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GREAT DEPRESSION**

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## Monetary and Financial Forces in the Great Depression

by Satyajit Chatterjee and Dean Corbae

What caused the worldwide collapse in output from 1929 to 1933? Why was the recovery from the trough of 1933 so protracted for the U.S.? How costly was the decline in terms of welfare? Was the decline preventable? These are some of the questions that have motivated economists to study the Great Depression.

Cole and Ohanian (1999) document that U.S. per capita GNP fell 38% below its long-run trend path (of 2% per annum growth) from 1929 to 1933. Real per capita nondurables consumption fell nearly 30%, durables consumption fell over 55%, and business investment fell nearly 80%. On the input side, total employment fell 24% and total factor productivity (TFP) fell 14%. On the nominal and financial side, the GNP deflator fell 24%; per capita M1 (currency plus deposits) fell 30%; M1 velocity fell 32%; the per capita monetary base rose 9%; the currency/deposit ratio rose over 160% (Friedman and Schwartz (1963, Table B3)); the loan/deposit ratio fell 30% (Bernanke (1983, Table 1)); and ex-post real commercial paper rates rose from 6% in 1929 to a peak of 13.8% in 1932.

What caused the Depression? For the U.S., Friedman and Schwartz (1963, p. 300) argued that it was the decline in the stock of M1 – a consequence of Fed tightening and of a fall in the money multiplier induced by banking panics. According to Eichengreen (1992), international adherence to the gold standard transmitted the U.S. monetary contraction to other industrialized countries. Specifically, high interest rates and low prices in the U.S. attracted foreign inflows of gold (in 1932 the U.S. and France held over 70% of the world gold reserves), which the Fed largely sterilized (i.e., sold domestic government debt and bought money). The outflow of gold from foreign countries implied that gold-backed money supplies of those countries had to decline in order to meet their cover ratios. Further evidence (see Bernanke and James (1991), Table 4) for the importance of the gold standard in transmitting the contraction comes from the experience of countries like Britain, which suspended the gold

standard in 1931 and recovered by 1932; from Spain, which never was on it and had a much less severe contraction than those on the gold standard; and from France, which was one of the last major countries to leave it and still faced declining industrial production past the 1933 trough. As Bernanke (1995, p. 3) puts it: “The new gold-standard research allows us to assert with considerable confidence that *monetary factors played an important causal role*, both in the worldwide decline in prices and output and in their eventual recovery.”

Much of this evidence is problematic in that it is in the nature of correlations between *endogenous* variables – a fact that makes it challenging to establish causality. Did the decline in M1 *cause* the decline in aggregate output or – as Temin (1976) argued early on – did M1 and aggregate output decline in response to some other common shock? If the “monetary-cum-exchange-rate-policy” explanation is indeed correct, we ought to be able to demonstrate its correctness in a reasonably calibrated, dynamic stochastic general equilibrium (DSGE) model. To paraphrase Lucas (1993, p. 271): “If we know what a depression is, we ought to be able to *make* one.” The challenge of “making” a Depression has been taken up by various researchers and constitutes a noteworthy recent development in Depression research.

The conventional explanation of why money affected output is sticky nominal wages – goods prices fell as a result of the monetary contraction but nominal wages adjusted slowly and the ensuing increase in the real wage depressed the demand for labor. Bordo, Erceg, and Evans (2000) “test” this explanation by calibrating a one-sector stochastic macro model with four-quarter nominal wage rigidity and find that 70% of the output decline from 1929-1933 can be accounted for by feeding in the negative innovations to the actual M1 money supply process during that period. One criticism of their “test” is that the real-wage rise in the model was calibrated to mimic actual real-wage data in the *manufacturing* sector when there is evidence that nonmanufacturing real wages may actually have fallen during the 1929-1933 downturn. Cole and Ohanian (2000) re-examine the sticky-wage hypothesis in a multisector model and found much less support for it.

