the nation’s banking system.<sup>35</sup>

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<sup>32</sup> The next major banking panic—the first one of the Great Depression—occurred in 1930, sixteen years after the founding of the Fed.

<sup>33</sup> Broadening the analysis to incorporate minor banking panics does not provide support to the claim of a reduction in the frequency of panics between 1914 and 1929. Between 1825 and 1914, minor banking panics occurred at a rate of one every 6 years. By contrast, between 1914 and 1929, minor banking panics occurred at a rate of one every 3.5 years.

<sup>34</sup> Minor banking panics were not much more likely to occur during the fall or spring: 53% broke out during the fall or spring, whereas 47% broke out during the summer or winter. See table 6.

<sup>35</sup> Even though it was noted in the previous subsection that the frequency of panics did not decline during the first fifteen years of the existence of the Federal Reserve, its policies—such as the establishment of an elastic currency—still might have helped strengthen the nation’s banking system to ward off panics. The true counterfactual—the incidence of panics from 1914 to 1929 without the Federal Reserve’s policies—is unobservable. Indeed, the general tendency of major banking panics to occur during those seasons characterized by stringent monetary conditions before 1914 suggests that the establishment of an elastic currency following the founding of the Federal Reserve

### 3.5 Correlation with Downturns

A final trend that merits attention is the strong correlation between major banking panics and downturns. Table 6 presents the behavior of the Davis Index of Industrial Production surrounding every major banking panic between 1825 and 1914. The Davis Index is the only consistent output series that spans the entire pre-WWI U.S. economy. Davis (2004) used 43 quantity-based annual series in the mining and manufacturing sectors to compile his index. According to Davis, these series “indirectly represent close to 90 percent of the value added produced by the U.S. industrial sector during the nineteenth century.”<sup>36</sup> Consequently, it serves as a reliable measure of real economic activity. Its chief limitation is that it is available at only a yearly frequency.

Table 6 shows that the Davis index declines surrounding each panic episode. The correlation between major banking panics and downturns is clear. These results stand in stark contrast to those of DeLong and Summers (1986) who do not find a strong link between downturns and panics using their series.

However, the existence of a correlation between panics and downturns does not prove that panics have real output effects since panics might be consequences—rather than causes—of downturns. To identify the output effects of panics, stronger evidence is required.

## Part IV. The Macroeconomic Effects of Banking Panics

Equipped with the new panic series, this section empirically examines the macroeconomic effects of major banking panics of the pre-Great Depression era. The main problem in identifying the output effects of panics is the possibility that panics might be consequences—rather than causes—of downturns. To overcome this problem, I study the output effects of major banking panics via both narrative and VAR-based methods. Section 4.1 presents the narrative test and section 4.2 presents the findings from the VAR.

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might have helped stabilize the banking system. In this sense, these findings support the broad conclusions of Miron (1986).

<sup>36</sup> Page 1179.

Section 4.3 then investigates three related macroeconomic issues: (1) the role of panics as a source of economic instability before the founding of the Fed, (2) how downturns with major banking panics differed from downturns without them, and (3) the behavior of trend output in the aftermath of panics.

#### **4.1 A Narrative Approach**

##### **A. Restriction of Test to Major Banking Panics**

To begin, I limit my test on the real output effects of banking panics to major banking panics. I exclude minor banking panics due to data limitations. The existing historical series on real economic activity are available at a national level, making an assessment of the effect of major banking panics on aggregate output feasible. By contrast, an assessment of the real effects of minor banking panics, which tend to be more localized disturbances, would require regional data on output. Unfortunately, such data are unavailable throughout most of U.S. history. This does not mean that localized banking panics did not have significant real effects for the U.S. economy. However, any evidence of the output effects of localized panics would likely be muddled in national statistics on output, making a statistical analysis of the real effects of localized panics very noisy. As a consequence, I confine my test to major banking panics.

##### **B. The Identification Problem and the Benefits of a Narrative Approach**

Table 6, which presents the behavior of the Davis Index of Industrial Production surrounding every major banking panic between 1825 and 1914, shows that there is a clear correlation between major banking panics and output declines. However, as noted earlier, this information by itself does not prove that panics have real output effects. If panics are products of recessions, then deteriorating economic conditions might be causing panics, rather than vice versa. Mitchell (1941) and Fels (1959) provide the main articulation of this hypothesis.<sup>37</sup> They argue that major recessions cause panics. During downturns, business failures and declining fundamentals cause depositors to become alarmed that banks will suspend

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<sup>37</sup> Gorton (1988) terms this the Recession Hypothesis.

or fail. This precipitates a run to convert deposits into currency, thereby generating a panic. Under this specification, it would be misleading to attribute output declines to panics since panics would be products of downturns rather than causes.<sup>38</sup>

In developing a test to identify the output effects of major banking panics—one that address this identification problem, a reliance on purely statistical evidence, by itself, suffers from two main drawbacks. First, data limitations for the pre-Great Depression era make this identification problem trickier. Many of the output series dating back to the 1800s are available at only a yearly frequency, making it difficult to identify whether panics preceded downturns or occurred in the midst of downturns.<sup>39</sup> If time series data on output were available at a greater frequency, it might be possible to identify the timing of panics in relation to the timing of output declines. If, for example, panics precede output declines, then it might be possible to conclude that panics caused the output declines, rather than vice versa. In the absence of such data, this is not possible. Second, while the availability of output data at a greater frequency would certainly be helpful in determining whether panics preceded downturns, such information, by itself, might not even be sufficient to solve the identification problem since bad news about future output conditions could generate a panic even before output begins to decline.

As a consequence, to address this identification problem, additional information is helpful. Of particular relevance, financial and economic newspapers from the 1825 to 1929 period contain detailed commentaries by economic observers that clarify many of the issues left unanswered by a strictly

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<sup>38</sup> These issues are particularly relevant in the debate on the causes of the Great Depression. Friedman and Schwartz (1963) argue that a wave of banking panics turned a relatively normal downturn into a much more severe depression. However, Temin (1976) challenges the Friedman and Schwartz view, distinguishing between two possibilities:

“The assertion is that the banking panics turned a short depression into a sustained decline in national income. The question to be examined here is whether the banking panics were independent of the fall in income or a result of this fall” (p. 83)

Friedman and Schwartz place special emphasis on the banking panic of October 1930, the first major banking panic of the Great Depression, arguing that “in October 1930, the monetary character of the contraction changed dramatically” (p. 308). As a result, Temin focuses his analysis on this panic episode. He concludes that agricultural distress—which was, he argues, a component of the depression—caused the banking panic of 1930. In Temin’s view, the banking panics of the Great Depression were consequences—rather than causes—of the depression.

<sup>39</sup> The Miron-Romer Index of Industrial Production, the first, reliable monthly series of industrial production, begins in 1884. Monthly data on pig iron production begin in 1877. Monthly data on bank clearings begin in 1854 and have often been used as an indicator of business activity. However, they are not useful for the purposes of this paper since bank clearings are a measure of banking activity, rather than a direct measure of output. Using bank clearings to draw conclusions regarding the output effects of banking panics could therefore lead to spurious results.

quantitative analysis. In many instances, the economic press identify the events that precipitated a panic among depositors, making it easier to determine whether the panic was caused by a downturn or by some other disturbance.

Moreover, in the absence of more frequent time series data on output, newspaper records are also helpful in shedding light on the appropriate ordering of events: did panics predate downturns or did they occur in the midst of declining economic conditions? According to the Mitchell and Fels framework, major recessions cause panics because depositors become alarmed by declining fundamentals. In this framework, newspaper reports should reflect these deteriorating economic conditions and serve as a signal to depositors that fundamentals are declining or expected to decline. An examination of the news reports of economic conditions provides an assessment of how the public viewed the state of the economy surrounding each panic episode. According to the press, were economic conditions prosperous on the eve of the panic? Or were they declining? Did the press describe deteriorating economic fundamentals? Or was the state of the economy described as strong?

### **C. The Test**

To overcome this identification problem, I conduct the following test. I read the newspaper records surrounding every major banking panic between 1825 and 1929 to identify those panics that the reports of contemporary observers suggest were the result of idiosyncratic disturbances, as opposed to declining output conditions. I then use these episodes to empirically identify the output effects of panics. The test of whether panics have real output effects is simply to see if real economic activity declines following the outbreak of these panics.

Methodologically, this test is similar in approach to the work of Romer and Romer (1989, 2004) to identify the effects of monetary policy, Romer and Romer (2010) to identify the effects of changes in taxes, and Ramey and Shapiro (1998) and Ramey (2011) to identify the effects of changes in government spending. In their studies, Christina D. Romer and David H. Romer note that estimating the effects of monetary and fiscal policy is tricky both because measures of policy can respond endogenously to

economic developments and because changes in policy are often taken in anticipation of economic developments. To deal with these issues, they utilize narrative sources—the legislative record, minutes of Federal Open Market Committee meetings, presidential speeches, and policy statements—to identify the motivations behind policy changes. Likewise, in their work, Valerie A. Ramey and Matthew D. Shapiro use news reports in *Business Week* and other sources to identify large military build-ups that occurred for reasons unrelated to the state of the U.S. economy. Because these changes in government spending were the result of forces independent of prospective macroeconomic developments, they can be used to estimate the effects of changes in government spending.

Similar to Ramey and Shapiro (1998) and Ramey (2011), the narrative sources used in this study are contemporary financial and economic news reports. In particular, I employ the following newspapers: *The Niles Weekly Register* (1825-1849), *The New York Commercial Advertiser* (1825-1857), *The Merchants' Magazine and Commercial Review* (1839-1869) and *The Commercial and Financial Chronicle* (1865-1914). These periodicals were among the leading economic and financial newspapers of their day.

I read the newspaper records surrounding major banking panics to accomplish two goals: (1) to identify the perceived causes of panics and (2) to identify the perceived state of the economy when the panic broke out. The reasons for this are simple. In assigning causes to panics, contemporary observers may be able to pinpoint the forces that precipitated depositor anxiety and that led to a panic. In reporting the state of the economy, the press may be able to clarify whether there were indications of a major recession on the eve of the outbreak of panic. Both pieces of information are helpful in determining whether a panic was caused by a downturn or by some other disturbance.

Indeed, the newspaper records are incredibly useful in identifying the causes of panics. Descriptions of events leading up to panics and reports by contemporary economic observers help to identify the forces that precipitated a panic among depositors. Moreover, these records provide a gauge of market participants' contemporaneous beliefs regarding the causes that led to a panic. Did depositors panic because there were growing signs of an economic downturn or did they panic in response to some other disturbance?

