



Was the Deflation of the Depression Anticipated? An Inference Using Real-time Data

Gabriel Mathy
American University

Herman O. Stekler
The George Washington University

RPF Working Paper No. 2017-004
<https://www2.gwu.edu/~forcpgm/2017-004.pdf>

December 1, 2017

RESEARCH PROGRAM ON FORECASTING
Center of Economic Research
Department of Economics
The George Washington University
Washington, DC 20052
<https://www2.gwu.edu/~forcpgm>

Was the Deflation of the Depression Anticipated? An Inference Using Real-time Data

Gabriel Mathy, American University¹

Herman Stekler, George Washington University²

Abstract

Theories that explain the behavior of the economy during the Depression are based on assumptions about agents' expectations about future price trends. This paper uses an alternative methodological approach which utilizes real-time information from the Depression period to infer whether deflation was anticipated. The information includes the forecasting methodology of that time as well as projections about anticipated output that were obtained from the textual analysis of business statements, converting qualitative to quantitative data. We infer that deflation was not anticipated because agents did not expect economic output to consistently decrease.

¹ Corresponding Author: mathy@american.edu, American University, 4400 Massachusetts Ave. NW, Washington, DC 20016. +1.202.885.3708. The authors would like to thank Anthony Yezer and Tara Sinclair for helpful comments.

² hstekler@gwu.edu, George Washington University, 2115 G St., NW Suite 340 Washington, DC 20052. +1.202.994.7581.

WAS THE DEFLATION OF THE DEPRESSION ANTICIPATED? AN INFERENCE USING REAL-TIME DATA

In a recent paper, Binder (2016) surveyed several approaches for estimating inflationary expectations. The approaches include time series models, market-based analyses using asset prices, and narratives that examine information available in published sources that might indicate what people expected to happen. Moreover, Binder noted the challenge involved in “inferring what agents *would have* expected given their information..., not what agents *could have* expected using modern econometric methods and data” (Binder, 2016, p. 2).

This issue is particularly important in the case of the Great Depression because theories that explain the behavior of the economy during this period include assumptions about agents’ expectations about future price trends. While economists have attempted to determine whether the deflation of that period was anticipated (Cecchetti, 1992; Hamilton, 1992; Klug et al., 2005), the results were obtained using modern time series approaches that do not necessarily reflect what actually occurred in real-time. We employ a different methodological approach which allows us to shed new light on this topic. First, we base our analysis on the use of qualitative forecasts to create quantitative scores based on the optimism or pessimism of business analysts during the Great Depression. This analysis is based on the paper by Goldfarb, Stekler, and (2005) paper in this journal. We also examine forecasting methods employed at the time to better simulate whether a forecast was possible in real time. This method had been used previously in Mathy and Stekler (2017), but it represents another methodological innovation that we bring to bear on this question. Moreover, we use a narrative approach that uses information which is contemporaneously available, being very careful to use real-time and not historic data. Our application of several nonstandard methods allows us to extend our understanding of this iconic Great Depression period.

By taking a narrative approach and only using information that was contemporaneously available during this period, we are able to show that the deflation that occurred during the Great Depression could not have been anticipated. In the absence of a quantitative record,³ the narrative approach may yield important insights about agents' expectations during the Depression because it utilizes actual real-time data. A number of studies have already used a similar approach focused on descriptive analyses or using textual analysis to look for key words such as inflation or deflation (Romer, 1990; Nelson, 1991; Romer and Romer, 2013; Jahil and Rua, 2013; Binder, 2016). There is also a literature analyzing the way language is used to map onto positive and negative sentiments and expressions of uncertainty.⁴

We also focus our discussion of narratives with reference to Shiller (2017), and discuss how his approach to narratives in economics conforms or differs from our approach. He discusses how the usage of narratives in economics, that includes transmission of narratives which become more popular and go viral. Moreover, he notes that narrative stories can be used to describe episodes like the recent Great Recession. The Great Depression is another case where this approach has been observed in economics. For example, Great Depression narratives, include (1) narratives about New Deal policies that restricted competition (Cole and Ohanian (2004)), (2) the flawed interwar gold standard (Eichengreen (1996) and Eichengreen and Temin (2000)), and (3) failure of the Federal Reserve to control the money supply (Friedman and Schwartz (1960)). There were also narratives of

³ By this we mean quantitative forecasts made by business analysts which became common in the postwar period.

