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ESSAYS ON THE GREAT DEPRESSION

Part One

OVERVIEW

One

The Macroeconomics of the Great Depression: A Comparative Approach

TO UNDERSTAND THE GREAT DEPRESSION is the Holy Grail of macroeconomics. Not only did the Depression give birth to macroeconomics as a distinct field of study, but also—to an extent that is not always fully appreciated—the experience of the 1930s continues to influence macroeconomists' beliefs, policy recommendations, and research agendas. And, practicalities aside, finding an explanation for the worldwide economic collapse of the 1930s remains a fascinating intellectual challenge.

We do not yet have our hands on the Grail by any means, but during the past fifteen years or so substantial progress toward the goal of understanding the Depression has been made. This progress has a number of sources, including improvements in our theoretical framework and painstaking historical analysis. To my mind, however, the most significant recent development has been a change in the focus of Depression research, from a traditional emphasis on events in the United States to a more comparative approach that examines the experiences of many countries simultaneously. This broadening of focus is important for two reasons: First, though in the end we may agree with Romer (1993) that shocks to the domestic U.S. economy were a primary cause of both the American and world depressions, no account of the Great Depression would be complete without an explanation of the worldwide nature of the event, and of the channels through which deflationary forces spread among countries. Second, by effectively expanding the data set from one observation to twenty, thirty, or more, the shift to a comparative perspective substantially improves out ability to identify—in the strict econometric sense—the forces responsible for the world depression. Because of its potential to bring the profession toward agreement on the causes of the Depression—and perhaps, in consequence, to greater consensus on the central issues of contemporary macroeconomics—I consider the improved identification provided by comparative analysis to be a particularly important benefit of that approach.

In this lecture I provide a selective survey of our current understanding of

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the Great Depression, with emphasis on insights drawn from comparative research (by both myself and others). For reasons of space, and because I am a macroeconomist rather than a historian, my focus will be on broad economic issues rather than historical details. For readers wishing to delve into those details, Eichengreen (1992) provides a recent, authoritative treatment of the monetary and economic history of the interwar period. I have drawn heavily on Eichengreen's book (and his earlier work) in preparing this lecture, particularly in section 1 below.

To review the state of knowledge about the Depression, it is convenient to make the textbook distinction between factors affecting aggregate demand and those affecting aggregate supply. I argue in section 1 that the factors that depressed aggregate demand around the world in the 1930s are now well understood, at least in broad terms. In particular, the evidence that monetary shocks played a major role in the Great Contraction, and that these shocks were transmitted around the world primarily through the working of the gold standard, is quite compelling.

Of course, the conclusion that monetary shocks were an important source of the Depression raises a central question in macroeconomics, which is why nominal shocks should have real effects. Section 2 of this lecture discusses what we know about the impacts of falling money supplies and price levels on interwar economies. I consider two principal channels of effect: (1) deflation-induced financial crisis and (2) increases in real wages above market-clearing levels, brought about by the incomplete adjustment of nominal wages to price changes. Empirical evidence drawn from a range of countries seems to provide support for both of these mechanisms. However, it seems that, of the two channels, slow nominal-wage adjustment (in the face of massive unemployment) is especially difficult to reconcile with the postulate of economic rationality. We cannot claim to understand the Depression until we can provide a rationale for this paradoxical behavior of wages. I conclude the paper with some thoughts on how the comparative approach may help us make progress on this important remaining issue.

1. Aggregate Demand: The Gold Standard and World Money Supplies

During the Depression years, changes in output and in the price level exhibited a strong positive correlation in almost every country, suggesting an important role for aggregate demand shocks. Although there is no doubt that many factors affected aggregate demand in various countries at various times, my focus here will be on the crucial role played by monetary shocks.

For many years, the principal debate about the causes of the Great Depression in the United States was over the importance to be ascribed to

monetary factors. It was easily observed that the money supply, output, and prices all fell precipitously in the contraction and rose rapidly in the recovery; the difficulty lay in establishing the causal links among these variables. In their classic study of U.S. monetary history, Friedman and Schwartz (1963) presented a monetarist interpretation of these observations, arguing that the main lines of causation ran from monetary contraction—the result of poor policy-making and continuing crisis in the banking system—to declining prices and output. Opposing Friedman and Schwartz, Temin (1976) contended that much of the monetary contraction in fact reflected a passive response of money to output; and that the main sources of the Depression lay on the real side of the economy (for example, the famous autonomous drop in consumption in 1930).

To some extent the proponents of these two views argued past each other, with monetarists stressing the monetary sources of the latter stages of the Great Contraction (from late 1930 or early 1931 until 1933), and antimonetarists emphasizing the likely importance of nonmonetary factors in the initial downturn. A reasonable compromise position, adopted by many economists, was that both monetary and nonmonetary forces were operative at various stages (Gordon and Wilcox 1981). Nevertheless, conclusive resolution of the importance of money in the Depression was hampered by the heavy concentration of the disputants on the U.S. case—on one data point, as it were.[1]

Since the early 1980s, however, a new body of research on the Depression has emerged which focuses on the operation of the international gold standard during the interwar period (Choudhri and Kochin 1980; Eichengreen 1984; Eichengreen and Sachs 1985; Hamilton 1988; Temin 1989; Bernanke and James 1991; Eichengreen 1992). Methodologically, as a natural consequence of their concern with international factors, authors working in this area brought a strong comparative perspective into research on the Depression; as I suggested in the introduction, I consider this development to be a major contribution, with implications that extend beyond the question of the role of the gold standard. Substantively—in marked contrast to the inconclusive state of affairs that prevailed in the late 1970s—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. Two well-documented observations support this conclusion.[2]

[1] That both sides considered only the U.S. case is not strictly true; both Friedman and Schwartz (1963) and Temin (1976) made useful comparisons to Canada, for example. Nevertheless, the Depression experiences of countries other than the United States were not systematically considered.

[2] More detailed discussions of these points may be found in Eichengreen and Sachs (1985), Temin (1989), Bernanke and James (1991), and Eichengreen (1992). An important early precursor is Nurkse (1944).

First, exhaustive analysis of the operation of the interwar gold standard has shown that much of the worldwide monetary contraction of the early 1930s was not a passive response to declining output, but instead the largely unintended result of an interaction of poorly designed institutions, short-sighted policy-making, and unfavorable political and economic preconditions. Hence the correlation of money and price declines with output declines that was observed in almost every country is most reasonably interpreted as reflecting primarily the influence of money on the real economy, rather than vice versa.

Second, for reasons that were largely historical, political, and philosophical rather than purely economic, some governments responded to the crises of the early 1930s by quickly abandoning the gold standard, while others chose to remain on gold despite adverse conditions. Countries that left gold were able to reflate their money supplies and price levels, and did so after some delay; countries remaining on gold were forced into further deflation. To an overwhelming degree, the evidence shows that countries that left the gold standard recovered from the Depression more quickly than countries that remained on gold. Indeed, no country exhibited significant economic recovery while remaining on the gold standard. The strong dependence of the rate of recovery on the choice of exchange-rate regime is further, powerful evidence for the importance of monetary factors.

Section 1.1 briefly discusses the first of these two observations, and section 1.2 considers the second.

1.1. The Sources of Monetary Contraction: Multiple Monetary Equilibria?

Despite the focus of the earlier monetarist debate on the U.S. monetary contraction of the early 1930s, this country was hardly unique in that respect: The same phenomenon occurred in most market-oriented industrialized countries, and in many developing nations as well. As the recent research has emphasized, what most countries experiencing monetary contraction had in common was adherence to the international gold standard.