In addition, it is straightforward to determine how the press perceived the state of the economy when a panic broke out. Many of the newspapers used in this study contained sections that described general macroeconomic trends on a regular basis: “The Commercial Epitome” in the *Commercial and Financial Chronicle*, “The Commercial Chronicle and Review” in the *Merchants’ Magazine and Commercial Chronicle*, and “Review of the Market” in the *New York Commercial Advertiser*. Given the lack of data available to the economic press of the 19<sup>th</sup> and early 20<sup>th</sup> centuries, reporting of general macroeconomic trends clearly lacked the precision to which we are accustomed today. However, the economic press did have correspondence with the leading industrial and manufacturing centers of the country, allowing them to make broad generalizations regarding macroeconomic developments. Most importantly, the reporting by the press reveals the kinds of signals being sent to the public regarding the overall health of the economy. If depositors became alarmed that a recession would cause banks to fail, then such signals would have been present in the news reporting.

Therefore, I employ newspapers records to separate banking panics that might have been caused by downturns from those that were caused by other disturbances. However, since I will be relying on newspaper accounts, there may be varying degrees of certainty across panic episodes. In some cases, the causes of a panic might be clear and obvious, whereas in other cases, the causes might be more ambiguous. Hence, to reflect these varying degrees of certainty, I will be classifying panics along a two-dimensional scale. The scale ranges from 1 to 3. Figure 1 presents a visual representation of this scale.

On the first dimension, I classify panics according to reported causes. I read the newspaper records surrounding every major banking panic from 1825 to 1929 to identify the events or forces that contemporary observers cited as primary causes of the panic. If the newspaper records identify an event unrelated to output fluctuations as the primary cause of the panic, then I assign the panic a 3 on the first dimension of the scale. Examples of events that might precipitate a panic, but that are likely to be unrelated to output fluctuations include political decisions, the failure of a mismanaged bank, and international contagion. A political decision that causes a change in market expectations regarding the stability of the banking sector, the failure of a mismanaged bank and a subsequent contagion of fear

generated in the aftermath of such a failure, or a panic abroad that triggers financial instability at home are all events that might generate a panic, but that are likely to be unrelated to movements in domestic output conditions. If the newspaper records identify any of these events—political decisions, failure of a mismanaged bank, or international contagion—as the primary cause of the panic, then I assign the panic a 3.

By contrast, if the newspaper records identify output fluctuations as the primary cause of the panic, then I assign the panic a 1. A banking panic caused by depositor anxiety that a major recession will cause banks to fail or suspend would be a prime example of a panic that would receive a 1 on the first dimension of the scale.

On the second dimension of the scale, I classify panics according to the state of the economy when the panic broke out. I read the descriptions of economic conditions on the eve of the outbreak of panic.<sup>40</sup> If the newspaper records characterize economic conditions as “prosperous” on the eve of the outbreak of panic, then I assign the panic a 3. If the newspaper records characterize the state of the economy as in “depression” or in “recession” on the eve of the outbreak of panic, then I assign the panic a 1.<sup>41</sup>

Moreover, on both dimensions, there is an intermediate category 2, which is reserved for ambiguous situations in which the newspaper records are not definitive in assigning causes or in characterizing the state of the economy. If the newspaper records identify both a downturn as well as other events that are unrelated to output fluctuations as primary causes of the panic, then the panic is assigned a 2 on the first

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<sup>40</sup> To determine whether the press reported positively or negatively on the state of the economy before the outbreak of panic, I read the following articles for the two months immediately preceding the panic: “The Commercial Epitome” in the *Commercial and Financial Chronicle*, “The Commercial Chronicle and Review” in the *Merchants’ Magazine and Commercial Chronicle*, and “Review of the Market” in the *New York Commercial Advertiser*.

<sup>41</sup> The reason for classifying panics on this second dimension is simple: it provides an additional filter to separate panics that may have been caused by downturns from those that were not. For example, consider a panic that broke out in the midst of declining economic conditions. If contemporary observers attributed the panic to an event unrelated to these declining output conditions, then the panic would receive a 3 on the first dimension of the scale. However, the panic’s occurrence in the midst of declining economic conditions calls into question whether contemporary observers were accurate in dismissing the role of deteriorating economic activity in aggravating depositor unrest. Therefore, classifying panics according to the state of the economy when the panic broke out provides an additional criterion to weed out panics that might have been caused by output fluctuations from those that were not.

dimension. If the newspaper records do not clearly characterize economic conditions either as “prosperous” or as in “depression/recession,” then the panic is assigned a 2 on the second dimension

Lastly, in situations where the newspaper records are uninformative in identifying causes or in characterizing the state of the economy, I simply exclude the panic from the ranking. This occurs when the newspaper records do not seem to know what caused the panic and are in widespread disagreement or when the newspaper records simply do not contain descriptions of the state of the economy on the eve of the outbreak of panic.

#### **D. The Classification**

Between 1825 and 1929, there were seven major banking panics: 1833, 1837, 1839, 1857, 1873, 1893, and 1907. Table 7 presents the classification of these major banking panics on the scale. Three important observations should be noted. First, three banking panics—the panics of 1833, 1857, and 1873—received a 3 on both dimensions of the scale—that is, they did not break out in the midst of a downturn and they were not caused by output fluctuations, according to the newspaper records. These episodes serve as ideal candidates to identify the output effects of banking panics.

Second, no banking panics received a 1 on the first dimension of the scale—that is, none were attributed exclusively to a downturn. However, that should not be interpreted to mean that none of these banking panics were caused by downturns. Panics that received a 2 on the first dimension—the Panic of 1907—fell on the median category, meaning that the newspaper records identified both a downturn and another disturbance as causes. Moreover, even though the Panic of 1893 received a 3 on the first dimension of the scale, it received a 1 on the second dimension because the newspaper records reported deteriorating economic conditions when the panic broke out, raising the possibility that declining output conditions played a role in the outbreak of that panic.

Third, the newspaper records were particularly unhelpful in classifying two of the major banking panics—the panics of 1837 and 1839. Contemporary observers were in widespread disagreement regarding the causes of these panics. In addition, the press failed to provide descriptions of economic

conditions on the eve of the outbreak of these panics. For these reasons, I omit these two panics from the scale.

In this section, I describe the classification of panics on this scale. Due to space constraints, I present a condensed version. For a more detailed treatment of each panic and for more extensive documentation, see section A.3 of the appendix.

## **Dimension 1: Reported Causes**

### **Panic of 1833: Political Decision**

According to the newspaper records, a political decision—the withdrawal of the government deposits from the Bank of the United States—caused the Panic of 1833. Chartered in 1816, the Bank of the United States served as the country’s fiscal agent, promoted a more uniform national currency, and aided the economy in times of distress. Accordingly, many historians view the Bank of the United States as a quasi-central bank. However, for ideological reasons, President Andrew Jackson was a consistent opponent of the Bank of the United States throughout the course of his presidential administration. As a consequence, Jackson decided to remove the government deposits from the Bank of the United States, beginning on October 1, 1833. Shortly thereafter, confidence in the Bank of the United States and in the overall banking system became impaired, precipitating runs. Fears that the country’s quasi-central bank would be weakened and that the nation’s banking system might be destabilized were widely reported by the press. The newspaper records attribute the panic’s origins to the destruction of “aggregate individual confidence”<sup>42</sup> following the removal of the government deposits from the Bank of the United States.

### **Panic of 1837 and Panic of 1839: Records in Widespread Disagreement**

The newspaper records were in widespread disagreement regarding the causes of the Panics of 1837 and 1839. Indeed, a range of causes was provided for both panics. For the Panic of 1837, some reports

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<sup>42</sup> *New York Commercial Advertiser*, Jan 6, 1834, “Correspondence for the Commercial Advertiser”.

identified political decisions of the Jackson administration as causes, whereas others identified years of unstable activity in the banking sector as the primary cause. For the Panic of 1839, some reports identified misguided decisions of banking authorities as the cause of the panic, whereas others identified the weak economic conditions prevailing since the prior panic as the primary cause. In 1839, the editors of the *Niles Weekly Register* described the uncertainty they felt regarding the causes of the panic, “we are too much in the dark as to the immediate cause of the catastrophe, to venture a decided opinion on the causes which produced it.”<sup>43</sup>

### **Panic of 1857: Failure of Mismanaged Bank**

The catalyst for the Panic of 1857 was the failure of the Ohio Life Insurance Company. Its failure was attributed to mismanagement and fraudulent activities.<sup>44</sup> The collapse of this banking firm triggered the panic. The Ohio Life was considered one of the most reputable firms in the nation and initially, the cause of its failure was unknown. Its demise shocked the financial community and sparked runs on banks throughout the country. Over the succeeding weeks, fear spread and the panic gained in intensity. The news reports identify this contagion of fear following the failure of the Ohio Life as the cause of the panic.

### **Panic of 1873: International Contagion**

The panic of 1873 had its origins abroad. In May, a stock market crash in Vienna caused European investors to dispose of their holdings of American securities, and especially, their holdings of railroad bonds, the leading American security traded internationally. As a consequence, domestic markets became overloaded with railroad bonds to such a large degree that new bond sales could no longer be realized, cutting off the resources of many railroad companies and forcing several of them to default on interest

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<sup>43</sup> *Niles Weekly Register*, Oct 26, 1839, “Suspension of Specie Payments,” p. 139.

<sup>44</sup> Edward Ludlow, the director of its New York office, loaned \$2 million, an amount that equaled the firm’s capital, to several railroad companies, with a significant proportion being loaned to the struggling Cleveland & Pittsburgh road. Following the bank’s suspension, Charles Stetson, the president of the company, seemed to be unaware of Ludlow’s activities and immediately launched an investigation. The extent of Ludlow’s mismanagement is still unclear—charges that his activities involved fraud and that he stole money for his own devices were leveled against him.

payments. Over time, this precarious financial situation, along with the failure of some minor firms associated with the railroad sector, generated a feeling of distrust toward the railroad industry. On September 18, 1873, the failure of Jay Cooke and Company, a prominent banking company with connections to several railroad companies, unleashed the panic. The newspaper records identify international contagion as the cause of the panic: international forces—the unloading of American railroad securities abroad—produced financial instability at home, resulting in a panic.<sup>45</sup>

### **Panic of 1893: Political Decision**

The *Commercial and Financial Chronicle* attributed the outbreak of panic in 1893 to the Sherman Silver Purchase Act of 1890, a measure passed by pro-silver forces in the U.S. Congress. The Act's intended objectives centered on curbing deflation to improve the plight of debt-laden farmers; however, according to the press, it failed to achieve its goals and instead, served primarily to weaken the U.S. commitment to the gold standard. The Sherman Silver Act mandated that the U.S. government purchase 4.5 million ounces of silver bullion every month with notes that could be subsequently redeemed in either gold or silver—a requirement that over time, impaired the government's gold reserves and sparked doubts at home and abroad that the U.S. would remain on the gold standard. Fears that the U.S. would be forced onto a silver standard became self-fulfilling as foreign investors began withdrawing gold from the country in large quantities. Gold exports, coupled with growing anxiety over the U.S. commitment to the gold standard, undermined confidence in the nation's banking system, resulting in runs by nervous depositors that led to a panic. The newspaper records identify the Sherman Silver Purchase Act—a political decision—as the cause of the panic.<sup>46</sup>

### **Panic of 1907: Mixed Causes (Downturn or Mismanagement/Fraudulent Banking Activity)**

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<sup>45</sup> “Report of the Comptroller of the Currency” in the *Commercial and Financial Chronicle*, Dec 6, 1873, p. 767-768. See the appendix for more details.