⁴ Moxey and Sanford (1986) and Sanford and Moxey (2011) discuss how language can be mapped onto positive and negative sentiments in a similar fashion to our study. Teigen (1988) shows how the language around uncertainty varies in degree and expresses varying levels of uncertainty.

the Depression itself, including the stock crash of October 1929, and comparisons between the declines of 1929-1933 and those of the previous recession of 1920-1921.⁵

Our narrative approach focuses on the forecasting methodology that was employed during this period, showing the relation between forecasts of economic activity and the expected change in prices. Using a large number of qualitative output forecasts that were obtained from financial publications, we are, thus, able to infer what agents *would have* expected during the Great Depression using only real-time information.

This analysis involves three methodological steps. First, following the forecasting methods that existed in the 1930s, we can describe how changes in the overall price level were predicted at that time. It is necessary to obtain real-time forecasts of output to infer the direction of price changes, but there are no quantitative output forecasts for this period. Our next step, then, is to use forecasts generated by using a textual analysis of real-time qualitative statements about economic activity. These correspond to quantitative forecasts of business activity (Mathy and Stekler, 2017). Finally, given the relation between output and prices and the information about output forecasts, we show that agents could not have expected prices to decrease consistently throughout the Depression.

The next section presents the forecasting methodology that prevailed through the Depression focusing on the relation between changes in output and prices. We then describe the process for converting qualitative statements about the current and future levels of economic

⁵ Here Shiller argues in a similar fashion as we do, as he proposes that consumers postponed expenditures as they believed 1929-1933 would see rapid but brief price declines that consumers could take advantage of. However, by doing so, the delayed expenditure worsened the economic crisis, causing price declines to continue in a way that most Americans didn't expect.

activity into quantitative forecasts that we can analyze. The remaining sections present our results and conclusions.

I. Forecasting during the Depression

Several sources describe the forecasting approach that prevailed during the 1920s and early 1930s (Hardy and Cox, 1927; Haney, 1931; Persons, 1931). The approach in those books was highly descriptive and imprecise (at least by contemporary standards) and was intended for business analysts and academics. The basic premise of the forecasting framework at that time was that the economy experienced periodic cycles which moved with regularity from one phase of the cycle to the next one.

Thus, the process for making statements about future economic activity consisted of two steps. First, because the economy experienced periodic cycles and exhibited some degree of regularity, it was necessary to understand the current phase of the cycle. For this purpose, the forecaster collected the data and weighed the positive and negative effects of each piece of information.⁶ From weighted aggregation of these effects, the current position was ascertained. Was this condition normal? Or was it above (below) normal? The prevailing view was that if activity was above (below) normal it was expected to decline (increase) (Hardy and Cox, p.17).

Because these methods did not provide quantitative estimates or the expected length of that phase of the cycle, it was often suggested that the current situation be compared with historical data from previous cycles. Thus, analogies were used to compare the current state with previous cycles. This would determine how long the economy would remain in its current state and when it could be

⁶ The literature of the time period called this the cross-cut method. We now call it cross-sectional analysis that is useful for nowcasting.

expected to recover from a recession.⁷ A real-time illustration of this approach, written in the Fall of 1930, indicated the economy would recover in early 1931 (Persons, 1931, pp. 7-47).