Suspended at the beginning of World War I, the gold standard had been laboriously reconstructed after the war: The United Kingdom returned to gold at the prewar parity in 1925, France completed its return by 1928, and by 1929 the gold standard was virtually universal among market economies. (The short list of exceptions included Spain, whose internal political turmoil prevented a return to gold, and some Latin American and Asian countries on the silver standard.) The reconstruction of the gold standard was hailed as a major diplomatic achievement, an essential step toward restoring monetary and financial conditions—which were turbulent during the 1920s—to the relative tranquility that characterized the classical (1870–

1913) gold-standard period. Unfortunately, the hoped-for benefits of gold did not materialize: Instead of a new era of stability, by 1931 financial panics and exchange-rate crises were rampant, and a majority of countries left gold in that year. A complete collapse of the system occurred in 1936, when France and the other remaining "Gold Bloc" countries devalued or otherwise abandoned the strict gold standard.

As noted, a striking aspect of the short-lived interwar gold standard was the tendency of the nations that adhered to it to suffer sharp declines in inside money stocks. To understand in general terms why these declines happened, it is useful to consider a simple identity that relates the inside money stock (say, M1) of a country on the gold standard to its reserves of monetary gold:

$$M1 = (M1/BASE) \times (BASE/RES) \times (RES/GOLD) \times PGOLD \times QGOLD \quad (1)$$

where

M1 = M1 money supply (money and notes in circulation plus commercial bank deposits),
BASE = monetary base (money and notes in circulation plus reserves of commercial banks),
RES = international reserves of the central bank (foreign assets plus gold reserves), valued in domestic currency,
GOLD = gold reserves of the central bank, valued in domestic currency = *PGOLD* × *QGOLD*,
PGOLD = the official domestic-currency price of gold, and
QGOLD = the physical quantity (for example, in metric tons) of gold reserves.

Equation (1) makes the familiar points that, under the gold standard, a country's money supply is affected both by its physical quantity of gold reserves (*QGOLD*) and the price at which its central bank stands ready to buy and sell gold (*PGOLD*). In particular, ceteris paribus, an inflow of gold (an increase in *QGOLD*) or a devaluation (a rise in *PGOLD*) raises the money supply. However, equation (1) also indicates three additional determinants of the inside money supply under the gold standard:

(1) *The "money multiplier,"* M1/*BASE*. In fractional-reserve banking systems, the total money supply (including bank deposits) is larger than the monetary base. As is familiar from textbook treatments, the so-called money multiplier, M1/*BASE*, is a decreasing function of the currency-deposit ratio chosen by the public and the reserve-deposit ratio chosen by commercial banks. At the beginning of the 1930s, M1/*BASE* was relatively low (not much above one) in countries in which banking was less developed, or in which people retained a preference for currency in transactions. In contrast,

in the financially well-developed United States this ratio was close to four in 1929.

(2) *The inverse of the gold backing ratio, BASE/RES*. Because central banks were typically allowed to hold domestic assets as well as international reserves, the ratio *BASE/RES*—the inverse of the gold backing ratio (also called the coverage ratio)—exceeded one. Statutory requirements usually set a minimum backing ratio (such as the Federal Reserve's 40 percent requirement), implying a maximum value for *BASE/RES* (for example, 2.5 in the United States). However, there was typically no statutory minimum for *BASE/RES*, an important asymmetry. In particular, sterilization of gold inflows by surplus countries reduced average values of *BASE/RES*.

(3) *The ratio of international reserves to gold, RES/GOLD*. Under the gold-exchange standard of the interwar period, foreign exchange convertible into gold could be counted as international reserves, on a one-to-one basis with gold itself.[3] Hence, except for a few "reserve currency" countries, the ratio *RES/GOLD* also usually exceeded one.

Because the ratio of inside money to monetary base, the ratio of base to reserves, and the ratio of reserves to monetary gold were all typically greater than one, the money supplies of gold-standard countries—far from equalling the value of monetary gold, as might be suggested by a naive view of the gold standard—were often large multiples of the value of gold reserves. Total stocks of monetary gold continued to grow through the 1930s; hence, the observed sharp declines in inside money supplies must be attributed entirely to contractions in the average money-gold ratio.

Why did the world money-gold ratio decline? In the early part of the Depression period, prior to 1931, the consciously chosen policies of some major central banks played an important role (see, for example, Hamilton 1987). For example, it is now rather widely accepted that Federal Reserve policy turned contractionary in 1928, in an attempt to curb stock market speculation. In terms of quantities defined in equation (1), the ratio of the U.S. monetary base to U.S. reserves (*BASE/RES*) fell from 1.871 in June 1928, to 1.759 in June 1929, to 1.626 in June 1930, reflecting both conscious monetary tightening and sterilization of induced gold inflows.[4] Because of this decline, the U.S. monetary base fell about 6 percent between June 1928 and June 1930, despite a more-than-10 percent increase in U.S. gold reserves during the same period. This flow of gold into the United

[3] The gold-exchange standard was proposed by participants at the Genoa Conference of 1922, as a means of averting a feared shortage of monetary gold. Although the Genoa recommendations were not formally adopted, as the gold standard was reconstructed the reliance on foreign exchange reserves increased significantly relative to the prewar practice.

[4] U.S. monetary data in this paragraph are from Friedman and Schwartz (1963). Sumner (1991) suggests the use of the coverage ratio as an indicator of the stance of monetary policy under a gold standard.

States, like a similarly large inflow into France following the Poincare' stabilization, drained the reserves of other gold-standard countries and forced them into parallel tight-money policies.[5]

However, in 1931 and subsequently, the large declines in the money-gold ratio that occurred around the world did not reflect anyone's consciously chosen policy. The proximate causes of these declines were the waves of banking panics and exchange-rate crises that followed the failure of the Kreditanstalt, the largest bank in Austria, in May 1931. These developments affected each of the components of the money-gold ratio: First, by leading to rises in aggregate currency-deposit and bank reserve-deposit ratios, banking panics typically led to sharp declines in the money multiplier, *M1/BASE* (Friedman and Schwartz 1963; Bernanke and James 1991). Second, exchange-rate crises and the associated fears of devaluation led central banks to substitute gold for foreign exchange reserves; this flight from foreign-exchange reserves reduced the ratio of total reserves to gold, *RES/GOLD*. Finally, in the wake of these crises, central banks attempted to increase gold reserves and coverage ratios as security against future attacks on their currencies; in many countries, the resulting "scramble for gold" induced continuing declines in the ratio *BASE/RES*.[6]

A particularly destabilizing aspect of this process was the tendency of fears about the soundness of banks and expectations of exchange-rate devaluation to reinforce each other (Bernanke and James 1991; Temin 1993). An element that the two types of crises had in common was the so-called "hot money," short-term deposits held by foreigners in domestic banks. On one hand, expectations of devaluation induced outflows of the hot-money deposits (as well as flight by domestic depositors), which threatened to trigger general bank runs. On the other hand, a fall in confidence in a domestic banking system (arising, for example, from the failure of a major bank) often led to a flight of short-term capital from the country, draining international reserves and threatening convertibility. Other than abandoning the parity altogether, central banks could do little in the face of combined banking and exchange-rate crises, as the former seemed to demand easy money policies while the latter required monetary tightening.

From a theoretical perspective, the sharp declines in the money-gold ratio during the early 1930s have an interesting implication: namely, that under the gold standard as it operated during this period, *there appeared to be multiple potential equilibrium values of the money supply*.[7] Broadly speaking, when

[5] The gold flow into France was exacerbated by a 1928 law that induced a systematic conversion of foreign exchange reserves into gold by the Bank of France; see Nurkse (1944).

