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Identifying the effects of a lender of last resort on financial markets: Lessons from the founding of the fed ☆

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ABSTRACT

We use the founding of the Federal Reserve to identify the effects of a lender of last resort. We examine stock return and interest rate volatility during September and October, when markets were vulnerable because of financial stringency from the harvest. Stock volatility fell by 40% and interest rate volatility by more than 70% following the monetary regime change. The drop is insignificant if major panic years are omitted from the analysis, however. Because business cycle downturns occurred in the same year as financial crises, our results suggest that the existence of the Federal Reserve reduced liquidity risk.

1. Introduction

The recent subprime mortgage crisis in the United States raises serious questions about the role of monetary policy in a financial crisis. The Federal Reserve has responded to the credit crunch by lowering the Federal Funds Rate from 5.25% in September 2007 to near zero by the middle of December 2008. In addition to interest rate cuts, the central bank has dramatically increased the monetary base and helped to orchestrate bail-outs of AIG, Fannie Mae, Freddie Mac, and Wall Street firm Bear Stearns which was heavily invested in sub-prime mortgages. More recently, the Federal Reserve has expanded its balance sheet by purchasing mortgage-backed securities as well as long-term corporate debt.

One problem acknowledged by both proponents and opponents of activist central bank policy is that it is very difficult to identify the effect of lender-of-last-resort policies on financial markets.[1] Fortunately, history provides an experiment to measure the impact of the introduction of a lender of last resort on liquidity risk in financial markets. Following the Panic of 1907, which was accompanied by one of the shortest, but most severe recessions in American history,[2] Congress passed two measures that established a lender of last resort in the United States: (1) the Aldrich-Vreeland Act of 1908 which temporarily authorized some banks to issue emergency

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[1] For a discussion of the importance of a lender of last resort in American economic history, see Bordo (1990). Bernanke and Gertler (2000) argue that central banks should intervene in financial markets to the extent that they affect aggregate demand. Bernanke and Gertler (1989) argue that the balance-sheet effects of asset price decline can reduce investment and economic activity.

[2] The Panic of 1907 was precipitated when August Heinze's attempted short squeeze at United Copper, financed by borrowing from Knickerbocker Trust, collapsed. This caused a series of bank runs which started at the Knickerbocker Trust. This led to a credit crunch and a sharp decline in stock values (Moen and Tallman, 2000). For a more in-depth discussion of the Panic of 1907, see Bruner and Carr (2007).

currency during a financial crisis and (2) the Federal Reserve Act of 1913 that established a public central bank. The legislation was designed to provide a "more elastic currency" (i.e., liquidity) that could meet the seasonal demands of economic activity caused by the agricultural cycle. Several of the most severe financial crises of the National Banking Period (1863–1913) including the panics of 1873, 1890, and 1907, occurred in the months of September and October because of financial stress associated with the costs of harvesting crops in the fall (Kemmerer, 1911; Sprague, 1910).[3]

The seasonal nature of financial crises in the National Banking Period motivates the identification strategy we employ to isolate the effects of the lender-of-last-resort function on interest rates and stock returns from other macroeconomic shocks.[4] We compare the standard deviation of stock returns across the months of September and October over the period 1870–May 1908 with the standard deviation of stock returns in those same months during the Aldrich-Vreeland (June 1908–1913) and Federal Reserve (1913–1925) periods. We examine the volatility of asset prices in September and October for three reasons: (1) financial market volatility generally increases prior to the onset of a recession (Schwert, 1989a), (2) the effects of the lender of last resort should have been largest in the fall harvest months when financial markets were often illiquid, and (3) given the absence of high-frequency and high-quality macroeconomic data during the National Banking Period, our identification approach should provide some insight into the chicken and egg problem: did financial crises have real effects or did real shocks cause financial crises (Barro, 2000; Davis, Hanes, and Rhode, 2007)? If the former is true, then financial market volatility should have significantly declined with the establishment of a lender of last resort that provided liquidity to financial markets. To answer this question, we analyze the impact of the founding of the Fed on the stock market. We employ Goetzmann, Ibbotson, and Peng's (2001) new comprehensive database of stock prices, hereafter GIP, from 1870 to 1925. The new stock price index significantly improves on the widely used Cowles Index by using month-end closing prices rather than the average of monthly highs and lows, thereby avoiding a significant autocorrelation problem in stock returns (Schwert, 1989b; Working, 1960).

An analysis of the GIP Index shows that stock volatility in September and October declined more than 40% following the passage of the Aldrich-Vreeland Act. Although we find that stock volatility in September and October was significantly greater than the other 10 months of the year prior to the passage of Aldrich-Vreeland, this was not true following the monetary regime change.[5] The results are robust to a wide variety of specification tests with the exception that the result does *not* hold if we use the Cowles Index for the empirical analysis.[6] However, we do not find a statistically significant drop in financial market volatility if the major panic years are dropped from the empirical analysis.[7]

We also examine short-term interest rate volatility in the months of September and October before and after the monetary regime change. The volatility of the call loan rate declined by more than 70% in the months of September and October following the passage of Aldrich-Vreeland. The analysis also shows that the reduction in interest rate volatility can be attributed to a decrease in the standard deviation of the call loan rate, not to a decline in the level and seasonality of interest rates. As with stock returns, we do not find a statistically significant drop in interest rate volatility if the major panic years are dropped from the analysis. Given that the largest financial panics were preceded by the onset of an economic recession, this suggests that the primary effect of the creation of the Federal Reserve was to dramatically reduce liquidity risk in years when there was a business cycle turning point and a financial crisis.

We begin the analysis with a brief history of the National Banking Period prior to World War I. We then discuss the new database on stock prices in the pre-CRSP era. This is followed by an empirical analysis of stock and interest rate volatility. We conclude with a discussion of the implications of our results for future studies in financial economics and the role of monetary policy during a financial crisis.

2. The national banking period (1863–1913)

The National Banking Acts of 1863, 1864, and 1865 were passed to raise revenue to fight the Civil War, create a uniform currency, and to standardize the banking system in the United States. Prior to the passage of the monetary legislation, hundreds of different currencies circulated at different exchange rates in the United States during the antebellum period. The Acts required banks to maintain minimum levels of capital, dependent on the

[3] For a discussion of the links between agricultural shocks in the cotton market and recessions in the pre-World War I period, see Davis, Hanes, and Rhode (2007).

[4] Fishe and Wohar (1990), for example, argue that World War I and the closure of the New York financial markets played an important role in the change in the stochastic behavior of interest rates, in addition to the founding of the Federal Reserve. Given that these events all occurred around the same time, they argue that it is difficult to separate out the effects of these different events on interest rates.

[5] Previous studies by Meltzer (2003), Miron (1986) and Mankiw, Miron, and Weil (1987), find that the introduction of the Federal Reserve also reduced the seasonality and level of interest rates. Caporale and Caporale (2003) find that the introduction of the Federal Reserve led to a large reduction in the term premium a 6-month debt instrument pays over a 3-month one.

[6] Future research may usefully revisit some questions in financial economics using the new GIP Index. Some well-known studies that have employed the Cowles Index from the pre-CRSP era that have the autocorrelation problem include Shapiro (1988), Shiller (1992), and Siegel (2002). Other studies have relied on stock indexes such as the Dow, which have a very small number of stocks, but do not have significant autocorrelation problems Schwert (1989a, 1989b).

[7] Obviously, the results would not hold if we included the Great Depression as part of the analysis. Many studies, most notably Friedman and Schwartz (1963), argue that the Federal Reserve exacerbated the severity of the Great Depression because of tight monetary policy (i.e., the Fed failed to play the role of a lender of last resort).