These methods are designed to forecast the level of business activity but we are concerned with expectations about prices. The forecasting methodology that existed at that time did not predict prices. Rather price changes were positively associated with changes in business activity. In essence, forecasters expected that demand shocks would predominate, which would generate a robust positive correlation between changes in output and prices. (In fact, historical statistics indicate that this assumption was empirically accurate.)⁸

In essence, forecasters expected that demand shocks would predominate, which would generate a robust positive correlation between changes in output and prices. While Cooley and Ohanian (1991) argue that prices were not procyclical in the postwar period, they find that the price level was strongly procyclical in the interwar period, especially during the Great Depression. While there was a secular deflation between the Civil War and the turn of the century, there had been a strong correlation between output and the price level for the three decades that preceded the Great Depression. The decades prior had seen a large inflation during the WW1 boom and its aftermath, and a sharp recession in the deflationary recession of 1920-1921. Using the annual percent changes in monthly measure of the price level and the business cycle, prices and the business cycle have a correlation of 0.43 over the 1900-1929 period, and a correlation coefficient of 0.58 over the 1920-

⁷ In examining the business statements that we discuss below there were frequent analogies that referred to previous business cycles. This confirms that this approach was used in making projections during the Depression.

⁸ Cooley and Ohanian (1991) find that the price level was strongly procyclical in the interwar period, especially during the Great Depression. The correlation between price and output changes was 0.70 for the 1920-1939 period and 0.80 for the years 1929-1939.

1929 period. The belief that prices and the business cycle were correlated was quite reasonable, a view that was only reinforced by the experience of the Great Depression.⁹

Hardy and Cox (1927) show how the forecasting services handled price changes in their method and reports. For example, the Brookmire Service indicated that changes in commodity prices were representative of changes in general business activity (*ibid.*, p.63). Similarly, The Harvard Service believed that changes in business activity led price changes by about two months, but that some prices would change before and some after the economy changed direction (*ibid.*, pp. 70, 90). In any event, prices in the future will behave as they have done in the past (*ibid.*, p.137).

This discussion yields two conclusions: first, the price level was not a variable that was forecast; second, changes in the price level were believed to be positively related to the forecast of business activity. Thus, any forecasts of business activity or measures of output expectations could serve as proxy variables for the price level predictions.

II. Qualitative Business Forecasts of Economic Activity

In order to obtain an understanding of agents' expectations about economic activity, this section will examine the business forecasts made during the entire recessionary phase of the Depression until the 1933 trough. This enables us to determine how well the current economic situation was assessed and how well the future conditions were forecast. No quantitative forecasts are available for this period. Rather we will utilize the qualitative statements about economic conditions and the outlook for the future that appeared in the business press during this time

⁹ The Business Cycle series is "Index of American Business Activity for United States" from the Cleveland Trust Company, NBER Macroeconomy series M12003USM516NNBR, available monthly 1/1855-12/1970. The price level series is "Index of the General Price Level for United States" from the New York Fed, 1913=100, available monthly 1/1855-11/1939. Percent changes are calculated as annual log differences.

period.¹⁰ The qualitative forecasts came from *The New York Times* (NYT) and the *Commercial and Financial Chronicle* (CFC).¹¹ The method was developed by Goldfarb et al. (2005), who only examined the 1929-30 forecasts, and used by Mathy and Stekler (2017) to evaluate the real-time nowcasts and forecasts for the entire recessionary phase of the Depression.

The qualitative statements in the two publications were scored by the system developed by Goldfarb et al. (2005) by hand by the authors. Each statement was divided into two categories which were scored separately. The first referred to the current state of economic conditions; the second referred to statements about the future economic conditions.

The scores were based on particular words, expressions, or phrases contained in the statements that indicate varying degrees of optimism or pessimism about the state of the economy. More specifically, they were scored on an index that runs from +1 to -2 by the authors. For example, words that indicate extremely good performance, such as a “vigorous recovery”, have a score of +1; lower positive scores were assigned to words that reflect a lower level of positive economic activity. Similarly, if the words suggested a weakening of economic activity, a score of $-\frac{1}{4}$ was assigned. The scores became more negative if the statements reflected a further deterioration of the economy with those indicating a crisis receiving a score of $-1\frac{1}{2}$ or -2. The words used and the associated scores are presented in Table 1.