[6] Declines in *BASE/RES* also reflected sterilization of gold inflows by gold-surplus countries concerned about inflation; and, more benignly, the revaluation of gold reserves following currency devaluations.

[7] I am investigating this possibility more formally in ongoing work with Ilian Mihov.

financial investors and other members of the public were "optimistic," believing that the banking system would remain stable and gold parities would be defended, the money-gold ratio and hence the money stock itself remained "high." More precisely, confidence in the banks allowed the ratio of inside money to base to remain high, while confidence in the exchange rate made central banks willing to hold foreign exchange reserves and to keep relatively low coverage ratios. In contrast, when investors and the general public became "pessimistic," anticipating bank runs and devaluation, these expectations were to some degree self-confirming and resulted in "low" values of the money-gold ratio and the money stock. In its vulnerability to self-confirming expectations, the gold standard appears to have borne a strong analogy to a fractional-reserve banking system in the absence of deposit insurance: For example, Diamond and Dybvig (1983) have shown that in such a system there may be two Nash equilibria, one in which depositor confidence ensures that there will be no run on the bank, the other in which the fears of a run (and the resulting liquidation of the bank) are self-confirming.

An interpretation of the monetary collapse of the interwar period as a jump from one expectational equilibrium to another one fits neatly with Eichengreen's (1992) comparison of the classical and interwar gold-standard periods [see also Eichengreen (forthcoming)]. According to Eichengreen, in the classical period, high levels of central bank credibility and international cooperation generated stabilizing expectations, for example, speculators' activities tended to reverse rather than exacerbate movements of currency values away from official exchange rates. In contrast, Eichengreen argues, in the interwar period central banks' credibility was significantly reduced by the lack of effective international cooperation (the result of lingering animosities and the lack of effective leadership) and by changing domestic political equilibria—notably, the growing power of the labor movement, which reduced the perceived likelihood that the exchange rate would be defended at the cost of higher unemployment. Banking conditions also changed significantly between the earlier and later periods, as war, reconstruction, and the financial and economic problems of the 1920s left the banks of many countries in a much weaker financial condition, and thus more crisis-prone. For these reasons, destabilizing expectations and a resulting low-level equilibrium for the money supply seemed much more likely in the interwar environment.

Table 1 illustrates equation (1) with data from six representative countries. The first three countries in the table were members of the Gold Bloc, who remained on the gold standard until relatively late in the Depression (France and Poland left gold in 1936, Belgium in 1935). The remaining three countries in the table abandoned gold earlier: the United Kingdom and Sweden in 1931, the United States in 1933. [Throughout this lecture I follow Bernanke and James (1991) in treating any major departure from

Table 1
Determinants or the Money Supply in Six Countries 1929–1936

	M1	*M1/BASE*	*BASE/RES*	*RES/GOLD*	*PGOLD*	*QGOLD*
France (devalued October 1936)						
1929	101562	1.354	1.109	1.623	16.96	2456.3
1930	111720	1.325	1.106	1.489	16.96	3158.4
1931	122748	1.239	1.101	1.307	16.96	4059.4
1932	121519	1.263	1.010	1.054	16.96	4893.9
1933	114386	1.264	1.156	1.015	16.96	4544.9
1934	113451	1.244	1.098	1.012	16.96	4841.2
1935	108009	1.230	1.298	1.020	16.96	3908.1
1936	117297	1.218	1.557	1.024	22.68	2661.8
Poland (imposed exchange control April 1936, devalued October 1936)						
1929	2284	1.339	1.390	1.750	5.92	118.3
1930	2212	1.328	1.709	1.735	5.92	94.9
1931	1945	1.267	1.888	1.355	5.92	101.3
1932	1773	1.275	2.177	1.273	5.92	84.7
1933	1802	1.280	2.496	1.185	5.92	80.3
1934	1861	1.301	2.693	1.056	5.92	84.9
1935	1897	1.277	3.155	1.061	5.92	74.9
1936	2059	1.340	3.634	1.076	5.92	66.3
Belgium (devalued March 1935)						
1929	42788	2.504	1.949	1.492	23.90	245.9
1930	46420	2.336	1.697	1.707	23.90	287.1
1931	44863	2.047	1.266	1.358	23.90	533.4
1932	41349	1.805	1.395	1.265	23.90	543.1
1933	40382	1.754	1.314	1.282	23.90	571.9
1934	NA	NA	1.113	1.266	23.90	524.0
1935	39956	1.579	1.063	1.378	33.19	520.8
1936	43314	1.617	1.098	1.293	33.19	561.6
United Kingdom (suspended gold standard September 1931)						
1929	1328	1.560	5.825	1.0	0.1366	1069.8
1930	1361	1.618	5.699	1.0	0.1366	1080.8
1931	1229	1.579	6.452	1.0	0.1366	883.8
1932	1362	1.667	6.823	1.0	0.1366	877.2
1933	1408	1.680	4.395	1.0	0.1366	1396.4
1934	1449	1.642	4.590	1.0	0.1366	1408.1
1935	1565	1.694	4.615	1.0	0.1366	1465.2
1936	1755	1.700	3.291	1.0	0.1366	2297.0
Sweden (suspended gold standard September 1931)						
1929	988	1.498	1.280	2 092	2.48	98.8
1930	1030	1.508	1.082	2.618	2.48	97.2

Table 1 (*cont.*)

	M1	M1/*BASE*	*BASE*/*RES*	*RES*/*GOLD*	*PGOLD*	*QGOLD*
1931	1021	1.522	2.631	1.238	2.48	83.1
1932	1004	1.373	1.740	2.039	2.48	83.1
1933	1085	1.106	1.202	2.205	2.48	149.2
1934	1205	1.211	1.101	2.575	2.48	141.5
1935	1353	1.268	1.029	2.542	2.48	164.5
1936	1557	1.211	1.032	2.355	2.48	213.3
United States (suspended gold standard March 1933)						
1929	26434	3.788	1.746	1.0	0.6646	6014.0
1930	24922	3.498	1.655	1.0	0.6646	6478.9
1931	21894	2.831	1.854	1.0	0.6646	6278.8
1932	20341	2.534	1.900	1.0	0.6646	6358.6
1933	19759	2.380	2.057	1.0	0.6646	6072.7
1934	22774	2.396	1.154	1.0	1.1253	7320.9
1935	27032	2.335	1.144	1.0	1.1253	8997.8
1936	30852	2.327	1.178	1.0	1.1253	10004.7

Notes: The table illustrates the identity, equation (1), for six countries. Where possible, values are end-of-year. Data sources are given in the Appendix.

Definitions are as follows: M1 = Money and notes in circulation plus commercial bank deposits; in local currency (millions). *BASE* = Money and notes in circulation plus commercial bank reserves; in local currency. *RES* = International reserves (gold plus foreign assets); valued in local currency. *GOLD* = Gold reserves, valued in local currency at the official gold price = *PGOLD* × *QGOLD*. *PGOLD* = Official gold price (units of local currency per gram); for countries not on the gold standard, a legal fiction rather than a market price. *QGOLD* = Physical quantity of gold reserves; in metric tons.

gold-standard rules, including devaluation or the imposition of exchange controls, as "leaving gold."] Of course, the gold leavers gained autonomy for their domestic monetary policies; but as these countries continued to hold gold reserves and set an official gold price, the components of equation (1) could still be calculated for those countries.

