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Agricultural and monetary shocks before the great depression: A graph-theoretic causal investigation

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Abstract

This paper uses graph-theoretic methods to investigate the causal relationships between agriculture, money, interest rates, prices, and real GDP in 12 countries during the years 1869–1929. We find that agricultural production directly and indirectly causes real GDP in two-thirds of the cases. Monetary shocks also play an important causal role in about half the cases, but unlike agriculture, the causal links are usually indirect through other variables to real GDP. The direct causal link between money and prices is also particularly strong. Between 1869 and 1929, money causes prices in nearly all of the countries in the sample.
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1. Introduction

The relative importance of agricultural and monetary shocks has a long history in economics. Prior to the Great Depression, many contemporary observers sought to establish a causal connection between agricultural production and the business cycle. Jevons (1878), Moore (1914), for example, envisioned a direct causal relationship from the agricultural

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sector to aggregate business cycles. Others, such as Andrew (1906), Kemmerer (1911), Sprague (1910), stressed the interdependence of agricultural and monetary factors in causing US business cycles. In this view, seasonal crop movements led to changes in money demand and, under normal circumstance, the associated interest rate movements. However, in the extreme, seasonal changes in money demand caused financial crises that subsequently led to recessions.[2]

Since the onset of the Great Depression, researchers have generally downplayed the potential importance of agriculture arguing that, at most, it only reacts to business cycles. Hansen (1932) believed that agricultural production only responded to business cycles caused by monetary or other factors. Other observers have denied that there was any correlation between agriculture and aggregate fluctuations. Mitchell (1951, p. 58) concluded that "in no other great industry for which we have records are the cyclical fluctuations so irregularly related to business cycles as in crop husbandry." Similar sentiments have been expressed by Frickey (1942, p. 229) and Gordon (1952, p. 386).

Since the work of Friedman and Schwartz (1963), monetary explanations of historical business cycles have dominated the debate. James (1993) is emblematic of this literature.[3] Using a structural VAR that includes money, interest rates, prices, and output, he concludes (p. 725) that in the United States "monetary rather than real disturbances, however, appear to be associated with major postbellum downturns."

Agricultural explanations of business cycle fluctuations, however, still persist. Solomou and Wu (1999, p. 369), for example, contend that in the leading industrial economies of Europe in the late nineteenth century "weather shocks to the agricultural sector had significant effects on macroeconomic fluctuations." Madsen (2001) has also stressed the role of relative agricultural prices in the international transmission of the Great Depression. He contends (pp. 327–328) that "the macroeconomic effects were significant because the agricultural decline had spill-over effects to other sectors of the economy and because the agricultural sector played an important role in the total economy at that time." Finally, Davis et al. (2004) have reintroduced agricultural fluctuations as an exogenous cause of pre-World War I US business cycles. These authors (p. 26) find "that over 1879–1913, variations in the annual cotton harvest reflecting largely exogenous factors, such as weather and crop diseases, were an important cause of business-cycle fluctuations in industrial output."

While standard multiple regression techniques are commonly interpreted to imply causal relationships, these techniques, however, are unable to determine the causal direction between two stationary variables. X and Y may be correlated because X causes Y or because Y causes X. It may also be the case that the observed correlation between X and Y is not the result of a direct causal relationship between X and Y, but due to an omitted common cause. However, without further information, be it theoretical or statistical, it is not possible to differentiate between these possibilities. In particular, Spirtes et al. (2000, p. 192) state that "it is easy to construct cases in which a variable with no [causal] influence

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[2] Miron (1986) reports evidence consistent with this view. According to Miron, the founding of the Federal Reserve led to smoother seasonal variations in interest rates after 1914, and no financial panics between 1915 and 1928. We thank an anonymous referee for highlighting this possible channel.

[3] Other examples include Parker and Rothman (2004), who test whether monetary shocks had asymmetric effects on output in the United States, and Rolnick and Weber (1997), who provide evidence on the generally positive correlations between money growth, inflation, and output growth using historical data for fifteen countries.