The chronologically ordered sequence of these scores created two times series- one for the nowcasts; the other for the forecasts. Figure 1 shows the relation between the nowcasts, the Federal Reserve Bulletin index, and the Index of Industrial Production for the same quarter and Figure 2

¹⁰ Several recent papers have shown that it is possible to convert qualitative statements into quantitative numbers and to obtain meaningful results. (See Balke and Petersen, 2002; Ericsson, 2016; Goldfarb et. al, 2005; Lundquist and Stekler, 2012, and Stekler and Symington, 2016).

¹¹ The CFC is a weekly publication that is a compendium of information of and about the business and financial community.

presents the business sector's scored forecasts made in quarter t and the Index of Industrial Production in quarter $t+2$. Figure 1 shows that the business community made accurate nowcasts, i.e. these nowcasts closely reflect the real-time economic conditions that prevailed during the Depression¹². On the other hand, the forecasts present a different picture. In late 1929 and early 1930, the business forecasts did expect the economy to decline further. However, after this initial period of the Depression, the forecasts consistently indicate that the business community expected the economy to recover and real output to increase. (The observations in Figure 2 are consistently above the zero line). The forecasts may have been wrong but this is what the forecasting community of the time believed. These forecasts are consistent with the method that was described above: if activity was below normal it was expected to increase.

III. Inference: the Deflation Was Not Anticipated

The purpose of this paper has been to use real-time information so determine whether the deflation of the Depression was anticipated. We now show that logical inference can answer that question. The real-time literature and forecasts yielded two results: 1. The forecasting method of that period indicated that price and output movements were generally expected to move in the same direction; and 2. After early 1930, the business community consistently expected output to increase in the future. *Therefore, we must infer that the business community, given the forecasting methods available at the time, could not have expected prices to consistently decrease in the future, i.e. we find that the deflation was not anticipated.*

IV. Conclusions

¹² The Bulletin scores are correlated with industrial production with a correlation coefficient of 0.95, between the private sector nowcasts and the bulletin scores the correlation is 0.81, and between the private forecasters and industrial production of 0.91. The correlation between the private forecaster's forecasts and future value of the Bulletin Scores is 0.17.

