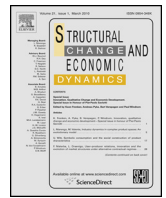




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## Can inflation expectations be measured using commodity futures prices?

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### ABSTRACT

This paper reexamines the use of US commodity futures price data to show that the US deflation of 1929–1932 was at best no more than partially anticipated by economic actors. By focusing on the expected real interest rate, previous studies provide some empirical support for explanations of the Great Depression that are not exclusively monetary in nature. However, these studies did not consider the context and the market microstructures from which the data was sourced. Our analysis suggests that it is more likely that agricultural commodity markets adjusted to deflationary expectations by the end of 1930. Evidence from commodities futures markets, such as the Chicago Board of Trade, therefore should not be used to critique the Keynesian challenge to the classical monetarist explanation of the Great Depression.

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### 1. Introduction

In economics, there remains a significant controversy over the causes of the length and depth of the Great Depression, as well as the role, if any, of the severe deflation from 1930 to 1933. On one side, [Friedman and Schwartz \(1963\)](#) argue for a strictly monetary cause. Other authors, while agreeing partially with the monetarists, point to other important transmission effects, such as the loss of banks as credit information holders (e.g. [Bernanke, 1983](#) or [Fisher, 1933](#)). Finally, there are those, mostly Keynesians, who reject the monetarist explanation, and focus on the role of secular shocks (e.g. [Temin, 1976](#)). There are significant problems with a strictly monetarist explanation. Specifically, Friedman and Schwartz comment on but cannot fully explain the decline the velocity of money during the period, nor are some convinced that the direction of causality runs from money supply declines to real output declines ([Temin, 1976](#)). An additional problem with the Friedman-Schwartz hypothesis is that interest rates during the Great Depression were too low to indicate the severe monetary contraction that the US Federal Reserve is accused of accelerating ([Temin, 1976](#)). The counter argument, voiced by [Brunner \(1981\)](#) is that, as economic agents expected deflation after 1929, real interest rates *ex ante* were actu-

ally quite high. However, at first, economists lacked the tools to measure inflation expectations. By the 1980s, Frederic Mishkin and James Hamilton brought together the concept of 'rational expectations' (RE) with the latest in financial theory, the 'efficient markets hypothesis' (EMH),<sup>1</sup> to address such questions as price expectations and their role in economics.

[Muth \(1961\)](#) exhorted economists to 'model agents as if they know the model' (Hoover and Young, 2011). That is, 'if economic variables are determined by an identifiable on-going process then sooner or later intelligent economic agents will recognize the process and will then model their expectations in the light of that process' ([Shaw, 1987](#)). Academics studying expected inflation in the 1980s examined interest rate (e.g. [Cecchetti, 1992](#)) and commodity price ([Hamilton, 1992](#)) data for potential measures of expected future inflation. Another line of attack for those looking for market expectations of inflation utilized the then new tools of finance that posited that all information was fully discounted into the market price of a stock, bond or commodity contract ([Fama, 1965](#)). As such market-determined prices would already reflect the expectation of future performance.

<sup>1</sup> Interestingly, though often viewed as identical, the development of RE and the EMH were quite separate. Even Merton Miller, who sat on the PhD committees of both the generally-accepted founders of RE (Muth, at Carnegie Tech) and EMH (Fama, at Chicago), did not connect the two theories at first ([Hoover and Young, 2013](#)).

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Hamilton (1987) appears to be the first to marry conceptions of the EMH from such adherents as Fama and French (1987), with somewhat stylized understandings of agricultural commodities futures market to examine the broader implication of commodity price movements on expected economy-wide price level changes. In his early study of commodity markets in 1987 Hamilton shows that, for example, the wheat futures market was ‘predicting’ a 19.9% annualized own inflation rate in May 1930, when, in fact wheat prices fell for the next five months at an annualized rate of 53.8% (See Table 3). He finds similar results throughout 1929–1932 for corn, cotton and oats as well, therefore asserting that commodity investors did not anticipate the oncoming deflation. As such, he concluded ‘I am persuaded that one can convincingly rule out the hypothesis that the mechanism whereby monetary policy led to the depression in agriculture was that large anticipated deflation led to high *ex ante* real interest rates’ (Hamilton 1987 p. 166). [This] seems to [cast] considerable doubt on the Keynesian interpretation’ (Hamilton, 1987: 166). Hamilton’s 1992 article begins with a similar study, observing that six commodity ‘markets seemed to repeat the same error [underestimating deflation] throughout 1929–1932’ (Hamilton, 1992: 160). From this he concludes that such futures markets did not anticipate any deflation from 1929 to 1932, and, in fact, expected commodity prices to rise.