<sup>46</sup> *Commercial and Financial Chronicle*, Aug 12, 1893, “The Financial Situation,” p. 232; *Commercial and Financial Chronicle*, Aug 5, 1893, “Is It the Balance of Trade or the Silver Law, p. 199.

The actions of a group of New York City financiers, with controlling interests over several banks, triggered the panic of 1907. The group misappropriated bank funds to speculate on rising copper prices. The gamble proved to be a mistake. Copper prices collapsed and news of these events triggered runs on the banks implicated in the speculation. Rumors that other banks and trust companies might be connected to the speculators unsettled public confidence and a panic quickly spread throughout the city. Within a few days, the panic spanned most of the country. What caused the panic? The *Commercial and Financial Chronicle* identified two causes. For one, the *Chronicle* identified this fraudulent banking activity as a cause. But for another, the *Chronicle* also identified growing signs of a recession as an additional force that undermined confidence. The editors of the *Chronicle* wrote, “The more immediate causes for the upheaval deserve narration here...There were...multiplying evidences of a reaction in the iron and steel trades and of recession in general business.”<sup>47</sup>

## **Dimension 2: State of the Economy**

### **Panics of 1833, 1857, and 1873: Prosperity**

Prior to the outbreak of the Panics of 1833, 1857, and 1873, economic conditions were prosperous, according to the newspaper records. On the eve of the Panic of 1833, commentators were describing “the unexampled prosperity of the year”<sup>48</sup> and were reporting, “every thing has the appearance that an early and extensive fall business will be done.”<sup>49</sup> On the eve of the Panic of 1857, the *Merchants’ Magazine* noted, “the country continues prosperous,”<sup>50</sup> and the *New York Commercial Advertiser* reported, “The general business of the country is in a good condition, presenting both present and prospective, a most healthy appearance.”<sup>51</sup> On the eve of the Panic of 1873, the newspaper records noted, “business has been large and

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<sup>47</sup> *Commercial and Financial Chronicle*, Nov 2, 1907, “Review of October,” p. 22.

<sup>48</sup> *New York Commercial Advertiser*, Wed Oct 2, 1833, p. 2.

<sup>49</sup> *New York Commercial Advertiser*, Aug 17, 1833, “Review of Market.

<sup>50</sup> *Merchants’ Magazine and Commercial Review*, “Commercial Chronicle and Review,” September 1857, p. 325.

<sup>51</sup> “Cincinnati Gazette of Tuesday, Aug 25” in *New York Commercial Advertiser*, August 27, 1857.

a cheerful tone pervades mercantile circles,”<sup>52</sup> and the Comptroller of the Currency reported, “there were in almost every direction evidences of prosperity.”<sup>53</sup> Indeed, by all accounts, economic conditions were prosperous prior to the outbreak of these panics.<sup>54</sup>

### **Panics of 1893 and 1907: Depression/Recession**

Prior to the outbreak of the Panics of 1893 and 1907, economic conditions were declining, according to the newspaper records. On the eve of the outbreak of the Panic of 1893, there were reports of many business and mercantile failures and the *Commercial and Financial Chronicle* made general references to an “existing depression.”<sup>55</sup> On the eve of the outbreak of the Panic of 1907, there were reports of large increases in commercial failures and the press made frequent references to an “existing depression”<sup>56</sup> and to a “recession in business.”<sup>57</sup> The newspaper records suggest that these two panics occurred in the midst of a downturn.

### **Panics of 1837 and 1839: No Clear Descriptions**

In contrast to the reporting of other panics, the press failed to provide descriptions of economic conditions on the eve of the outbreak of these two panics. The section in the *New York Commercial Advertiser* that described economic conditions—the “Review of the Market”—was discontinued in 1837 and in 1839.

## **E. The Effect of Banking Panics on Output and Prices**

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<sup>52</sup> Sept 13, 1873, *Commercial and Financial Chronicle*, “Commercial Epitome,” p. 358.

<sup>53</sup> “Report of Comptroller of the Currency” in the *Commercial and Financial Chronicle*, Dec 6, 1873, p. 767-768.

<sup>54</sup> For more accounts, see the appendix.

<sup>55</sup> *Commercial and Financial Chronicle*, June 10, 1893, “The Financial Situation,” p. 946 and *Commercial and Financial Chronicle*, May 13, 1893, “The Depression in the Iron and Steel Trades,” p.775.

<sup>56</sup> *Commercial and Financial Chronicle*, Oct 5, 1907, “The Financial Situation,” p. 826-8.

<sup>57</sup> *Commercial and Financial Chronicle*, Nov 2, 1907, “Review of October,” p. 22.

Equipped with my classification of panics, I analyze the impact of banking panics on output. I estimate the relationship between banking panics and output under a variety of restrictions. Then, I investigate the impact of banking panics on inflation and the price level.

## Output

*Methodology.* To determine how output behaves following banking panics, I regress output growth on a constant, lagged values of output growth, a panic dummy and lagged panic dummies. I include lagged values of output growth to model the normal behavior of output. I include contemporaneous and lagged panic dummies to measure the direct impact of a panic on output growth. To measure output, I use the Davis Index of Industrial Production.

I estimate the following regression:

$$\Delta y_t = a_0 + \sum_{k=0}^3 b_k P_{t-k} + \sum_{j=1}^3 c_j \Delta y_{t-j} + e_t$$

where  $y$  is the log of the Davis Index of Industrial Production and  $P$  is a panic dummy.<sup>58</sup> I estimate three different specifications of the above regression, with each specification corresponding to a distinct restriction on the panic dummy variable. In the first specification, I include panics that received a 3 on the first dimension of the scale in the panic dummy, in the second, I include panics that received a 2 or a 3 on the first dimension and in the third, I include only those panics that received a 3 on both dimensions of the scale. The first specification presents the baseline case in which all panics that received a 3 on the first dimension of the scale—those that the newspaper records attribute to events unrelated to output fluctuations—are included in the panic dummy variable. The second specification takes into account the possibility that panics that received a ranking of 2 on the first dimension of the scale were, in fact, not caused by output fluctuations. The third specification presents the most restrictive case in which only

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<sup>58</sup> This empirical framework can be thought of as a VAR with a single variable (log change in output) and with an exogenous variable (the panic dummy). It is similar to the framework used by Romer and Romer (1989, 2004) to identify the effects of monetary policy and to the framework used by Ramey (2008), Ramey and Shapiro (1998), and Romer and Romer (2008) to identify the effects of fiscal policy.

panics that received a 3 on both dimensions of the scale—those that did not break out in the midst of a downturn and that were not caused by output fluctuations, according to the newspaper records—are included in the panic dummy. The sample period is 1825 to 1915, the final year of the Davis Index of Industrial Production.

*Results.* Table 8 presents the estimates. In all three specifications, the coefficients on the first lag of the panic dummy are negative and statistically significant. The coefficient is -0.102 in specification 1, -0.130 in specification 2, and -0.091 in specification 3, indicating that output growth declines by approximately nine to thirteen percentage points in the year following a major banking panic. The respective t-statistics are -2.86 (p-value = 0.005), -4.30 (p-value < 0.001), and -2.14 (p-value = 0.035).

The impulse response functions implied by the estimated regressions are shown in figure 2. They map out the implied response of output to a unit shock in the panic dummy variable. The figures contain one standard error bands. The impulse response functions show that panics have large and significant effects on output. In the contemporaneous year, output remains roughly constant: it increases slightly in the third impulse response function—an increase that is statistically insignificant from zero—and decreases modestly in the first and second impulse response functions. However, in the year following the panic—year 1, there is a large decline in output: 13.3 percent according to the first impulse response function, 15.5 percent according to the second, and 8.3 percent according to the third. The impact remains fairly constant in years 2 and 3, decreasing slightly in year 2, but then increasing slightly again in year 3. The results are robust across all three specifications.<sup>59</sup>

*A Monthly Measure of Output.* A monthly output series—the Long Index of Urban Construction—is available beginning in 1868. It measures building construction in thirty-five major cities. In his work *Building Cycles and the Theory of Investment*, Long (1940) argues that building was a leading investment goods industry in the 19<sup>th</sup> and early 20<sup>th</sup> centuries and as a consequence, that his series can be used as a

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<sup>59</sup> As an additional robustness check, including the Panic of 1837 and the Panic of 1839—the two panics excluded from my ranking—in the panic dummy does not change the results in any of the three specifications. If anything, the results become more significant with their inclusion.

proxy for investment.<sup>60</sup> At the very least, the index is a reliable measure of construction, an important indicator of real economic activity.

The regression I use to estimate the monthly impact of banking panics on output is:

$$\Delta LongIndex_t = a_0 + \sum_{k=0}^{24} b_k P_{t-k} + \sum_{i=1}^{24} c_i \Delta LongIndex_{t-i} + \sum_{j=1}^{11} d_j D_{jt} + e_t$$

where LongIndex is the log of the Long Index of Urban Construction, the  $D_j$ 's are monthly dummies, and P is a dummy variable that equals one in the month in which a major banking panic breaks out. I include 24 lags of the panic dummy to measure the lagged effects of the panic. I estimate two different specifications of the regression. In the first specification, I include panics that received a 3 on the first dimension of the scale, and in the second specification, I include panics that received a score of 2 or 3 on the first dimension of the scale. I do not include a regression that restricts the dummy variable to panics that received a 3 on both dimensions of the scale since only one banking panic satisfies this criterion between 1868 and 1914.

The estimates are presented in table 9. In both regressions, the coefficients of the first several lags of the panic dummy are negative, large, and in most cases, significant. In the first regression, the coefficients for the contemporaneous month and lags 1, 2, 3, and 4 are -0.283 (t-stat = -1.68), -0.335 (t-stat = -1.99), -0.849 (t-stat = -5.04), -0.454 (t-stat = -2.63), and -0.224 (t-stat = -1.29), respectively. In the second regression, the coefficients are -0.218 (t-stat = -1.61), -0.278 (t-stat = -2.05), -0.649 (t-stat = -4.76), -0.339 (t-stat = -2.43), and -0.312 (t-stat = -2.23), respectively.