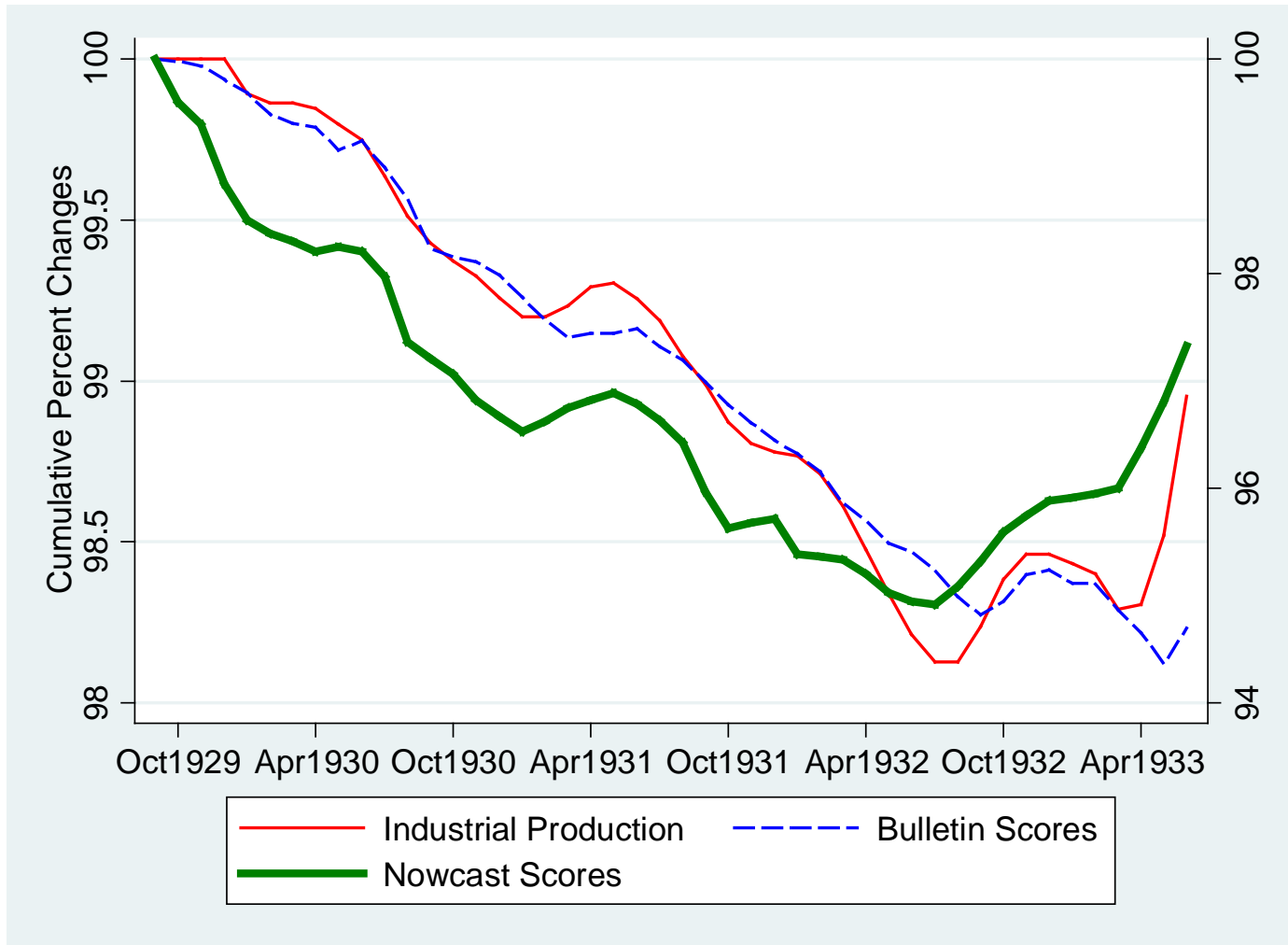
This is the first study that has used real-time information to determine whether the deflation of the Depression was anticipated. We combined the forecasting literature of that period with output forecasts that were obtained from a textual analysis of business statements made during the Depression. This novel methodological approach combines narratives in the forms of a model of how business cycles proceeded chronologically, as well as a intuitive model of the economy where business activity and the price level were highly correlated. As a result, we have presented non-trivial evidence that the deflation of this Depression was not anticipated.

Table 1: Scoring rubric for translating qualitative statements into quantitative scores

General Outlook	Type of Statement Made	Score Assigned
Positive	Vigorous Recovery	+1
Positive	Rapid Recovery	+3/4
Positive	Strong Recovery	+1/2
Positive	Mild Recovery	+1/4
Neutral	Seasonal Changes, Offsetting Changes	0
Negative	Mild Decline	-1/4
Negative	Steady Decline	-1/2
Negative	Rapid Decline	-3/4
Negative	Vigorous Decline	-1
Strongly Negative	Disastrous Collapse in Output	-3/2
Strongly Negative	Worst downturn in U.S. History	-2