Several useful points may be gleaned from Table 1: First, observe the strong correspondence between gold-standard membership and falling M1 money supplies (a minor exception is Poland, which managed a small growth in nominal M1 between 1932 and 1936). Second, note the sharp declines in M1/*BASE* and *RES*/*GOLD*, reflecting (respectively) the banking crises and exchange crises (both of which peaked in 1931). Third, the table shows the tendency of gold-surplus countries to sterilize (that is, *BASE*/*RES* tends to fall in countries experiencing increases in gold stocks, *QGOLD*).

A striking case shown in Table 1 is that of Belgium: Although that country was the beneficiary of large gold inflows early in the Depression, the

combination of declines in M1/*BASE* (reflecting banking panics), *RES*/*GOLD* (reflecting liquidation of foreign-exchange reserves), and *BASE*/*RES* (the result of conscious sterilization early in the period, and of attempts to defend the exchange rate against speculative attack later in the period) induced sharp declines in the Belgian money stock. Similarly, because of falls in M1/*BASE* and *RES*/*GOLD*, France experienced almost no nominal growth in M1 between 1930 and 1934, despite a more than 50 percent increase in gold reserves. The other Gold Bloc country in the table, Poland, experienced monetary contraction principally because of loss of gold reserves.

Another interesting phenomenon shown in Table 1 is the tendency of countries devaluing or leaving the gold standard to attract gold away from countries still on the gold standard. In the table, the United Kingdom, Sweden, and the United States all experienced significant gold inflows starting in 1933. This seemingly perverse result reflected the greater confidence of speculators in already depreciated currencies, relative to the clearly overvalued currencies of the Gold Bloc. This flow of gold away from some important Gold Bloc countries was the final nail in the gold standard's coffin.

1.2. The Macroeconomic Implications of the Choice of Exchange-rate Regime

We have seen that countries adhering to the international gold standard suffered largely unintended and unanticipated declines in their inside money stocks in the late 1920s and early 1930s. These declines in inside money stocks, particularly in 1931 and later, were naturally influenced by macroeconomic conditions; but they were hardly continuous, passive responses to changes in output. Instead, money supplies evolved discontinuously in response to financial and exchange-rate crises, crises whose roots in turn lay primarily in the political and economic conditions of the 1920s and in the institutional structure as rebuilt after the war. Thus, to a first approximation, it seems reasonable to characterize these monetary shocks as exogenous with respect to contemporaneous output, suggesting a significant causal role for monetary forces in the world depression.

However, even stronger evidence for the role of nominal factors in the Depression is provided by a comparison of the experiences of countries that continued to adhere to the gold standard with those that did not. Although, as has been mentioned, the great majority of countries had returned to gold by the late 1920s, there was considerable variation in the strength of national allegiances to gold during the 1930s: Many countries left gold following the crises of 1931, notably the "sterling bloc" (the United Kingdom and its trading partners). Other countries held out a few years more before capit-

ulating (for example, the United States in 1933, Italy in 1934). Finally, the diehard Gold Bloc nations, led by France, remained on gold until the final collapse of the system in late 1936. Because countries leaving gold effectively removed the external constraint on monetary reflation, to the extent that they took advantage of this freedom we should observe these countries enjoying earlier and stronger recoveries than the countries remaining on the gold standard.

That a clear divergence between the two groups of countries did occur was first noticed in a pathbreaking paper by Choudhri and Kochin (1980), who considered the relative performances of Spain (which as mentioned never joined the gold standard club), three Scandinavian countries (which left gold following the sterling crisis in September 1931), and four countries that remained part of the Gold Bloc (the Netherlands, Belgium, Italy, and Poland). Choudhri and Kochin found that the gold-standard countries suffered substantially more severe contractions in output and prices than did Spain and the three Scandinavian nations. In another important paper, Eichengreen and Sachs (1985) examined a number of macro variables in a sample of ten major countries over the period 1929–1935; they found that by 1935 countries that had left gold relatively early had largely recovered from the Depression, while the Gold Bloc countries remained at low levels of output and employment. Bernanke and James (1991) confirmed the general findings of the earlier authors for a broader sample of twenty-four (mostly industrialized) countries, and Campa (1990) did the same for a sample of Latin American countries.

If choices of exchange-rate regime were random, these results would leave little doubt as to the importance of nominal factors in determining real outcomes in the Depression. Of course, in practice the decision about whether to leave the gold standard was endogenous to a degree, and so we must be concerned with the possibility that the results of the literature are spurious, that is, that some underlying factor accounted for both the choice of exchange-rate regime and the subsequent differences in economic performance. In fact, these results are very unlikely to be spurious, for two general reasons:

First, as has been documented in detail by Eichengreen (1992) and others, for most countries the decision to remain on or leave the gold standard was strongly influenced by internal and external political factors and by prevailing economic and philosophical beliefs. For example, the French decision to stay with gold reflected, among other things, a desire to preserve at any cost the benefits of the Poincaré stabilization and the associated distributional bargains among domestic groups; an overwhelmingly dominant economic view (shared even by the Communists) that sound money and fiscal austerity were the best long-run antidotes to the Depression; and what can only be described as a strong association of national pride with mainte-

nance of the gold standard.[8] Indeed, as Bernanke and James (1991) point out, economic conditions in 1929 and 1930 were on average quite similar in those countries that were to leave gold in 1931 and those that would not; thus it is difficult to view this choice as being simply a reflection of cross-sectional differences in macro-economic performance.

Second, and perhaps even more compelling, is that any bias created by endogeneity of the decision to leave gold would appear to go the wrong way, as it were, to explain the facts: The presumption is that economically weaker countries, or those suffering the deepest depressions, would be the first to devalue or abandon gold. Yet the evidence is that countries leaving gold recovered substantially more rapidly and vigorously than those who did not. Hence, any correction for endogeneity bias in the choice of exchange-rate regime should tend to strengthen the association of economic expansion and the abandonment of gold.

Tables 2 and 3 below extend the results of Bernanke and James (1991) on the links between exchange-rate regime and macroeconomic performance, using a data set similar to theirs. Both tables employ annual data on thirteen macroeconomic variables for up to twenty-six countries, depending on availability (see the Appendix for a list of countries, data sources, and data availabilities). Following similar tables in Bernanke and James, Table 2 shows average values of the log-changes of each variable (except for nominal and real interest rates, which are measured in percentage points) for all countries in the sample, and for the subsets of countries on and off the gold standard in each year.[9] Averages for the whole sample are reported for each year from 1930 to 1936; because almost all countries were on gold in 1930 and almost all had left gold by 1936, averages for the subsamples are shown for 1931–1935 only.

The statistical significance of the divergences between gold and nongold countries is assessed in Table 3. Lines marked "a" in Table 3 present the

[8] The differences in world views were most apparent at the ill-fated 1933 London Economic Conference, in which Gold Bloc delegates decried lack of sound money as the root of all evil, while representatives of the sterling bloc stressed the imperatives of reflation and economic expansion (Eichengreen and Uzan 1993). The persistence of these attitudes across decades is fascinating; note the attachment of the French to the *franc fort* in the recent troubles of the EMS, and the contrasting willingness of the British (as in September 1931) to abandon the fixed exchange rate in the pursuit of domestic macroeconomic objectives.

[9] As noted earlier, we treat a country as leaving gold if it deviates seriously from gold-standard rules, for example, by imposing comprehensive controls or devaluing, as well as if it formally renounces the gold standard. Dates of changes in gold-standard policies for twenty-four of our countries are given by Bernanke and James, Table 2.1. In addition, we take Argentina and Switzerland as leaving gold on their official devaluation dates (December 1929 and October 1936, respectively). Reported values are simple within-group averages of the data; however, weighting the results by gold reserves held or relative to 1929 production levels (available in League of Nations 1945) did not qualitatively change the results.