Figure 3 presents the impulse response functions. They show the cumulative impact of a major banking panic, along with one standard error bands. The impulse response functions show that panics have rapid effects. Output declines to its lowest level two months after the panic: a 65.5% decline according to the first specification and a 55.8% decline according to the second. Output then increases slightly for a few months, but then hovers at roughly the same level for the remainder of the period, fluctuating within a relatively narrow band.

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<sup>60</sup> Grossman (1993) adopts this interpretation.

## Prices

In addition to the output effects of panics, I evaluate the impact of a banking panic on inflation and the price level. My methodology for prices is similar to the one for output. In particular, I estimate the following regression:

$$\Delta price_t = a_0 + \sum_{k=0}^{12} b_k P_{t-k} + \sum_{i=1}^{12} c_i \Delta price_{t-i} + \sum_{j=1}^{11} d_j D_{jt} + e_t$$

where price is the log of the USA Annalist Wholesale Price Index, P is a panic dummy variable, and the D's are monthly dummies. The sample period is 1854, the first year included in the USA Annalist Wholesale Price Index, to 1914.<sup>61</sup> I estimate three different specifications of the above regression, with each specification corresponding to a distinct restriction on the panic dummy variable. In the first specification, I include panics that received a 3 on the first dimension of the scale, in the second, I include panics that received a 2 or 3 on the first dimension, and in the third, I include only those panics that received a 3 on both dimensions.

The estimates are shown in table 10. Eight of the twelve coefficients of the lagged panic dummies are negative in the first specification, nine are negative in the second, and seven are negative in the third. The coefficient of the panic dummy is largest and most significant in month two in all three specifications: -0.041 (t-stat = -3.47), -0.033 (t-stat = -3.24), and -0.048 (t-stat = -3.25), respectively.

Figure 4 shows the cumulative impact of a banking panic on the wholesale price index, along with one-standard error bands. There is a rapid decline in the price level in the immediate months succeeding the panic. The decline slows down over time, but continues over the course of a year. The impacts at month 12 are -13.1%, -11.2%, and -12.5% for the three specifications, respectively.

## 4.2 A VAR-Based Approach

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<sup>61</sup> The price data come from [globalfinancialdata.com](http://globalfinancialdata.com). The index incorporates the wholesale prices of twenty-five commodities. It begins in 1854 and ends in 1940.

The results from the narrative test are strong; they indicate that banking panics have large and strongly significant effects on output. Indeed, the benefits of adopting a narrative approach are substantial: by bringing in additional evidence on the causes of panics, the narrative approach provides a direct way of addressing identification concerns. However, an alternative methodology for dealing with the identification problem—one that can provide a useful check on the findings from the preceding section— involves the use of Vector Autoregressions. VARs are frequently used in the literature to estimate the effects of policy and other macroeconomic events. VARs possess the benefit of controlling for the prior behavior of all variables in the system.

The basic VAR that I estimate has two variables: a panic dummy series that equals one in the year in which a major banking panic breaks out and the change in log output. The panic dummy includes all seven major banking panics identified in my series from 1825-1929. Output is measured using the Davis Index of Industrial Production. The VAR is ordered such that the panic dummy can affect output growth within the contemporaneous period.

Figure 5 presents the results from the VAR. It shows the impulse response functions of the panic dummy and output to shocks of one unit in the panic dummy and one-percentage point in output growth, along with one-standard error bands. Panels A and D show that both the panic dummy and output growth exhibit few dynamics in response to shocks in their own series: in both cases, shocks lead to small and irregular movements in the two respective series.

Panel B shows that the movements in the panic dummy in response to an output shock are insignificant. After a one-percentage point innovation to output growth, the panic dummy increases by an insignificant 0.41 units one year after the shock ( $t\text{-stat} = 0.90$ ), returning in years 2 and 3 to roughly zero. The  $p$ -value for the test of the null hypothesis that output does not Granger-cause the panic dummy series is 0.79, suggesting that the panics are unrelated to past movements in output.

The main result of the VAR is in panel C. It presents the behavior of output following a unit shock in the panic dummy variable. The results are very similar to those from the preceding section. The estimated maximum effect is a decline of 13.5 percent in the year following the panic ( $t\text{-stat} = -4.42$ ),

comparable to the earlier results. Thus, both the narrative approach and the results from the VAR corroborate one another: they indicate that panics cause output declines.

### **4.3 Related Macroeconomic Findings**

Armed with the new panic series, this subsection investigates three related macroeconomic issues: (1) the role of panics as a source of economic instability before the founding of the Fed, (2) how downturns with major banking panics differed from downturns without them, and (3) the behavior of trend output in the aftermath of panics.

#### **A. Panics as a Source of Output Volatility, 1825-1914**

In assessing the determinants of historical changes in output variability, DeLong and Summers (1986) conclude that financial panics were not a significant source of economic instability prior to World War II:

“The view that financial panics were a principal cause of economic instability before World War II does not seem to be strongly supported. This finding weakens the monetarist argument linking output variability to erratic monetary growth by showing that relatively little of the variability in output observed before World War II can be linked to exogenous changes in the money stock.”<sup>62</sup>

They base this conclusion on their finding that no more than a small portion of the variance in output between 1890 and 1910 can be attributed to financial panics. However, their findings depend on their panic series.

According to my new series, how important were panics as a source of economic instability? The Davis Chronology of Business Cycle Turning Points provides a useful indicator for the pre-WWI period. Davis (2006) isolates fifteen turning points—fifteen downturns—between 1825 and 1915 using the Davis Index of Industrial Production. Table 13 presents the Davis Chronology.

Seven of these fifteen cycles—or 47 percent—contained major banking panics: 1833-1834, 1836-1837, 1839-1840, 1856-1858, 1873-1875, 1892-1894, and 1907-1908. This suggests that banking panics either caused or—at the very least—seriously aggravated nearly half of all business cycle downturns

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<sup>62</sup> Pages 692-693.

between 1825 and 1914. If I exclude the three cycles contained within a major war—the two Civil War cycles from 1860 to 1861 and 1864 to 1865 and the World War I cycle from 1913 to 1914, then seven of the twelve non-war downturns—or 58 percent—contained major banking panics.

An alternative measure of the role of panics as a source of output volatility is the  $R^2$  in a regression that includes a panic dummy equal to one in the year in which a major banking panic breaks out, three lagged panic dummies, and three lagged log changes in output (measured using the Davis Index) as right-hand side variables and that uses the log change in output as the left-hand side variable. The  $R^2$  in such a regression is 0.28, indicating that roughly 28% of the variation in the growth rate of output can be explained by the right-hand side variables. By contrast, the  $R^2$  in a regression that excludes the contemporaneous and lagged panic dummies—but otherwise remains the same—is 0.01.

These results suggest that banking panics were a substantial source of output volatility in the 85 years prior to the founding of the Federal Reserve. Indeed, the presence of major banking panics in nearly half of all business cycle downturns prior to WWI and their reoccurrence during the Great Depression—the sharpest downturn in U.S. history—suggest that panics were a significant source of economic instability throughout much of U.S. history.<sup>63</sup>

## **B. Downturns with Major Banking Panics versus Downturns without Major Banking Panics**

Equipped with an accurate listing of when major banking panics occurred and with the Davis Chronology, I am also able to examine how downturns with major banking panics differed from downturns without them. Table 14 compares downturns with major banking panics from downturns without major banking panics on three dimensions: severity (the percentage decline in output from peak-to-trough), the length of the downturn (the length of time from peak-to-trough), and the length of recovery (the length of time output took to recover from its trough back to its pre-downturn peak level). The table reports averages for the entire 1825-1914 period. It also presents averages for the pre-Civil war and post-Civil

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<sup>63</sup> These results also indicate that the avoidance of banking panics after 1933 deserves some credit for improved macroeconomic stability in the postwar period.

war sub-periods. Because wartime conditions represent special economic circumstances that may have their own unique features, the table omits the three downturns that occurred in the midst of major wars—that is, the two downturns during the Civil War (1860-1861 and 1864-1865) and the downturn at the beginning of World War I (1913-1914).

Table 14 reveals that in the post-Civil War period, downturns with major banking panics differed from downturns without them. Between 1865 and 1915, downturns with major banking panics were slightly longer and substantially more severe than downturns without major banking panics on average, and output recoveries for downturns with major banking panics were two-to-three times the length of output recoveries for downturns without them. Specifically, for downturns with major banking panics, the average percentage decline in output was 12.3%, the average length of time from peak-to-trough was 1.7 years, and the average length of recovery was 2.7 years. For downturns without major banking panics, the average percentage decline in output was 4.5%, the average length of time from peak-to-trough was 1.3 years and the average length of recovery was 1 year.

However, similar patterns do not hold in the pre-Civil War period. Before the Civil War, downturns with major banking panics were not, on average, more severe than downturns without them and the average length of recovery was the same for both downturns with major banking panics and downturns without them. Why do strong differences exist in the post-Civil War era and not in the pre-Civil War era? One hypothesis is that structural changes to the U.S. economy over time—the transformation of an agricultural economy to a more industrial one or a greater reliance on bank credit—rendered the U.S. economy more vulnerable to disruptions in the banking sector. The hundred years prior to the Great Depression was a period of dramatic economic transformation; it is highly plausible that changes to the U.S. economy increased the susceptibility of the real economy to banking panics over time.

### **C. Trend and Level Effects**

How long do the effects of banking panics last? Are panics shocks to the economy that get rapidly undone? Does output quickly revert back to trend? Or do panics disrupt the normal dynamics of output in

ways that persist over time? There appears to be a growing consensus in the literature that banking crises can have highly persistent and lingering effects on output. Several recent studies—primarily confined to banking crises over the past half-century—have arrived at this conclusion. Using a panel data set for a large number of countries in the post-1960 period, Cerra and Saxena (2008) find that following financial crises, output does not, on average, revert back to its pre-crisis trend. In an analysis of 88 banking crises since 1970, the IMF’s October 2009 World Economic Outlook concludes that output typically does not recover to its pre-crisis trend over the medium term—that is, within the first seven years after the crisis. In a study of 40 banking crises since 1980, Cecchetti, Kohler, and Upper (2009) find that many banking crises have long-lasting effects on output and that trend reversion—when it occurs—tends to be a slow process.

Do similar patterns hold for the banking panics of the pre-Great Depression era? The impulse response functions in figure 2 provide some insight into this question. The impacts on output in year 1 are large. But rather than weaken in subsequent years, the impacts hover at roughly the same level they did in year 1—there is no reversion back to zero, suggesting that the effects of panics persist over time.<sup>64</sup> The relatively constant level of the impact in subsequent years indicates that there may be a persistent level effect associated with panics. Even after output growth resumes, in other words, the level of output at any point in time may be lower than where it would have been had the panic never occurred.

