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Was the Great Deflation of 1929–33 inevitable?

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Abstract. This paper re-examines the recent and provocative hypothesis that the Great Deflation of 1929–33 was an inevitable consequence of the return to the gold convertibility of currencies at pre-war parities. An alternative hypothesis, that the relative prices of gold tended to gravitate to one another, is put forward in this paper. This hypothesis is derived from the conventional gold standard model and Cassel's well known insights on purchasing power of currency. Empirical evidence lends support to the alternative hypothesis: even though the relative price of gold returned to its pre-war level by 1931, the adjustment process was mainly driven by differences between countries rather than the absolute deviation from the pre-war level.

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INTRODUCTION

One of the most intriguing economic phenomena was the Great Depression. There is a myriad of hypotheses on the causes and nature of the Great Depression, e.g. a collapse in consumption (Romer, 1990 and 1993), failures in monetary policy (Friedman and Schwartz, 1963; Hamilton, 1987), competition for gold reserves (Irwin, 2012), failures in the operation of international monetary system (Hamilton, 1988; Temin, 1993), a lack of cooperation between central banks (Eichengreen, 1992).

Even today, after more than eight decades from the onset of the Depression, the debate has not seemed to die out. The reason was vividly stated by Bernanke (1995): '[t]o understand the Great Depression is the Holy Grail of macroeconomics.'

In a recent paper Mazumder and Wood (2013) made an attempt to explain the Great Deflation anew. Their hypothesis is that 'the Great Deflation of 1929–33 was inherent in the operation of the gold standard once a country decided to return to pre-war parity following its suspension and wartime inflation.' They point to the fact that 'the value (general purchasing power) of a convertible currency must be the relative cost of producing gold and other products, which did not change significantly between 1914 and the 1930s.' Thus, the price fall of 1929–33 was an inevitable consequence of the mismanagement of the gold standard which lay in the resumption of gold convertibility at pre-war parities and the resultant overvaluation of currencies. Moreover, macroeconomic policies were of secondary (if any) importance with their impact limited, at most, to the deflation's timing.

One terminological comment should be made here. Mazumder and Wood (2013) use the term Great *Deflation* and not *Depression* since they focus on price levels only. One should not overemphasize that difference because deflationary forces were at the heart of the Great Depression. Indeed, Mazumder and Wood (2013) admit that even though real effects are not discussed in their analysis they 'may be surmised. 'For Bernanke (1995) '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' (emphasis added). The channels linking deflation and depression are analysed in detail by Bernanke and James (1991). It is also interesting to observe that Knakiewicz (1967) used the term 'deflation' in her description of the course of economic events in Poland in 1930–1935.

The objective of this paper is threefold. First, the hypothesis that the Great Deflation was inevitable is re-examined. It is demonstrated that even though this hypothesis conforms well to the conventional gold standard model developed by Barro (1979), it is oriented at the long-run (ultimate) equilibrium and does not explain the adjustment process towards it. Thus, its main weakness is the lack of a credible explanation of the medium-run equilibrium and the deflation's timing. Second, a competing hypothesis is put forward, which says that the relative prices of gold tended to gravitate to one another. Its theoretical underpinnings are derived from the conventional gold standard model and Cassel's insights on purchasing power of currency. Third, both hypotheses are confronted on empirical grounds.

The paper is organized in a standard way. In Section 2, Mazumder and Wood's hypothesis is shortly presented. Its drawbacks are discussed in Section 3. Theoretical foundations of the alternative hypothesis are explained in Section 4; Section 5 compares these two hypotheses. Results of empirical tests are discussed in Section 6 and conclusions are offered in the last Section.

ARGUMENTS IN FAVOUR OF THE GREAT DEFLATION'S INEVITABILITY

Mazumder and Wood (2013) use a simplified version of the model presented by Barro (1979) to explain the inevitability of the Great Deflation. The model describes a world economy with full employment, fully flexible prices and fixed exchange rates. Money supply, M^s, and money demand, M^d, are respectively

$$M^s = \Gamma P_g G_m \tag{1a}$$

$$M^d = PYL(i) \tag{1b}$$

where Γ is the money multiplier or the reciprocal of the cover ratio, P_g is the fixed nominal price of gold, G_m is the monetary gold stock, P is the general price level of commodities, Y is the aggregate income (output), and L is a decreasing function of the nominal rate of interest, i. In equilibrium the relative (real) price of gold, P_g / P, is

$$\frac{P_g}{P} = \frac{YL(i)}{\Gamma G_m} \tag{2}$$

and it holds at all times (it is assumed that equilibrium in money market holds continuously).