Table 2
Average Behavior of Selected Macro Variables for Countries on and off the Gold Standard, 1930–1936

	1930	1931	1932	1931	1934	1935	1936
1. Manufacturing production (log-change)							
Average	−.066	−.116	−.090	.076	.100	.074	.072
ON		−.117	−.173	.068	.025	−.001	
OFF		−.113	−.057	.078	.120	.008	
2. Wholesale prices (log-change)							
Average	−.116	−.122	−.045	−.017	.018	.024	.048
ON		−.140	−.133	−.065	−.037	−.038	
OFF		−.084	−.011	−.002	.033	.036	
3. M1 money supply (log-change)							
Average	.016	−.088	−.068	−.006	.019	.027	.074
ON		−.094	−.088	−.045	−.013	−.067	
OFF		−.076	−.060	.007	.028	.046	
4. M1-currency ratio (log-change)							
Average	.030	−.129	−.006	−.024	−.002	−.011	−.011
ON		−.142	−.052	−.009	−.016	−.037	
OFF		−.102	.014	−.030	.002	−.006	
5. Nominal wages (log-change)							
Average	.004	−.030	−.053	−.030	−.002	−.001	.031
ON		−.027	−.070	−.033	−.031	−.022	
OFF		−.039	−.045	−.029	.007	.004	
6. Real wages (log-change)							
Average	.122	.094	.007	−.009	−.023	−.022	−.018
ON		.110	.064	.032	.005	.016	
OFF		.059	−.020	−.025	−.032	−.031	
7. Employment (log-change)							
Average	−.066	−.117	−.074	.050	.096	.064	.068
ON		−.113	−.137	.006	.028	−.016	
OFF		−.127	−.047	.065	.113	.083	
8. Nominal interest rate (percentage points)							
Average	5.31	5.43	5.29	4.37	3.97	3.89	3.79
ON		5.22	4.20	3.69	3.26	4.05	
OFF		5.90	5.68	4.56	4.13	3.86	

Table 2 (*cont.*)

	1930	1931	1932	1931	1934	1935	1936
9. Ex-post real interest rate (percentage points)							
Average	16.89	9.39	6.51	2.78	1.11	−1.19	−8.93
ON		10.38	9.41	6.94	3.35	−4.92	
OFF		7.16	5.47	1.64	0.61	−0.62	
10. Relative price of exports (log-change)							
Average	−.033	−.011	−.047	.076	.084	−.067	.039
ON		.003	−.019	.134	.140	−.112	
OFF		−.040	−.058	.058	.070	−.058	
11. Real exports (log-change)							
Average	−.073	−.179	−.222	.014	.056	.021	.072
ON		−.193	−.292	−.008	.015	−.024	
OFF		−.146	−.192	.021	.067	.030	
12. Real imports (log-change)							
Average	−.071	−.211	−.264	.004	.038	−.020	.049
ON		−.159	−.250	−.006	−.067	−.012	
OFF		−.315	−.271	.008	.070	.027	
13. Real share prices (log-change)							
Average	−.107	−.186	−.214	.133	.060	.091	.115
ON		−.181	−.219	.139	−.028	.062	
OFF		−.198	−.211	.130	.092	.098	

Notes: For each variable and year, the table presents the overall average value of the variable, and the average for countries on and off the gold standard in that year (see Bernanke and James 1991). As most countries were on the gold standard in 1930 and off the gold standard in 1936, disaggregated data for those years are not presented. Data are annual and for up to twenty-six countries, depending on data availability (see the Appendix). Real wages, real share prices, and the ex post real rate of interest are computed using the wholesale price index. If a country is on the gold standard for a fraction f of a particular year, the values of its variables for the whole year are counted with the gold standard countries with weight f and with non-gold-standard countries with weight $1\text{-}f$ for that year. The proportion of country-months "on gold" in each year are as follows: 0.676 (1931), 0.282 (1932), 0.237 (1933), 0.205 (1934), 0.160 (1935).

Table 3
Regressions of Selected Macro Variables against Gold Standard and Banking Panic Dummies, 1931–1935

Dependent Variable		*ONGOLD*	*PANIC*	Adjusted R^2
Manufacturing production	(1a)	−.0704		0.601
		(4.04)		
	(1b)	−.0496	−.0926	0.634
		(2.80)	(3.50)	
Wholesale prices	(2a)	−.0914		0.622
		(8.20)		
	(2b)	−.0885	−.0129	0.620
		(7.47)	(0.73)	
Money supply (M1)	(3a)	−.0534		0.297
		(3.26)		
	(3b)	−.0344	−.0846	0.352
		(2.06)	(3.40)	
M1-currency ratio	(4a)	−.0329		0.263
		(1.91)		
	(4b)	−.0176	−.0680	0.294
		(0.99)	(2.55)	
Nominal wages	(5a)	−.0204		0.196
		(2.62)		
	(5b)	−.0145	−.0262	0.219
		(1.78)	(2.16)	
Real wages	(6a)	.0605		0.466
		(5.84)		
	(6b)	.0656	−.0230	0.470
		(5.99)	(1.41)	
Employment	(7a)	−.0610		0.557
		(4.38)		
	(7b)	−.0507	−.0458	0.569
		(3.48)	(2.10)	
Nominal interest rate	(8a)	−1.22		0.109
		(2.83)		
	(8b)	−1.00	−0.97	0.116
		(2.20)	(1.43)	
Ex-post real interest rate	(9a)	2.70		0.264
		(2.07)		
	(9b)	2.16	2.39	0.266
		(1.56)	(1.16)	
Relative price of exports	(10a)	.0464		0.198
		(1.70)		
	(10b)	.0288	.0783	0.213
		(1.00)	(1.83)	
Real exports	(11a)	−.0745		0.323
		(2.08)		

Table 3 (*cont.*)

Dependent Variable		*ONGOLD*	*PANIC*	Adjusted R^2
	(11b)	−.0523	−.0990	0.334
		(1.39)	(1.76)	
Real imports	(12a)	−.0000		0.416
		(0.00)		
	(12b)	.0232	−.1036	0.435
		(0.75)	(2.25)	
Real share prices	(13a)	−.0299		0.354
		(1.12)		
	(13b)	−.0206	−0.413	0.354
		(0.72)	(0.97)	

Notes: Entries are estimated coefficients from regressions of the dependent variables against dummies for adherence to the gold standard (*ONGOLD*) and for the presence of a banking panic (*PANIC*). Absolute values of *t*-statistics are in parentheses. Dependent variables are measures in log-changes, except for the nominal and ex post real interest rates, which are in percentage points (levels). Data are annual, 1931 to 1935 inclusive, and for up to twenty-six countries, depending on data availability (see the Appendix). Each regression includes a complete set of year dummies *ONGOLD* and *PANIC* are measured as the number of months during the year in which the country was on gold or experiencing a banking panic (see text), divided by twelve.

results of panel-data regressions of each of the macroeconomic variables in Table 2 against a constant, yearly time dummies, and a dummy variable for gold-standard membership (*ONGOLD*). (Lines in Table 3 marked "b" should be ignored for now.) For each country-year observation, the variable *ONGOLD* indicates the fraction of the year that the country was on the gold standard (the number of months on the gold standard divided by twelve). The regressions use data for 1931–1935 inclusive, but the results are not sensitive to adding data from 1930 or 1936 or to dropping 1931. Because each regression contains a full set of annual time dummies, the estimated coefficients of *ONGOLD* in each regression may be interpreted as reflecting purely cross-sectional differences between countries on and off gold, holding constant average macroeconomic conditions. Absolute values of *t*-statistics, given under each estimated coefficient, indicate the significance of the between-group differences.