To further investigate whether the banking panics of the pre-Great Depression era might have had lingering effects on the behavior of output, I estimate a trend regression for each major banking panic. The regression takes the following form:

$$\ln y_t = \alpha_0 + \alpha_1 D_t + \beta_0 t + \beta_1 D_t t + \varepsilon_t,$$

where  $y_t$  is the Davis Index of Industrial Production in year  $t$  and  $D_t$  is a dummy variable that equals 1 if year  $t$  is in the post-panic period and 0 if year  $t$  is in the pre-panic period. I include the dummy variable to identify changes in trend following the panic. Since the Davis Index is available at an annual frequency and since I want to come as close as possible to separating periods by banking panics, I implement a

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<sup>64</sup> Extending the model to include more lags finds that the estimated impacts are still below zero ten years out in all three specifications. However, the standard errors grow considerably over time, making the impacts in later years less precisely estimated.

specific criterion for panic years. If the panic broke out in the first half of the year, then I include that year in the post-panic period. If the panic broke out in the second half of the year, then I include that year in the pre-panic period. For uniformity across panics, I restrict each pre-panic period to the fifteen years prior to the panic. To avoid contaminating the behavior of output following the panic with the behavior of output following a subsequent panic, each post panic period ends before the next major banking panic. Because there were three major banking panics during the 1830's—1833, 1837, and 1839, I begin my analysis in 1840, rather than try to estimate shifts in trend between the panics of 1833 and 1837, which only spans four years, and between the panics of 1837 and 1839, which only spans two years. Thus, I run four separate regressions, corresponding to each of the four major banking panics of the post-Jacksonian period: 1857, 1873, 1893, and 1907.

Figure 6 presents a graphical representation of these breaks in trend. It contains four graphs, with each graph corresponding to a different banking panic. Each graph plots the log of the Davis Index of Industrial Production on the vertical axis and year on the horizontal axis. Pre-panic and post-panic trends—based on the above regressions—are contained in each graph. To show where output would have been had it continued to follow its pre-panic trend, I project each pre-panic trend line out into the subsequent period. The solid lines represent actual trends whereas the dashed lines represent projected trends. Following the panics of 1857, 1893, and 1907, the actual trend line falls below the projected trend line. In these three instances, output does not rapidly revert back to its pre-panic trend. For the panic of 1893, the projected and actual trends are parallel, suggesting that a level effect is associated with this panic. For the panics of 1857 and 1907, the actual trend is significantly flatter than the projected trend, indicating a decline in trend output growth following these panics. In the remaining projection—the one corresponding to the 1873 panic episode, the actual trend line crosses the projected trend line, indicating that output reverts back to its pre-panic trend.

These findings for the pre-Great Depression era are consistent with the growing consensus in the literature that banking crises can have lingering effects on output. What do these results predict for the path of output as it continues to recover from the banking crisis of 2008? While it is impossible to precisely

predict how output will behave in the years ahead, the results of these studies and the findings of this paper suggest that following major banking disturbances, rapid reversion to the pre-crisis trend is far from certain.

## **Part V. Conclusions**

There are two major problems in identifying the real output effects of financial panics of the pre-Great Depression era. First, it is not clear when panics occurred because prior panic series differ in their identification of panics. Second, establishing the direction of causality is tricky: are panics causing downturns or are downturns causing panics?

This study sequentially addresses these two problems. It accomplishes this (1) by deriving a new series on banking panics for the 1825-1929 period—one that rectifies many of the problems of earlier series—and (2) by studying the output effects of major banking panics via both narrative and VAR-based methods.

In the process, I discover some major misconceptions in the history of American financial panics. First, prior panic series presented flawed lists of when panics occurred. Several series lumped together different types of financial disturbances—banking panics, stock market disturbances, increases in interest rates—under the common heading of panic. Some series omitted important panic episodes. A few series incorrectly identified foreign banking panics as domestic ones. These inconsistencies are the result of methodological flaws in the development of earlier series. Many panic series did not explicitly define a panic and most series did not adopt a consistent rule to identify panics.

Second, contrary to the conventional wisdom, there is no evidence of a decline in the frequency of financial panics during the first fifteen years of the existence of the Federal Reserve. The orthodox view in the literature—that the frequency of panics was high before 1914 and that the frequency dramatically decreased between 1914 and 1929—was based on an unreliable panic series.

Third, prior studies on the causes and effects of panics based their conclusions on inconsistent panic series. While my findings support the general conclusions of Miron (1986) that major financial panics—in particular, major banking panics—were more likely to occur during particular seasons prior to the founding of the Federal Reserve, Miron employed an unreliable panic series—the Kemmerer series—to document the incidence of panics before 1914. Moreover, DeLong and Summers (1986), in an influential work on historical changes in business cycle variability, concluded that (1) the real output effects of panics are smaller than generally realized and (2) there is little support for the hypothesis that panics were a substantial source of economic instability prior to WWII. However, my results show the exact opposite: major banking panics have large and significant real output effects and they were a significant source of economic instability before WWII. DeLong and Summers missed the link between panics and downturns because they relied on a flawed panic series.

As for the results of my empirical tests, I find that major banking panics have large effects. My results indicate that banking panics have strongly significant effects on output. According to my estimates, output growth declines by approximately 9 to 13 percentage points in the year following a major banking panic. In addition, using monthly data on real economic activity, I show that panics have rapid effects on output. These results are robust to a variety of specifications.

My results also indicate that banking panics have significant effects on inflation and the price level. According to the empirical findings, banking panics cause declines in the price level of 11 to 13 percent within one year, depending on the specification. The decline is most rapid in the immediate months following the panic, but continues over the course of a year.

These findings shed important insights into the causes of the Great Depression. Banking panics cause large declines in output, suggesting that the banking panics of the Great Depression can account for a significant portion of the output losses occurring between 1930 and 1933. These results are consistent with the view of Friedman and Schwartz (1963) that a wave of banking panics converted a normal downturn into a severe depression. They also support the work of Bernanke and James (1991) who find

that countries with banking panics had more severe downturns between 1929 and 1933 than countries without banking panics.

Moreover, these results have several implications for the recent banking crisis. First, banking panics produce deflationary shocks, making the avoidance of deflation a well justified goal of policy in the immediate aftermath of the crisis. As the banking crisis of 2008 unfolded, policymakers expressed concerns about the potential deflationary consequences of the crisis. Minutes of the Federal Open Market Committee meetings reveal that Fed officials were closely monitoring for any signs of deflation, with many officials expressing concerns that there were “significant risks that inflation could decline and persist for a time at uncomfortably low levels.”<sup>65</sup> That the banking panics of the pre-Federal Reserve era were followed by large declines in prices legitimizes those concerns.

Second, downturns with major banking panics differ from downturns without them. In the post Civil War era, downturns with major banking panics were slightly longer and substantially more severe than downturns without them on average, and output recoveries for downturns with major banking panics were two-to-three times the length of output recoveries for downturns without them. That the Great Recession has been substantially more severe than the typical postwar recession and been followed by a protracted recovery period is consistent with these historical trends.

Third, the effects of major banking panics can persist over time. This is important both from the perspective of adopting policies to mitigate output losses and from the perspective of forecasting what might happen to output in the years ahead. Output does not necessarily rapidly revert back to trend following a major banking panic. Indeed, output did not rapidly revert back to its pre-panic trend following three of the four major banking panics of the post-Jacksonian period. These findings underscore the stakes of the banking crisis of 2008 and should raise warnings that the U.S. economy could end up on a lower output trajectory or that it could take many years for output to catch up to its pre-crisis trend. It is highly plausible that forces beyond the scope of this study—policies designed to stimulate economies,

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<sup>65</sup> Minutes of the Federal Open Market Committee, December 15-16, 2008.

avoid deflation and stabilize banking systems—could have a significant impact on the path of output in the years ahead.

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Table 1  
Eight Panic Series, 1825-1929

Bordo-Wheelock	Thorp	Reinhart-Rogoff: Table A3	Reinhart-Rogoff: Table A5	Gorton	Sprague	Wicker	Kemmerer	DeLong-Summers
Banking Panic	Panic	Banking Crisis	Banking Crisis	Banking Panic	Crisis	Banking Panic	Panic	Panic
1790-1933	1790-1925	1800-2007	1800-2007	1863-1914	1864-1910	1864-1914	1873-1908	1890-1913
	1825	1825	1825					Jan 1825
	1833	1833						
			1836					
	1837	1837						March 1837 - 1838
	1839	1839						
								March 1841
								1847
	1857	1857	1857					Aug 1857
								Dec 1861
								April 1864
	1873	1873	1873	Sept 1873	1873 (Crisis)	Sept 1873 (Panic)	Sept 1873 (Major)	Sept 1873 (Major)
								April 1876 (Minor)
1878 (financial distress)								Nov 1879 (Minor)
								May-June 1880 (Minor)
								March-April 1882 (Minor)
1884 (financial distress)		1884	May 1884	June 1884	1884 (Panic)	May 1884 (Incipient Panic)	May 1884 (Major)	May 1884 (Major)
								June 1887 (Minor)
								March-April 1888 (Minor)
1890 (financial distress)		1890		Nov 1890	1890 (Financial Stringency)	Nov 1890 (Incipient Panic)	Nov 1890 (Major)	1890:4
								Feb 1893 (Minor)
	1893	1893	May 1893	May 1893	1893 (Crisis)	Jun-Aug 1893 (Panic)	May - Aug 1893 (Major)	1893:2 and 1893:3
								Sept-Dec 1895 (Minor)
								1896:1
				Oct 1896				June-July 1896 (Minor)
								1896:3
								Dec 1896 (Minor)
								March 1898 (Minor)
								1898:2
								Sept 1899 (Minor)
								Dec 1899 (Major)
								1899:4
								May 1901 (Major)
								1901:2
								July 1901 (Minor)
								Sept 1901 (Minor)
								Sept-Nov 1902 (Minor)
								March - Aug 1903 (Major)
								1903:2
								Dec 1904 (Minor)
								April 1905 (Minor)
								1905:4
								April-May 1906 (Minor)
								Dec 1906 (Minor)
			March 1907					March 1907 (Minor)
	1907	1907	1907	Oct-07	1907 (Crisis)	Oct 1907 (Panic)	Oct 1907 (Major)	1907:4
								Sept 1908 (Minor)
								1909:4
			1914	Jul-14	Aug-14			
1920s (financial distress)								
	1929-1933		1929	1929-1933				
1980s (financial distress)								
			1984	1984-1991				
			2007					

Table II  
New Series on Banking Panics, 1825-1929

Major Banking Panic	Minor Banking Panic
Nov 1833 - Apr 1834	
Mar - May 1837	
Oct 1839	
	Jan - April 1841 (PA, DE, MD, NC, VA, IL)
	Mar 1842 (PA)
	May - Jun 1842 (New Orleans)
	Oct 1851 (NY, NJ, MD)
	Sep 1854 - Feb 1855 (OH, IN, MI, WI, IA, MO, NY, CA)
Aug - Oct 1857	
	Nov 1860 (suspension of specie payments by banks in the South)
	Dec 1861 (generalized suspension of specie payments)
Sep 1873	
	May 1884 (NYC, PA, NJ)
	Nov 1890 (New York City)
May - Aug 1893	
	Dec 1896 (IL, MN, WI)
	Dec 1899 (Boston and New York City)
	Jun - Jul 1901 (New York: Buffalo and NYC)
	Oct 1903 (PA, MD)
	Dec 1905 (Chicago)
Oct - Nov 1907	
	Jan 1908 (New York City)
	Aug - Sep 1920 (Boston)
	Nov 1920 - Feb 1921 (North Dakota)
	Jul 1926 (FL, GA)
	Mar 1927 (FL)
	Jul - Aug 1929 (FL)

Table III

## Comparison of Eight Earlier Panic Series with New Series on Banking Panics

Entries with a Strike Through Them Denote Episodes Not Listed in New Series on Banking Panics. Those episodes do not contain banking panics.