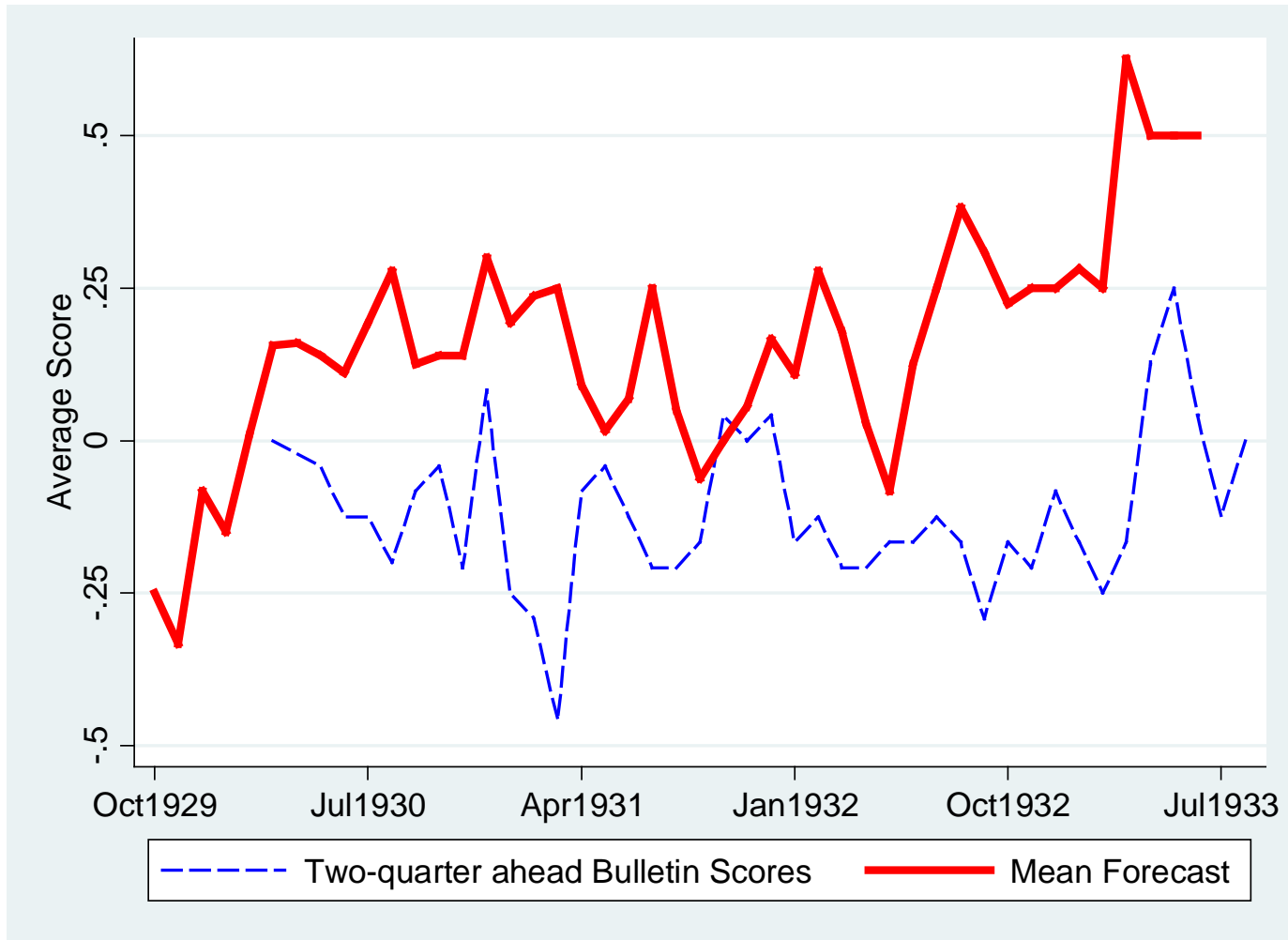
Notes: These scores were assigned to both nowcasts and forecasts for a given analyst. Source: *Commercial and Financial Chronicle and New York Times*.

Figure 1: Cumulative Changes in Industrial Production and Federal Reserve Bulletin and Business Press Nowcasts



Notes: Nowcasts derived from *Commercial and Financial Chronicle* and *New York Times*. Federal Reserve Bulletin scores are based on various issues of the *Federal Reserve Bulletin*. Industrial Production data from Federal Reserve Board of Governors, plotted on right axis. Nowcast and Federal Reserve Bulletin Index scoring described in text, plotted on the left axis.

Figure 2: Business Press Forecasts compared to future values of Fed index



Notes: Nowcasts derived from *Commercial and Financial Chronicle* and *New York Times*. Federal Reserve Bulletin scores are based on various issues of the *Federal Reserve Bulletin*. Nowcast and Fed Bulletin scores described in text. Two-quarter ahead values of Federal Reserve Bulletin index used as forecasts for next quarter as there is an approximately one-quarter lag for data releases.