A second criticism of Bordo *et al.* is that they do not take into account the evidence on

aggregate labor productivity and TFP, both of which declined between 1929-33. Ohanian (2002) argues that only about a third of the decline in labor productivity and/or TFP can be plausibly accounted for by mismeasurement of factor inputs. By itself, a decline in TFP could account for a substantial fall in aggregate output, consumption, and investment. Unless a decline in TFP can be viewed as an endogenous response to the monetary shock (through, for example, aggregate increasing returns), the decline leaves less scope for a purely monetary explanation. Using a DSGE model where money is nonneutral due to imperfect information, Cole, Ohanian, and Leung (2005) show that the decline in M1 accounts for only one-third of the decline in output from 1929-1933, while the effect of an exogenous decline in TFP accounts for two-thirds. They use a misperceptions model of monetary nonneutrality because nonneutrality due to nominal wage rigidity generates counterfactual labor productivity.

Sticky wages and monetary misperceptions are not the only mechanisms through which money can affect real output. Irving Fisher (1933) pointed out that the unanticipated fall in prices during 1929-33 led to bankruptcies because it increased the real value of nominal debt of households, firms, and financial intermediaries. This “debt-deflation” hypothesis was analyzed by Mishkin (1978) for households and formalized by Bernanke and Gertler (1989) for firms. More generally, Bernanke (1983) argued that the reduction in borrower net worth increased the cost of obtaining external finance, while bank failures and tightened credit standards hampered the efficient allocation of capital. However, a quantitative DSGE model featuring this mechanism has yet to be implemented for the Depression. Such a model holds out the promise of explaining some portion of the puzzling decline in TFP during 1929-33 as an endogenous response to a misallocation of capital.

One of the most striking facts of the Depression was the reduction in the money multiplier from 1929 to 1933 associated with the flight from bank deposits to currency. Cooper and Corbae (2002) construct a model in which households have the option of saving in the form of currency or bank deposits and in which bank deposits ultimately fund working capital for businesses. Because of increasing returns in the intermediation technology associated

with fixed verification costs, their model admits multiple equilibria. In the good equilibrium the return on bank deposits is high, households hold low amounts of currency, and output is high. In the bad equilibrium, the return on bank deposits is low, households substitute into currency, and output is low. A shift from the good to the bad equilibrium replicates many of the salient nominal changes that occurred between 1929 and 1933. Although not quantitative, their work formalizes the idea that output, credit and money supply responded negatively to a loss in confidence – much as Irving Fisher (1933, p. 343) suggested it did.

Why was the recovery from the trough of 1933 so protracted for the U.S.? As noted by Cole and Ohanian (1999), aggregate U.S. output was still below trend in 1939. The answer cannot be the gold standard or M1 because the U.S. left the gold standard in 1933 and the U.S. money stock recovered rapidly thereafter. One explanation offered is that the National Industrial Recovery Act (NIRA) encouraged businesses to accept high real wages of industrial workers. Cole and Ohanian (2004) embedded labor bargaining into a DSGE model and quantitatively explored the effect of the NIRA giving more weight to workers in the bargaining process post-1933. Their model is reasonably successful in producing a slow recovery. Adverse labor market interventions also appear to have played a role in other industrialized countries such as Germany, France, the U.K. and Italy (Kehoe and Prescott (2002)).

How costly was the Depression in terms of the welfare? Real per capita consumption of nondurables fell 30 percent in the U.S. but it is not known how this decline was distributed across households. Chatterjee and Corbae (forthcoming) analyzed how households that can self-insure against uninsured earnings losses would fare through a depression. They found that the welfare cost of living in a world with a small likelihood of a Depression-like event is quite large – somewhere between 1 to 7 percent of consumption in perpetuity depending on the completeness of asset markets. Much of this cost is associated with the increased variability of individual consumption streams.

Was the Depression preventable? First, if the “monetary-cum-exchange-rate-policy” expla-

nation is correct, the right monetary policy could have prevented the decline. Christiano, Motto, and Restagno (2003) estimate a DSGE model with many shocks but find that a liquidity preference shock inducing households to hold currency instead of deposits played the most important role in the contraction phase of the Depression. They then specify a policy rule that raises the monetary base as a function of liquidity shocks and run a counterfactual experiment where they find that output would have declined only 6 % if such a reaction function had been in place. Second, if a portion of the decline in output was the result of a banking collapse stemming from a shock to confidence then – as shown by Cooper and Corbae (2002) – an announcement by the monetary authority that it stands ready to supply liquidity to the banking system might have moderated the decline. Finally, with regard to the slow recovery in the U.S., the only credible explanation offered is adverse labor market intervention. If this explanation is correct, we know what *not* to do to prolong a severe decline in output.

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