Bordo-Wheelock 1790-1933	Thorp 1790-1925	Reinhart-Rogoff: A3 1800-2007	Reinhart-Rogoff: A5	Gorton	Sprague 1863-1914	Wicker 1864-1910	Kemmerer 1864-1914	DeLong-Summers 1873-1908	DeLong-Summers 1890-1913	New Series (Major) 1825-1929	New Series (Minor) 1825-1929
	<del>1825</del>	<del>1825</del>	<del>1825</del>								
	1833	1833								Nov 1833 - Apr 1834	
			<del>1836</del>								
	1837	1837		March 1837 - 1838						Mar - May 1837	
	1839	1839								Oct 1839	
				March 1841							Jan - April 1841
											Mar 1842
											May - Jun 1842
											October 1851
											Sep 1854 - Apr 1855
	1857	1857	1857	Aug 1857						Aug - Oct 1857	
				Dec 1861							Nov 1860
				<del>April 1864</del>							Dec 1861
	1873	1873	1873	Sept 1873	Sept 1873	1873 (Crisis)	Sept 1873 (Panic)	Sept 1873 (Major)			Sept 1873
	<del>1878 (financial distress)</del>							<del>April 1876 (Minor)</del>			
								<del>Nov 1879 (Minor)</del>			
								<del>May-June 1880 (Minor)</del>			
								<del>March-April 1882 (Minor)</del>			
	1884 (financial distress)		1884	May 1884	June 1884	1884 (Panic)	May 1884 (Incipient Panic)	May 1884 (Major)			May 1884
								<del>June 1887 (Minor)</del>			
								<del>March-April 1888 (Minor)</del>			
	1890 (financial distress)		1890		Nov 1890	1890 (Stringency)	Nov 1890 (Incipient Panic)	Nov 1890 (Major)	1890:4		Nov 1890
								<del>Feb 1893 (Minor)</del>			
	1893	1893		May 1893	May 1893	1893 (Crisis)	June-August 1893 (Panic)	May - Aug 1893 (Major)	1893:2 and 1893:3	May-Aug 1893	
								<del>Sept-Dec 1895 (Minor)</del>			
										<del>1896:1</del>	
					<del>Oct 1896</del>			<del>June-July 1896 (Minor)</del>		<del>1896:2</del>	
								Dec 1896 (Minor)			Dec 1896
								<del>March 1898 (Minor)</del>			
										<del>1898:2</del>	
								<del>Sept 1899 (Minor)</del>			
								Dec 1899 (Major)	1899:4		Dec 1899
								<del>May 1901 (Major)</del>	1901:2		
								July 1901 (Minor)	1901:2 (same as above)		Jun-Jul 1901
								<del>Sept 1901 (Minor)</del>			
								<del>Sept-Nov 1902 (Minor)</del>			
								<del>March - Aug 1903 (Major)</del>	<del>1903:2</del>		
											Oct 1903
								<del>Dec 1904 (Minor)</del>			
								<del>April 1905 (Minor)</del>			
									1905:4		Dec 1905
								<del>April-May 1906 (Minor)</del>			
								<del>Dec 1906 (Minor)</del>			
								<del>March 1907 (Minor)</del>			
	1907	1907	1907		Oct-07	1907 (Crisis)	Oct 1907 (Panic)	Oct 1907 (Major)	1907:4	Oct - Nov 1907	
											Jan 1908
								<del>Sept 1908 (Minor)</del>			
										<del>1909:4</del>	
											Aug - Sep 1920
											Nov 1920 - Feb 1921
											Jul 1926
											Mar 1927
											Jul-Aug 1929

Table IV  
Frequency of Banking Panics

<b>Banking Panics</b>	<b>Pre-Fed</b>	<b>Post-Fed (1914 - 1929)</b>
	Average Rate	Average Rate
Major	one every 12.9 years (median # years b/w major bank panics = 16)	no major banking panics between 1914 and 1929 (next one occurs in 1930, 16 years after 1914)
Minor	one every 6 years	one every 3.5 years

Table V  
Seasonality of Banking Panics

<b>Distribution of Panics by Starting Months</b>		
	Major Bank	Minor Bank
<u>Spring</u>		
March	1	1
April	1	0
May	0	2
<u>Summer</u>		
June	0	1
July	0	0
August	1	0
<u>Fall</u>		
September	1	1
October	2	2
November	1	2
<u>Winter</u>		
December	0	4
January	0	2
February	0	0
Percentage Spring & Fall	85.7	53.3
Percentage Summer & Winter	14.3	47.7

Table VI  
Correlation of Major Banking Panics and Downturns

Panic	Percent Change in Davis Index
1833	-4.5% from 1833 to 1834
1837	-1.4% from 1837 to 1838
1839	-4.7% from 1839 to 1840
1857	-8.0% from 1856 to 1858
1873	-6.0% from 1873 to 1875
1893	-15.3% from 1892 to 1894
1907	-15.6% from 1907 to 1909

Table VII  
Classification of Panics

Panic	Dimension 1	Dimension 2
1833	3	3
1837	No Rank	No Rank
1839	No Rank	No Rank
1857	3	3
1873	3	3
1893	3	1
1907	2	1

Table VIII  
The Impact of Banking Panics on Industrial Production

Specification 1: Panic Dummy = {Panics with 3 on Dimension 1}					
Panic Shock			Change in Industrial Production		
Lag	Coefficient	Standard Error	Lag	Coefficient	Standard Error
0	-0.0395	0.0359	0	-----	-----
1	-0.1024	0.0359	1	0.0315	0.1113
2	0.0240	0.0376	2	-0.1358	0.1142
3	-0.0526	0.0378	3	0.0452	0.1094
R <sup>2</sup> =0.14					
Specification 2: Panic Dummy = {Panics with 2 or 3 on Dimension 1}					
Panic Shock			Change in Industrial Production		
Lag	Coefficient	Standard Error	Lag	Coefficient	Standard Error
0	-0.0351	0.0301	0	-----	-----
1	-0.1300	0.0303	1	0.0787	0.1103
2	0.0437	0.0332	2	-0.1537	0.1132
3	-0.0583	0.0340	3	0.0642	0.1014
R <sup>2</sup> =0.25					
Specification 3: Panic Dummy = {Panics with 3 on Both Dimensions}					
Panic Shock			Change in Industrial Production		
Lag	Coefficient	Standard Error	Lag	Coefficient	Standard Error
0	0.0046	0.0426	0	-----	-----
1	-0.0910	0.0425	1	0.0234	0.1123
2	0.0071	0.0436	2	-0.1224	0.1155
3	-0.0299	0.0437	3	0.0581	0.1127
R <sup>2</sup> =0.07					

Table IX  
The Impact of Banking Panics on Construction

Specification 1: Panic Dummy = {Panics with 3 on Dimension 1}					
Banking Panic Shock			Change in Index		
Lag	Coefficient	Standard Error	Lag	Coefficient	Standard Error
0	-0.2829	0.1682	0	-----	-----
1	-0.3349	0.1684	1	-0.6597	0.0458
2	-0.8491	0.1686	2	-0.4175	0.0543
3	-0.4544	0.1729	3	-0.4385	0.0568
4	-0.2235	0.1738	4	-0.3517	0.0597
5	0.0146	0.1737	5	-0.3423	0.0609
6	-0.0713	0.1736	6	-0.2727	0.0622
7	-0.2234	0.1735	7	-0.1792	0.0631
8	0.0484	0.1738	8	-0.1978	0.0631
9	0.0131	0.1727	9	-0.2479	0.0636
10	-0.3459	0.1726	10	-0.1942	0.0646
11	-0.2111	0.1728	11	-0.0724	0.0650
12	0.1442	0.1731	12	0.0589	0.0649
13	0.2681	0.1729	13	0.1352	0.0650
14	-0.0750	0.1733	14	0.0262	0.0654
15	-0.0217	0.1732	15	-0.0415	0.0642
16	0.1075	0.1732	16	-0.0646	0.0632
17	-0.0547	0.1723	17	-0.0795	0.0623
18	0.0427	0.1720	18	-0.1119	0.0618
19	-0.2182	0.1720	19	-0.1480	0.0608
20	0.2462	0.1722	20	-0.1515	0.0593
21	0.0040	0.1714	21	-0.0615	0.0580
22	-0.3160	0.1709	22	-0.0603	0.0548
23	0.1384	0.1710	23	-0.0765	0.0517
24	-0.0338	0.1709	24	-0.0203	0.0426

R<sup>2</sup>=0.61

Specification 1: Panic Dummy = {Panics with 2 or 3 on Dimension 1}					
Banking Panic			Change in Index		
Lag	Coefficient	Standard Error	Lag	Coefficient	Standard Error
0	-0.2177	0.1356	0	-----	-----
1	-0.2783	0.1359	1	-0.6693	0.0458
2	-0.6486	0.1363	2	-0.4321	0.0544
3	-0.3393	0.1394	3	-0.4551	0.0570
4	-0.3121	0.1400	4	-0.3605	0.0601
5	-0.0778	0.1403	5	-0.3406	0.0612
6	0.0116	0.1402	6	-0.2645	0.0623
7	-0.1746	0.1401	7	-0.1611	0.0631
8	0.1513	0.1402	8	-0.1652	0.0630
9	0.1484	0.1399	9	-0.2096	0.0634
10	-0.2282	0.1400	10	-0.1567	0.0641
11	-0.0628	0.1401	11	-0.0318	0.0644
12	0.2577	0.1402	12	0.0997	0.0640
13	0.3450	0.1406	13	0.1758	0.0640
14	0.0475	0.1414	14	0.0589	0.0646
15	0.0286	0.1413	15	-0.0142	0.0636
16	0.1079	0.1412	16	-0.0338	0.0628
17	-0.0356	0.1406	17	-0.0666	0.0617
18	-0.0568	0.1405	18	-0.1204	0.0612
19	-0.1868	0.1405	19	-0.1635	0.0602
20	0.0483	0.1406	20	-0.1775	0.0587
21	-0.0129	0.1398	21	-0.0873	0.0573
22	-0.2294	0.1394	22	-0.0840	0.0542
23	0.0845	0.1394	23	-0.0901	0.0512
24	-0.1142	0.1390	24	-0.0276	0.0422