References

- Balke, Nathan S., and D'Ann Petersen. "How well does the Beige Book reflect economic activity? Evaluating qualitative information quantitatively." *Journal of Money, Credit and Banking* (2002): 114-136.
- Binder, Carola Conces. "Estimation of historical inflation expectations." *Explorations in Economic History* 61 (2016): 1-31.
- Cecchetti, Stephen G. "Prices During the Great Depression: Was the Deflation of 1930-1932 Really Unanticipated?" *The American Economic Review* (1992): 141-156.
- The Commercial and financial chronicle*. New York: National News Service, 1929-1933.
- Cole, Harold L., and Lee E. Ohanian. "New Deal policies and the persistence of the Great Depression: A general equilibrium analysis." *Journal of Political Economy* 112.4 (2004): 779-816.
- Cooley, Thomas F., and Lee E. Ohanian. "The cyclical behavior of prices." *Journal of Monetary Economics* 28.1 (1991): 25-60.
- Eichengreen, Barry, and Peter Temin. "The gold standard and the great depression." *Contemporary European History* 9.2 (2000): 183-207.
- Eichengreen, B. J. (1992). *Golden fetters: The gold standard and the Great Depression, 1919-1939*. New York: Oxford University Press.
- Ericsson, Neil R. "Eliciting GDP Forecasts from the FOMC's Minutes Around the Financial Crisis." *International Journal of Forecasting*. (2016):571-583.
- Friedman, Milton, and Anna Schwartz. *A Monetary History of the United States, 1867-1960*. National Bureau of Economic Research, Inc, 1963.
- Goldfarb, Robert S., H. O. Stekler, and Joel David. "Methodological issues in forecasting: Insights from the egregious business forecast errors of late 1930." *Journal of Economic Methodology* 12.4 (2005): 517-542.
- Hamilton, James D. "Was the deflation during the Great Depression anticipated? Evidence from the commodity futures market." *The American Economic Review* (1992): 157-178.
- Haney, Lewis H. *Business Forecasting*, Ginn and Company, 1931.
- Hardy, Charles O. and Garfield V. Cox. *Forecasting Business Conditions* Macmillan Co., New York, 1927.
- Jalil, Andrew J., and Gisela Rua. "Inflation expectations and recovery in spring 1933." *Explorations in Economic History* 62 (2016): 26-50.

- Klug, Adam, John S. Landon-Lane, and Eugene N. White. "How could everyone have been so wrong? Forecasting the Great Depression with the railroads." *Explorations in Economic History* 42.1 (2005): 27-55.
- Lundquist, Kathryn, and Herman O. Stekler. "Interpreting the performance of business economists during the Great Recession." *Business Economics* 47.2 (2012): 148-154.
- Mathy, Gabriel, and Herman Stekler. "Expectations and Forecasting during the Great Depression: Real-Time Evidence from the Business Press." *Journal of Macroeconomics* (2017).
- Moxey, Linda M., and Anthony J. Sanford. "Quantifiers and focus." *Journal of semantics* 5.3 (1986): 189-206.
- The New York Times*. New York: New York Times Press, 1929-1933.
- Nelson, D., 1991. Was the deflation of 1929-1930 anticipated? The monetary regime as viewed by the business press. *Research in Economic History* 13, 1–65.
- Persons, William.M. *Forecasting Business Cycles*, New York: John Wiley and Sons, Inc. 1931.
- Romer, Christina D. "The great crash and the onset of the great depression." *The Quarterly Journal of Economics* 105.3 (1990): 597-624.
- Romer, Christina D., and David H. Romer. "The missing transmission mechanism in the monetary explanation of the Great Depression." *The American Economic Review* 103.3 (2013): 66-72.
- Sanford, Anthony J., and Linda M. Moxey. "Complement focus and reference phenomena." *The Processing and Acquisition of Reference* (2011): 381-402.
- Shiller, Robert J. "Narrative economics." *The American Economic Review* 107.4 (2017): 967-1004.
- Stekler, Herman, and Hilary Symington. "Evaluating qualitative forecasts: The FOMC minutes, 2006–2010." *International Journal of Forecasting* 32.2 (2016): 559-570.
- Teigen, Karl Halvor. "The language of uncertainty." *Acta Psychologica* 68.1 (1988): 27-38.