Tables 2 and 3 are generally quite consistent with the conclusions that (1) monetary contraction was an important source of the Depression in all countries; (2) subsequent to 1931 or 1932, there was a sharp divergence between countries which remained on the gold standard and those that left it; and (3) this divergence arose because countries leaving the gold standard had greater freedom to initiate expansionary monetary policies.

Turning first to the behavior of money supplies, we can see from Table 2 (line 3) that the inside money stocks of all countries contracted sharply in 1931 and 1932. In an arithmetic sense, much of this contraction can be attributed to declines in the ratio of M1 to currency (line 4), which in turn primarily reflected the effects of banking crises (note the concentration of this effect in 1931).[10] During the period 1933–1935, however, Table 2 shows that the money supplies of gold-standard countries continued to contract, while those of countries not on the gold standard expanded. Table 3 (line 3a) indicates that, over the 1931–1935 period, the growth rate of M1 (line 3a) in countries on gold average about 5 percentage points per year less than in countries off gold, with an absolute *t*-value of 3.26.

The behavior of price levels corresponded closely to the behavior of money stocks. Table 2 (line 2) shows that, although a sharp deflation occurred in all countries through 1931, in countries leaving gold wholesale prices stabilized in 1932–1933 and began, on average, to rise in 1934.[11] Countries remaining on gold experienced continuing deflation through 1935, leading to a cumulative difference in log price levels over 1932–1935 of .329. According to Table 3 (line 2a), over the 1931–1935 period wholesale price inflation was about 9 percentage points per year lower (absolute *t*-value = 8.20) in countries on gold.

Declines in output and employment were strongly correlated with money and price declines: Manufacturing production (Table 2, line 1) and employment (Table 2, line 7) fell in all countries in 1930–1931 but afterward began to diverge between the two groups. Over the period 1932–1935, the cumulative difference in log output levels was .310, and the cumulative difference in log employment levels was .301, in favor of countries not on gold. The corresponding absolute *t*-values (Table 3, lines 1a and 7a, for the 1931–1935 sample) were 4.04 and 4.38 for output and employment, respectively. These are highly significant differences, both economically and statistically.

The behavior of other macro variables shown in Tables 2 and 3 are also generally consistent with the monetary-shocks story. For example, a standard Mundell-Fleming analysis of a small gold-standard economy (Eichengreen and Sachs 1986) would predict that monetary contraction abroad

[10] The preferred measure, M1/*BASE*, is not used owing to lack of data on commercial bank reserves for many countries in the sample. Note from Table 3, line 4a, that the fall in the M1-currency ratio is greater on average in gold-standard countries (and the difference is statistically significant at approximately the 5 percent level), consistent with our earlier observation that banking problems were more severe in gold-standard countries.

[11] Thus price-level stabilization preceded monetary stabilization in the typical country leaving gold. A possible explanation is that devaluation raised expectations of future inflation, lowering money demand and raising current prices.

would depress domestic aggregate demand by raising the domestic real interest rate. It also would predict an increase in the domestic real exchange rate (price of exports), relative to countries not on gold, and an accompanying decline in real exports. Table 2 (line 9) shows that ex post real interest rates were universally high in 1930, coming down gradually in both gold and nongold countries, but being consistently lower in countries not on gold.[12] Table 3 (line 9a) confirms that, on average, ex post real interest rates were 2.7 percentage points higher in gold-standard countries ($t = 2.07$). The real exchange rate in gold-standard countries (line 10a of Table 3, measured relative to the United States) grew on average close to 5 percentage points per year relative to that of nongold countries (but with a *t*-value of only 1.70), and correspondingly real exports (Table 3, line 11a) of gold-standard countries fell between 7 and 8 percentage points per year more quickly (absolute *t*-value = 2.08). There was no difference in the growth rates of imports between gold and nongold countries (Table 3, line 12a), presumably reflecting the offsetting effects in Gold Bloc countries of lower domestic income and improved terms of trade.

Interestingly, real share prices (a nominal share-price index deflated by the wholesale price index) did not fare that much worse in gold-standard countries, falling about 3 percentage points a year faster (absolute *t*-value = 1.12). There are significant differences between gold and nongold countries in the behavior of nominal and real wages, but as these variables are most closely linked to issues of aggregate supply, we defer discussion of them until the next section.

2. Aggregate Supply: The Failure of Nominal Adjustment

Although the consensus view of the causes of the Great Depression has long included a role for monetary shocks, we have seen in section 1 that recent

[12] A finding that ex post real interest rates were higher in gold-standard countries of course does not settle whether ex ante real interest rates were higher; that depends on whether deflation was anticipated. For the U.S. case, Cecchetti (1992) finds evidence for, and Hamilton (1992) find evidence against, the proposition that people anticipated the declines in the price level. (I do not know of any studies of this issue for countries other than the United States.) This debate bears less on the question of whether the initiating shocks were monetary than it does on the particular channel of transmission: If deflation was anticipated, so that the ex ante real interest rate was high, then the channel of monetary transmission was through conventional IS curve effects. If deflation was unanticipated, as both Cecchetti and Hamilton note, then one must rely more on a debt-deflation mechanism (see section 2). The behavior of nominal interest rates, which remained well above zero in most countries and were not substantially lower in gold-standard than in non-gold-standard countries (Table 2, line 8), suggests to me that much of the deflation was not expected, at least at the medium-term horizon. Evans and Wachtel (1993) draw a similar conclusion based on U.S. nominal interest rate behavior.

research taking a comparative perspective has greatly strengthened the empirical case for money as a major driving force. Further, the effects of monetary contraction on real economic variables appeared to be persistent as well as large. Explaining this persistent non-neutrality is particularly challenging to contemporary macroeconomists, since current theories of non-neutrality (such as those based on menu costs or the confusion of relative and absolute price levels) typically predict that the real effects of monetary shocks will be transitory.

On the aggregate supply side, then, we still have a puzzle: Why did the process of adjustment to nominal shocks appear to take so long in interwar economies? In this section 1 will discuss the evidence for two leading explanations of how monetary shocks may have had long-lived effects: induced financial crisis and sticky nominal wages.

2.1. Deflation and the Financial System

If one thinks about important sets of contracts in the economy that are set in nominal terms, and which are unlikely to be implicitly insured or indexed against unanticipated price-level changes, financial contracts (such as debt instruments) come immediately to mind. In my 1983 paper I argued that nonindexation of financial contracts may have provided a mechanism through which declining money stocks and price levels could have had real effects on the U.S. economy of the 1930s. I discussed two related channels, one operating through "debt-deflation" and the other through bank capital and stability.

The idea of debt-deflation goes back to Irving Fisher (1933). Fisher envisioned a dynamic process in which falling asset and commodity prices created pressure on nominal debtors, forcing them into distress sales of assets, which in turn led to further price declines and financial difficulties.[13] His diagnosis led him to urge President Roosevelt to subordinate exchange-rate considerations to the need for reflation, advice that (ultimately) FDR followed. Fisher's idea was less influential in academic circles, though, because of the counterargument that debt-deflation represented no more than a redistribution from one group (debtors) to another (creditors). Absent implausibly large differences in marginal spending propensities among the groups, it was suggested, pure redistributions should have no significant macroeconomic effects.