R<sup>2</sup>=0.61

Table XI  
The Impact of Banking Panics on Prices

Specification 1: Panic Dummy = {Panics with 3 on Dimension 1}					
Banking Panic Shock			Change in Prices		
Lag	Coefficient	Standard Error	Lag	Coefficient	Standard Error
0	0.0012	0.0121	0	-----	-----
1	-0.0172	0.0121	1	0.3007	0.0391
2	-0.0420	0.0121	2	0.0471	0.0407
3	-0.0123	0.0122	3	-0.0039	0.0409
4	0.0162	0.0122	4	-0.0409	0.0408
5	-0.0173	0.0122	5	-0.0289	0.0409
6	-0.0066	0.0123	6	0.0136	0.0409
7	0.0015	0.0123	7	-0.0731	0.0405
8	-0.0091	0.0122	8	0.1472	0.0405
9	-0.0102	0.0123	9	-0.0313	0.0410
10	-0.0041	0.0123	10	-0.0289	0.0412
11	0.0005	0.0122	11	-0.0209	0.0412
12	0.0026	0.0122	12	-0.0092	0.0412
R <sup>2</sup> =0.19					
Specification 2: Panic Dummy = {Panics with 2 or 3 on Dimension 1}					
Banking Panic Shock			Change in Prices		
Lag	Coefficient	Standard Error	Lag	Coefficient	Standard Error
0	0.0026	0.0105	0	-----	-----
1	-0.0242	0.0105	1	0.2971	0.0391
2	-0.0341	0.0105	2	0.0453	0.0407
3	-0.0114	0.0106	3	0.0009	0.0409
4	0.0092	0.0106	4	-0.0409	0.0408
5	-0.0109	0.0106	5	-0.0301	0.0409
6	-0.0010	0.0106	6	0.0189	0.0409
7	0.0018	0.0106	7	-0.0686	0.0404
8	-0.0058	0.0106	8	0.1445	0.0404
9	-0.0051	0.0106	9	-0.0322	0.0409
10	-0.0056	0.0106	10	-0.0256	0.0411
11	-0.0001	0.0106	11	-0.0183	0.0411
12	0.0046	0.0106	12	-0.0141	0.0411
R <sup>2</sup> =0.19					
Specification 3: Panic Dummy = {Panics with 3 on Both Dimensions}					
Banking Panic Shock			Change in Prices		
Lag	Coefficient	Standard Error	Lag	Coefficient	Standard Error
0	0.0014	0.0148	0	-----	-----
1	-0.0214	0.0148	1	0.3057	0.0390
2	-0.0483	0.0149	2	0.0433	0.0407
3	0.0014	0.0150	3	-0.0028	0.0409
4	-0.0005	0.0150	4	-0.0337	0.0408
5	-0.0254	0.0149	5	-0.0283	0.0408
6	0.0066	0.0150	6	0.0090	0.0408
7	0.0068	0.0150	7	-0.0700	0.0404
8	-0.0018	0.0150	8	0.1485	0.0405
9	-0.0116	0.0150	9	-0.0353	0.0409
10	0.0052	0.0150	10	-0.0263	0.0411
11	-0.0092	0.0149	11	-0.0191	0.0412
12	0.0049	0.0149	12	-0.0147	0.0411
R <sup>2</sup> =0.19					

Table XII

Turning Points in the Prewar U.S. Industrial Economy, 1830-1915				
Peak	Trough	Major Panic	% Change in Davis Index	
Antebellum Industrial Cycles				
1828	1829	No Major Panic	-6.0	
<b>1833</b>	<b>1834</b>	<b>Panic of 1833</b>	<b>-4.5</b>	
<b>1836</b>	<b>1837</b>	<b>Panic of 1837</b>	<b>-1.4</b>	
<b>1839</b>	<b>1840</b>	<b>Panic of 1839</b>	<b>-4.7</b>	
<b>1856</b>	<b>1858</b>	<b>Panic of 1857</b>	<b>-8.0</b>	
Civil War Industrial Cycles				
1860	1861	No Major Panic	-0.9	
1864	1865	No Major Panic	-5.2	
Postbellum Industrial Cycles				
<b>1873</b>	<b>1875</b>	<b>Panic of 1873</b>	<b>-6.0</b>	
1883	1885	No Major Panic	-6.3	
<b>1892</b>	<b>1894</b>	<b>Panic of 1893</b>	<b>-15.3</b>	
1895	1896	No Major Panic	-3.1	
1903	1904	No Major Panic	-4.7	
<b>1907</b>	<b>1908</b>	<b>Panic of 1907</b>	<b>-15.6</b>	
1910	1911	No Major Panic	-3.7	
1913	1914	No Major Panic	-10.2	

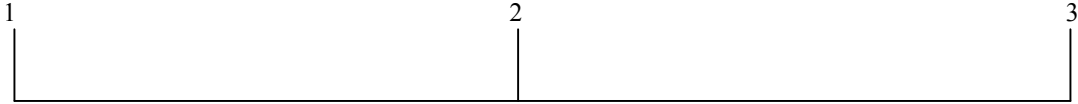
Table XII.  
Downturns with Major Banking Panics vs Downturns without Major Banking Panics

Downturns with Major Banking Panics					Downturns without Major Banking Panics				
Downturn	% Change in Output	Length in Years	Output Recovery in Years		Downturn	% Change in Output	Length in Years	Output Recovery in Years	
<b>Pre-Civil War</b>					<b>Pre-Civil War</b>				
1833-1834	-4.5	1	1		1828-1829	-6	1	1	
1836-1837	-1.4	1	1						
1839-1840	-4.7	1	1						
1856-1858	-8.0	2	1						
<b>Post-Civil War</b>					<b>Post-Civil War</b>				
1873-1875	-6.0	2	3		1883-1885	-6.3	2	1	
1892-1894	-15.3	2	3		1895-1896	-3.1	1	1	
1907-1908	-15.6	1	2		1903-1904	-4.7	1	1	
					1910-1911	-3.7	1	1	
<b>All Downturns</b>	Avg.	-7.9	1.4	1.7	Avg.	-4.8	1.2	1.0	
<b>Pre-Civil War Downturns</b>	Avg.	-4.7	1.3	1.0	Avg.	-6.0	1.0	1.0	
<b>Post-Civil War Downturns</b>	Avg.	-12.3	1.7	2.7	Avg.	-4.5	1.3	1.0	

Figure I

# Classification Algorithm

## Dimension 1 Reported Causes



Primary Cause: Event Related  
to Output Fluctuations  
--Downturn

Mixed Causes: Records  
Cite a Downturn as well  
an Event Unrelated to Output  
Fluctuations (political decisions,  
failure mismanaged bank,  
intl. contagion)

Primary Cause: Event Unrelated  
to Output Fluctuations  
--Political Decision  
--Failure of Mismanaged Bank  
--International Contagion

## Dimension 2 State of the Economy

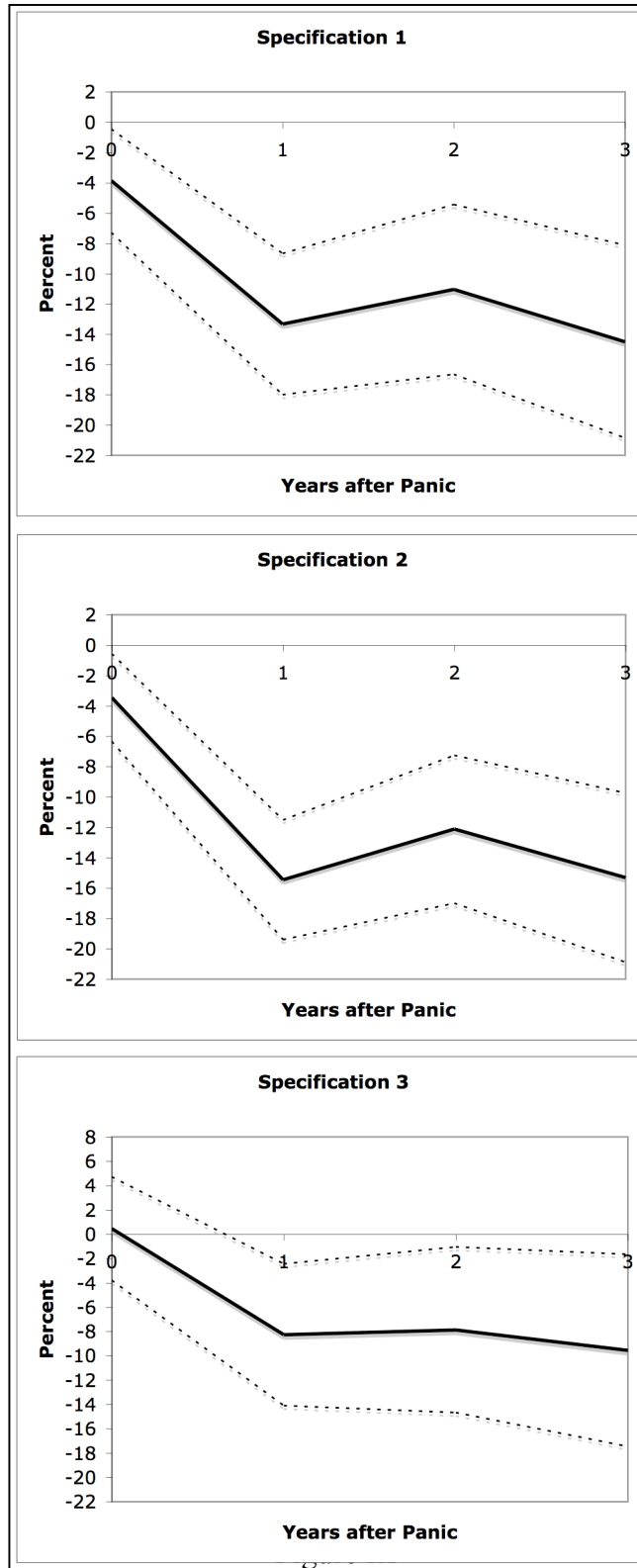


Depression/Recession on the  
Eve of the Outbreak of Panic

Mixed Reporting: Records do not  
clearly characterize conditions as either  
“prosperous” or as in “depression/recession”