In this paper, we argue that Hamilton in (1987) and in the first part of his 1992 paper misinterpreted his dataset in making such findings, and therefore the conclusions should not stand. In the second part of his 1992 study, Hamilton incorporated a RE approach to make an even more precise claim that deflation of 1930–1933 was at best partially anticipated by examining four and then three of the six commodities he analyzed in part one. Hamilton (1992: 159) states ‘during the first year of the Great Depression, people anticipated stable prices, meaning that the initial deflation of the Great Depression was largely unanticipated.’ This, in his view, indicates that, rather than operate through expected deflation, ‘highly contractionary monetary policy. . . operated through unanticipated deflation’ (Hamilton 1987: 145).

Thirty years later the debate surrounding unanticipated inflation remains unresolved. Hamilton (1987, 1992) sides with Dominguez et al. (1988), and Evans and Wachtel (1993), while Cecchetti (1992) and Nelson (1990) oppose Hamilton by claiming that deflation was anticipated. On the other hand, Hamilton (1992) remains unchallenged in the literature, with the author himself continuing to present his evidence in the debate (Hamilton, 2013) and with others applying the 1992 methodology to more recent periods of price volatility (e.g. Dotsey and DeVaro, 1995). Additionally, both Hamilton’s 1987 and 1992 articles appear as chapters in Parker’s (2011) *The Seminal Works of The Great Depression*, while top policymakers in key decision-making roles such as the Bank of Japan Governor Haruhiko Kuroda (2013) continue to cite Hamilton’s conclusions in public presentations of their monetary theories. If Hamilton is correct, and inflation was not expected, financial or other debt-focused models such as Bernanke’s (1983) or Fisher’s (1933) appear to better explain the depth and length of the largest contraction in over the last 100 years, while direct transmission such as via a Keynesian IS-LM mechanism are less likely. From a policy perspective, Hamilton’s results support governmental attempts to fix the financial system as opposed to those who preach only an expansion of the money supply.

In the context of the Global Financial Crisis of 2007’s comparison to the Great Depression, the awarding of the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel to Eugene Fama in 2013, and the recent end to Great Depression academic Ben Bernanke’s tenure as Chairman of the Federal Reserve, we believe it is highly timely to revisit Hamilton’s methodology, specifically the justification for using futures markets to determine expectations of real interest rates.

Our paper weighs in on the normative and empirical evidence as presented by the parties while introducing key contextual and theoretical arguments that to us appear ignored or misunderstood in the debate. Specifically, Hamilton (1992) cites as justification for his techniques papers by French (1986), Fama and French (1987) and Working (1949), yet we could not find adequate defense of his methodology therein. In fact, we argue that proper application of the empirical evidence and the theoretical framework proposed in these studies would have led to an entirely different framing of the investigation, and would likely have led Hamilton to wholly different conclusions. Our own conclusions, though still preliminary, point to conclusions broadly opposite to those of Hamilton.

More broadly, historical economics can, and does in the papers investigated here, suffer when historical context and the particularities of the markets under investigation are ignored, especially market microstructures. In such instances, we as financial historians can add to the debate on policy issues of the modern day by contributing to the analysis of markets from an earlier era.

This paper first, in section two, explores the history of the study of agricultural commodity futures markets, paying specific attention to the collected works of Holbrook Working, as well specific arguments from the ‘efficient markets’ school. In section three we show that there is strong reason to believe that Hamilton’s argument in the earlier part of his 1992 paper, and a dominant theme of his 1987 paper, is missing a crucial independent variable. Once we correct for the agricultural conditions of 1929–1931, we find it impossible to conclude that commodity markets forecasted inflation rather than deflation during the early years of the Great Depression. In this section, we also weigh in on the debate between Hamilton (1992) and Cecchetti (1992) on the relevance of government intervention in the futures market.

In section four, we examine Mishkin’s critique of Hamilton’s methodology and find that, though the paper itself is flawed, we support Mishkin’s (1990) argument against Hamilton’s (1987) paper. Specifically, Hamilton’s literal interpretation of rational expectations provides a theoretical justification for a data mining exercise that concludes that the prices of two minor and two reasonably important (though not the most important) commodities were used by economic agents of the time to forecast changes in the general price level in the US economy. In section five, we reinterpret the contributions of Fama (1965), Fama and French (1987), and Working (1942) to show that futures markets likely did anticipate some deflation ahead of its actual occurrence in the wider US price index. We conclude that a claim could be made that commodity futures markets did anticipate the deflation of the Great Depression. That is, we argue that Hamilton’s evidence in his 1987 and 1992 papers relating to commodity futures markets cannot be used as evidence against the unexpected deflation hypothesis, and therefore offers no support for theories of the Great Depression acting through financial channels.

## 2. The intellectual history of the futures markets: Holbrook Working, Eugene Fama and Kenneth French

### 2.1. Futures markets

Although there are earlier cases of documented exchange-based trading of contracts for delivery of a pre-agreed quantity of a pre-agreed quality of a certain product at a pre-agreed price at a specific location long before “futures” trading began in Chicago in the mid-19th century,<sup>2</sup> historical economists often rely heavily on price data from the Chicago Board of Trade because of the high vol-

<sup>2</sup> For example, see the Baltic grain in 16th century Amsterdam (Tielhof, 2002) or rice futures in 18th century Osaka (Wakita 2001).

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