However, the debt-deflation idea has recently experienced a revival, which has drawn its inspiration from the burgeoning literature on imperfect

[13] Kiyotaki and Moore (1993) provide a formal analysis that captures some of Fisher's intuition.

information and agency costs in capital markets.[14] According to the agency approach, which has come to dominate modern corporate finance, the structure of balance sheets provides an important mechanism for aligning the incentives of the borrower (the agent) and the lender (the principal). One central feature of the balance sheet is the *borrower's net worth*, defined to be the borrower's own ("internal") funds plus the collateral value of his illiquid assets. Many simple principal-agent models imply that a decline in the borrower's net worth increases the deadweight agency costs of lending, and thus the net cost of financing the borrower's proposed investments. Intuitively, if a borrower can contribute relatively little to his or her own project and hence must rely primarily on external finance, then the borrower's incentives to take actions that are not in the lender's interest may be relatively high; the result is both deadweight losses (for example, inefficiently high risk-taking or low effort) and the necessity of costly information provision and monitoring. If the borrower's net worth falls below a threshold level, he or she may not be able to obtain funds at all.

From the agency perspective, a debt-deflation that unexpectedly redistributes wealth away from borrowers is not a macroeconomically neutral event: To the extent that potential borrowers have unique or lower-cost access to particular investment projects or spending opportunities, the loss of borrower net worth effectively cuts off these opportunities from the economy. Thus, for example, a financially distressed firm may not be able to obtain working capital necessary to expand production, or to fund a project that would be viable under better financial conditions. Similarly, a household whose current nominal income has fallen relative to its debts may be barred from purchasing a new home, even though purchase is justified in a permanent-income sense. By inducing financial distress in borrower firms and households, debt-deflation can have real effects on the economy.

If the extent of debt-deflation is sufficiently severe, it can also threaten the health of banks and other financial intermediaries (the second channel). Banks typically have both nominal assets and nominal liabilities and so over a certain range are hedged against deflation. However, as the distress of banks' borrowers increases, the banks' nominal claims are replaced by claims on real assets (for example, collateral); from that point, deflation squeezes the banks as well.[15] Actual and potential loan losses arising from debt-deflation impair bank capital and hurt banks' economic efficiency in several

[14] An important early paper that applied this approach to consumer spending in the Depression is Mishkin (1978). Bernanke and Gertler (1990) provide a theoretical analysis of debt-deflation. See Calomiris (1993) for a survey of the role of financial factors in the Depression.

[15] Banks in universal banking systems, such as those of central Europe, held a mixture of real and nominal assets (for example, they held equity as well as debt). Universal banks were thus subject to pressure even earlier in the deflationary process.

ways: First, particularly in a system without deposit insurance, depositor runs and withdrawals deprive banks of funds for lending; to the extent that bank lending is specialized or information-intensive, these loans are not easily replaced by nonbank forms of credit. Second, the threat of runs also induces banks to increase the liquidity and safety of their assets, further reducing normal lending activity. (The most severely decapitalized banks, however, may have incentives to make very risky loans, in a gambling strategy.) Finally, bank and branch closures may destroy local information capital and reduce the provision of financial services.

How macroeconomically significant were financial effects in the interwar period? My 1983 paper, which considered only the U.S. case, showed that measures of the liabilities of failing commercial firms and the deposits of failing banks helped predict monthly changes in industrial production, in an equation that also included lagged values of money and prices. However, this evidence is not really conclusive: For example, as Green and Whiteman (1992) pointed out, the spikes in commercial and banking failures in 1931 and 1932 could well be functioning as a dummy variable, picking up whatever forces—financial or otherwise—caused the U.S. Depression to take a sharp second dip during that period. As with the debate on the role of money, the problem is the reliance on what amounts to one data point.

However, in the comparative spirit of the new gold standard research, Bernanke and James (1991) studied the macroeconomic effects of financial crises in a panel of twenty-four countries. The expansion of the sample brought with it data limitations: Bernanke and James used annual rather than monthly data, and lack of data on indebtedness and financial distress forced them to confine their analysis to the effects of banking panics. Further, not having a consistent quantitative measure of banking instability, they chose to use dummy variables to indicate periods of banking crisis (as suggested by their reading of historical sources). Offsetting these disadvantages, expanding the sample made it possible to compare the U.S. case with both countries that also suffered severe banking problems and countries in which banking remained stable despite the Depression. In particular, Bernanke and James argued that cross-national differences in vulnerability to banking crises had more to do with institutional and policy differences than macroeconomic conditions, strengthening the case that banking panics had an independent macroeconomic effect (as opposed to being a purely passive response to the general economic downturn).[16]

As a measure of banking instability, Bernanke and James constructed a

[16] Factors cited by Bernanke and James as contributing to banking panics included banking structure ("universal" banking systems and systems with many small banks were more vulnerable); reliance on short-term foreign liabilities; and the country's financial and economic experiences and banking policies during the 1920s. See Grossman (1993) for a more detailed and generally complementary analysis of the causes of interwar banking panics.

dummy variable called *PANIC*, which they defined as the number of months during each year that countries in their sample suffered banking crisis.[17] In regressions controlling for a variety of factors, including the rate of change of prices, wages, and money stocks, the growth rate of exports, and discount rate policy, Bernanke and James found an economically large and highly stastistically significant effect of banking panics on industrial production.

A reduced-form summary of the effects of *PANIC* on our list of macro variables is given in the rows of Table 3 marked "b," which reports estimated coefficients from regressions of each macro variable against *PANIC*, the dummy for gold standard membership (*ONGOLD*), and time dummies for each year. For these estimates we have divided the Bernanke-James *PANIC* variable by twelve, so that its estimated coefficients may be interpreted as annualized effects.

The results suggest important macroeconomic effects of bank panics that are both independent of gold-standard effects and consistent with theoretical predictions: On the real side of the economy, *PANIC* is found to have economically large and statistically significant effects on manufacturing production (line 1b) and employment (line 7b). In particular, with gold-standard membership controlled for, the effect of a year of banking panic on the log-change of manufacturing production is estimated to be −.0926 with an absolute *t*-value of 3.50; and the effect on the log-change of employment is −.0456, with a *t*-value of 2.10. Banking panics are also found to reduce both real and nominal wages (lines 6b and 5b), hurt competitiveness and exports (lines 10b and 11b), raise the ex post real interest rate (line 9b), and reduce real share prices (line 13b), although estimated coefficients are not always statistically significant.

On the nominal side of the economy, banking prices significantly lower the money multiplier (proxied in line 4b of Table 3 by the ratio of M1 to currency), as expected. We also find (line 3b) that banking panics in a country significantly reduce the M1 money stock. This effect on the money supply is actually inconsistent with a simple Mundell-Fleming model of a small open economy on the gold standard: With worldwide conditions held

[17] Bernanke and James dated periods of crisis as starting from the first severe banking problems, as determined from a reading of primary and secondary sources. If there was some clear demarcation point, such as the U.S. banking holiday of March 1933, that point was used as the ending data of the crisis; otherwise, they arbitrarily assumed that the effects of the crisis would last for one year after its most intense point. Countries with nonzero values of *PANIC* included Austria, Belgium, Estonia, France, Germany, Hungary, Italy, Latvia, Poland, Rumania, and the United States. Results presented here add data for Argentina and Switzerland to the Bernanke-James sample; consistent with the Bernanke-James banking crisis chronology, we treat Switzerland (July 1931–November 1933) as a crisis country. Grossman (1993) includes all of these countries as "crisis" countries to his study but differs in counting Norway as a crisis country as well.

constant (by the time dummies), a small country's money stock is determined by domestic money demand, so that any declines in the money multiplier should be offset by endogenous inflows of gold reserves. Possible reconciliations of the empirical result with the model are that banking panics lowered domestic M1 money demand or raised the probability of exchange-rate devaluation (either would induce an outflow of reserves); our finding above that panics raised the real interest rate fit with the latter possibility. A finding that *is* consistent with the Mundell-Fleming model is that, once gold-standard membership is controlled for, banking panics had no effect on wholesale prices (line 2b). This last result is impotant, because it suggests that the observed effects of panics on output and other real variables are operating largely through nonmonetary channels, for example, the disruption of credit flows.