Prosperity on the Eve of  
the Outbreak of Panic

Figure II  
 The Impact of a Major Banking Panic on Industrial Production



The Impact of a Major Banking Panic on Construction

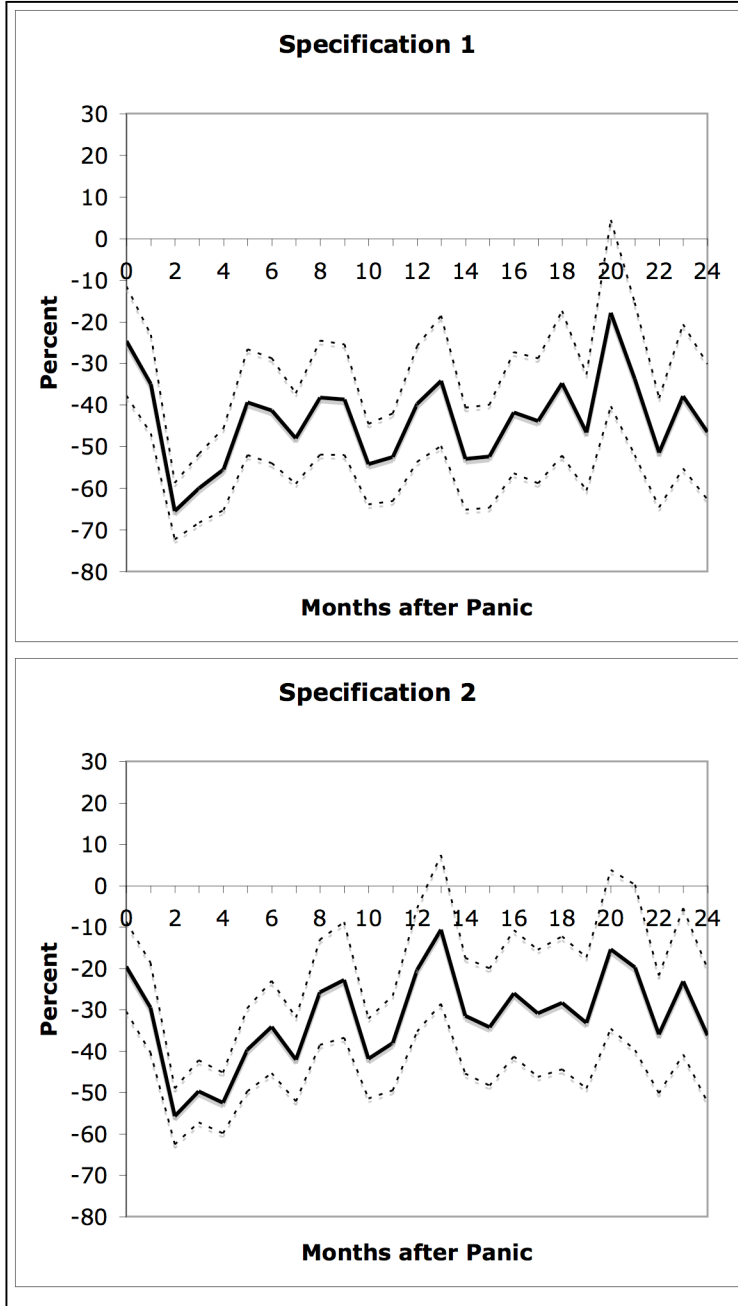


Figure IV

# The Impact of a Major Banking Panic on the Price Level

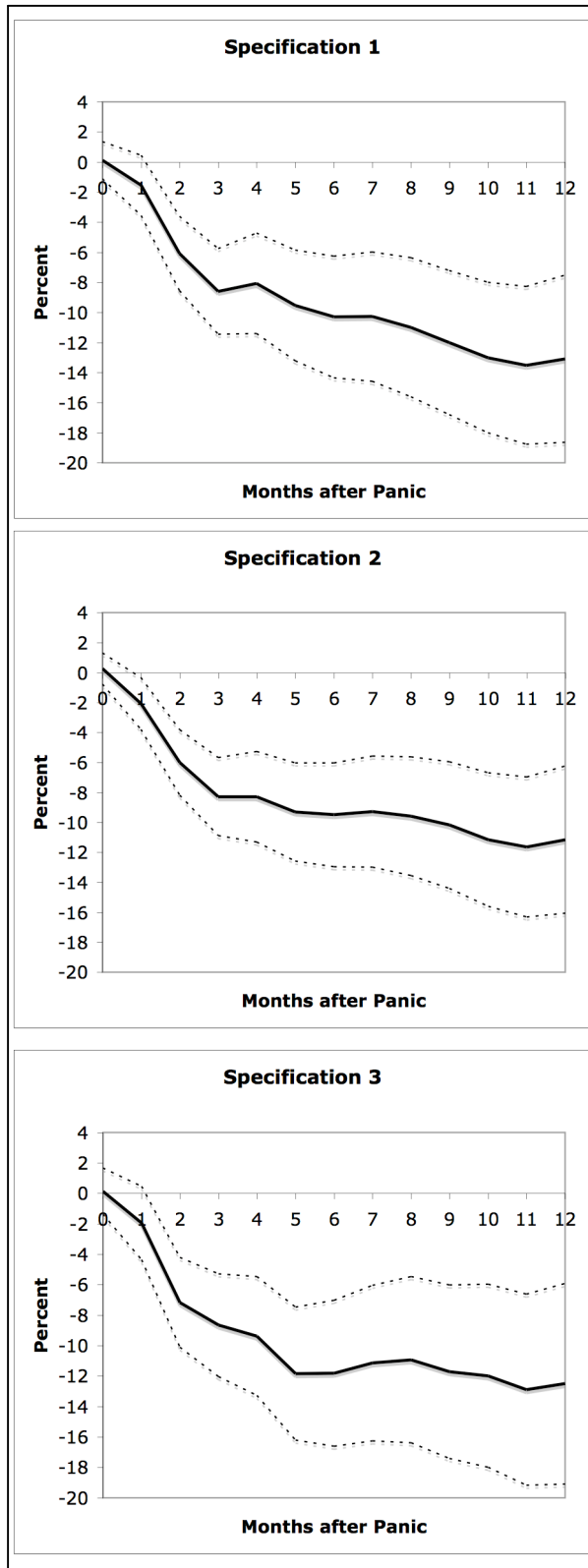
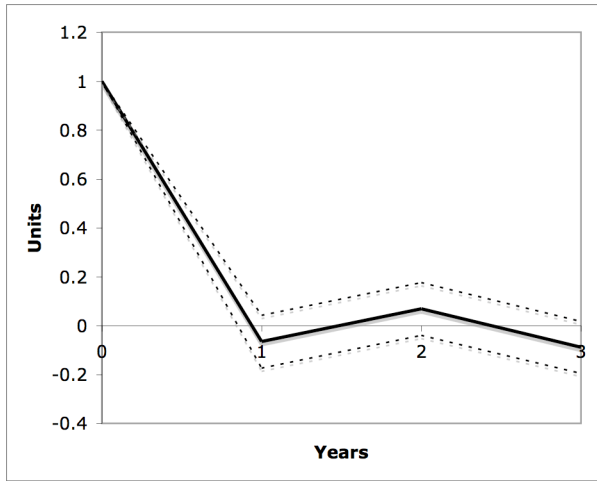
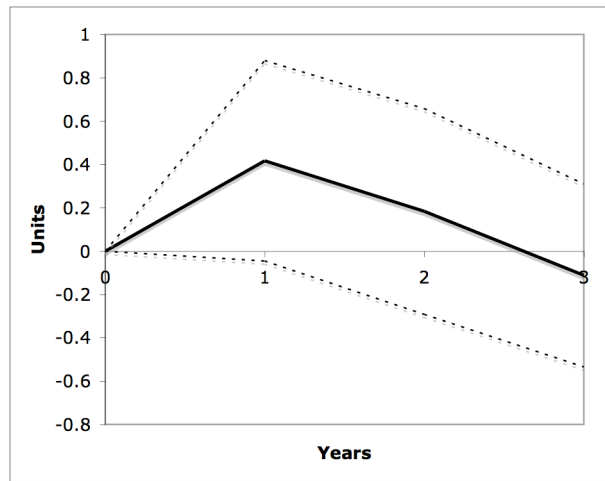


Figure V  
Results of the VAR

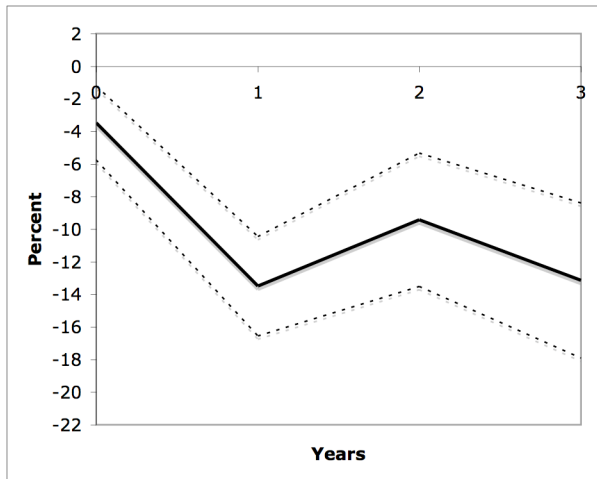
Panel A. Response of Panic to Panic



Panel B. Response of Panic to  $\Delta y$



Panel C. Response of Output to Panic



Panel D. Response of  $\Delta y$  to  $\Delta y$

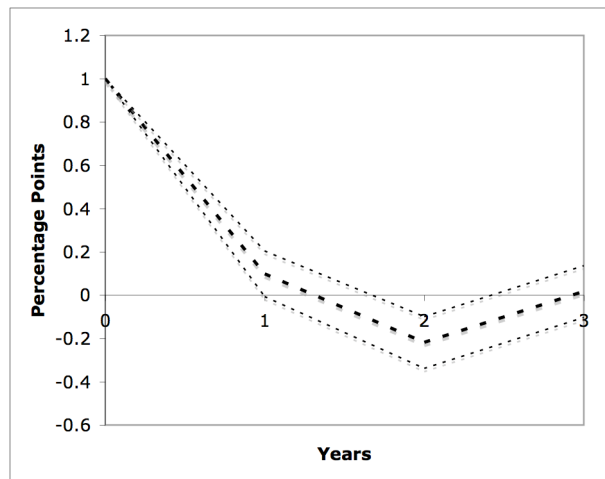


Figure VI

Actual and Projected Trend Lines (Panics of 1857, 1873, 1893, and 1907)