As with the earlier debate about the role of monetary shocks, moving from a focus on the U.S. case to a comparative international perspective provides much stronger evidence on the potential role of banking crisis in the Depression. Ideally, we should like to extend this evidence to the broader debt-deflation story as well. Indeed, the strong presumption is that debt-deflation effects were much more pervasive than banking crises, which were relatively more localized in space and time. Unfortunately, consistent international data on types and amounts of inside debt, and on various indicators of financial distress, are not generally available.[18]

2.2. Deflation and Nominal Wages

Induced financial crisis is a relatively novel proposal for solving the aggregate supply puzzle of the Depression. The more traditional explanation of monetary nonneutrality in the 1930s, as in macroeconomics more generally, is that nominal wages and/or prices were slow to adjust in the face of monetary shocks. In fact, widely available price indexes, such as wholesale and consumer price indexes, show relatively little nominal inertia during this period (admittedly, the same is not true for many individual prices, such as industrial prices). Hence—in contradistinction to contemporary macroeconomics, which has come to emphasize price over wage rigidity—research on the interwar period has focused on the slow adjustment of nominal wages as a source of nonneutrality. Following that lead, in this subsection I discuss the comparative empirical evidence for sticky wages in the Depression. I defer for the moment the deeper question of how wages could have failed to adjust, given the extreme labor-market conditions of the Depression era.

The link between nominal wage adjustment and aggregate supply is

[18] Eichengreen and Grossman (1994) attempt to measure debt-deflation by an indirect indicator, the spread between the central bank discount rate and the interest rate on commercial paper. As they note, this indicator is not wholly satisfactory and they obtain mixed results.

straightforward: If nominal wages adjust imperfectly, then falling price levels raise real wages; employers respond by cutting their workforces.[19] Similarly, in a country experiencing monetary reflation, real wages should fall, permitting reemployment. Although the cyclicality of real wages has been much debated in the postwar context, these two implications of the sticky-wage hypothesis are clearly borne out by the comparative interwar data, as can be seen in Tables 2 and 3:

First, during the worldwide deflation of 1930 and 1931, nominal wages worldwide fell much less slowly than (wholesale) prices, leading to significant increases in the ratio of nominal wages to prices (Table 2, lines 2, 5, and 6). Associated with this sharp increase in real wages were declines in employment and output (Table 2, lines 7 and 1).[20]

Second, from about 1932 on, there was a marked divergence in real-wage behavior between countries on and off the gold standard (Table 2, line 6): In countries leaving gold, prices rose more quickly than nominal wages (indeed, the latter continued to fall for a while), so that real wages fell; simultaneously, employment rose sharply. In countries remaining on gold, real wages rose or stabilized and employment remained stagnant. Table 3 (line 6a) indicates a difference in real wage growth between countries on and off the gold standard equivalent to about 6 percentage points per year, with a *t*-value of 5.84.

This latter result, that real-wage behavior varied widely between countries in and out of the Gold Bloc, was first pointed out in the previously cited article by Eichengreen and Sachs (1985). Using data from ten European countries for 1935, Eichengreen and Sachs showed that Gold Bloc countries systematically had high real wages and low levels of industrial output, while countries not on gold had much lower real wages and higher levels of production (all variables were measured relative to 1929).

In a recent paper, Bernanke and Carey (1994) extended the Eichengreen-Sachs analysis in a number of ways: First, they expanded the sample from ten to twenty-two countries, and they employed annual data for 1931–1936 rather than for 1935 only. Second, to avoid the spurious attribution to real

[19] In the standard analysis, increases in the real wage lead to declines in employment because employers move northwest along their neoclassical labor demand curves. An alternative possible channel is that higher wage payments deplete firms' liquidity, leading to reduced output and investment for the types of financial reasons discussed above (my thanks to Mark Gertler and Bruce Greenwald for independently making this suggestion). This latter channel might be tested by observing whether smaller or less liquid firms responded to real-wage increases by cutting employment more severely than did large, financially more robust firms.

[20] The wholesale price index is not the ideal deflator for nominal wages; to find the product wage, which is relevant to labor demand decisions, one should deflate by an index of output prices. The very limited international data on product wages are less supportive of the sticky-wage hypothesis than the evidence given here, see Eichengreen and Hatton (1988) or Bernanke and James (1991) for further discussion.

wages of price effects operating through nonwage channels,[21] in regressions they separated the real wage into its nominal-wage and price-level components. Third, they controlled for factors other than wages affecting aggregate supply and used instrumental variables techniques to correct for simultaneity bias in output and wage determination.[22] With these modifications, Bernanke and Carey's "preferred" equation describing output supply in their sample was (their Table 4, line 9):

$$q = \underset{(3.84)}{-.600\, w} + \underset{(5.10)}{.673\, p} + \underset{(7.66)}{.540\, q_{-1}} - \underset{(5.79)}{.144\, PANIC} - \underset{(3.60)}{.69\text{-}05\, STRIKE} \quad (2)$$

where

q, q_{-1} = current and lagged manufacturing production (in logs),
w = nominal wage index (in logs),
p = wholesale price index (in logs),
PANIC = number of months in each year of banking panic [see the text or Bernanke-James (1991)], divided by 12, and
STRIKE = working days lost to labor disputes (per thousand employees).

Absolute values of *t*-statistics are shown in parentheses. The regression pooled cross-sectional data for 1931–1936 and included time dummies and fixed country effects. A consistent estimate of within-country first-order serial correlation of −.066 was obtained by application of nonlinear least squares.

The equation indicates that banking panics (*PANIC*) and work stoppages (*STRIKE*) had large and statistically significant effects on the supply of output,[23] and the coefficient on lagged output indicates that output adjusted about half-way to its "target" level in any given year. Most importantly, the coefficient on nominal wages is highly significant and approximately equal and opposite in magnitude to the coefficient on the price level, as suggested by the sticky-wage hypothesis.[24] In particular, equation (2) indicates that

[21] Suppose that deflation affects output through a nonwage channel, such as induced financial crisis, and that nominal-wage data are relatively noisy (for example, they reflect official wage rates rather than rates actually paid). Then we might well observe an inverse relationship between measured real wages and output, even though wages are not part of the transmission channel.

[22] Instruments used in the equation to follow included, as aggregate demand shifters, a trade-weighted import price index and the discount rate for Gold Bloc countries, and M1 for countries off gold. Additionally, the banking panic and strike variables, and lagged values of the nominal wage and output, were treated as predetermined.

[23] The coefficient on *PANIC* implies that one year of banking crisis reduced output by approximately 14 percent. The coefficient on *STRIKE* is about what one would expect if output losses due to strikes are proportional to hours of work lost. See Bernanke and Carey (1994) for further discussion.

[24] That the coefficients on wages and prices are equal and opposite is easily accepted at standard significance levels ($p = .573$).

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