The monetary gold stock can change if there is a difference between the supply of new gold, g^s (supply is derived from the profit maximisation by gold producers), and the demand for non-monetary gold, g_n^d,

$$\dot{G}_m = g^s\left(\underset{+}{P_g/P}\right) - g_n^d\left(\underset{-}{P_g/P}, \underset{-}{i}, \underset{+}{Y}\right) \tag{3}$$

Using the above equations, Mazumder and Wood (2013) explain adjustments to the 1913–25 inflation. Assume that monetary policy is relaxed, i.e. the cover ratio is allowed to decrease, and Γ goes up. Thus, the relative price of gold falls (equation (2)), gold producers are discouraged from supplying gold and demand for non-monetary gold rises. Both these factors cause the change in monetary gold stock to decrease. It could even become negative, $\dot{G}_m < 0$. According to Mazumder and Wood (2013), this is sufficient to justify the conclusion that 'the final position includes a return to the original *P* and stock of money.'

Their line of reasoning is based on the long-run solution of the Barro's model: the relative price of gold in the world economy under the gold standard returns in the long run to its initial level when disturbed by changes of velocity, changes in the price of gold or in the gold backing of monetary base. It does this because 'the value (general purchasing power) of a convertible currency must be the relative cost of producing gold and other goods, which did not change significantly between 1914 and 1930s' (Mazumder and Wood, 2013).

ARGUMENTS IMPAIRING THE GREAT DEFLATION'S INEVITABILITY

Though long-run equilibrium is no doubt important, a reliable explanation of the Great Deflation cannot neglect the specifics of medium-run adjustment or, more generally, the Deflation's timing. Unfortunately this is an issue that Mazumder and Wood (2013) do not try 'to be precise about.'

There are three problems with the adjustment process that cast some doubt on its pace: sluggishness of changes in non-monetary demand, loose observance of the rules of the game by the central banks and rough empirical evidence.

First, following Barro (1979) and Barsky and Summers (1988), the demand for non-monetary gold, g_n^d, is assumed to be a difference between the target, $f(\cdot)$, and actual stocks of gold, G_n, held by private agents

$$g_n^d = \alpha\left[f\left(\underset{-}{P_g/P}, \underset{+}{\pi_g}, \underset{-}{r}\right)Y - G_n\right] \tag{4}$$

where α is the pace of adjustment, π_g is the expected change in the relative price of gold and *r* is the real interest rate.

Due to wartime inflation P_g/P was indeed low and stimulated non-monetary demand via the increase in target stock. The pace of adjustment, however, could be and actually was rather small because there was no opportunity of profitable arbitrage. The central bank was ready to stabilize the price of gold so there was no reason to change the stock of non-monetary gold in an abrupt way. As explained by Barro (1979), currency was equally good as gold so there was no reason for speculative behaviour.

The additional factor that contributed to rather small changes in non-monetary demand was a positive correlation between interest rates and price level (the Gibson paradox). As demonstrated by Barsky and Summers (1988), a rise in the real interest rate pushed down both the long-run level of the relative price of gold and the target stock of non-monetary gold, $f(\cdot)$. Thus, the return to the gold standard at a relatively high real interest rate due to wartime expenditure and higher public debt put downward pressure on the difference between target and actual stocks of non-monetary gold.

Second, so far we have focused on the implications of equations (3) and (4). But even if one assumes that low P_g/P makes the monetary gold stock smaller, as argued by Mazumder and Wood, this does not necessarily result in a proportionate change in the stock of money. For this assumption to hold the central bank has to observe the rules of the game, i.e. change domestic credit to reinforce the impact of gold flows onto the monetary base. In the words of McCloskey and Zecher (1981), '[a]n alternative indicator of the extent to which central bankers played the rules is the extent to which the relationship between inflows of gold and increases in domestic credit ... was positive'.

This, however, was not the case in the inter-war period. Nurkse (1945) pointed out that '[i]n the inter-war period neutralization of gold movements by central banks became, in fact, the rule rather than exception ... any change in a central bank's gold and foreign reserve was accompanied by a change *in the opposite direction* in the bank's domestic loans and securities' (emphasis in original). More detailed data on changes in central banks' international and domestic assets tabulated by Nurkse (1944, p. 69) show that the changes in the same direction were rather rare and their share in the total number of observations ranged from 19 to 35 per cent between 1928 and 1931, i.e. the period when the gold standard system was in full operation.[1] The weaker the observance of the rules of the game, the slower the adjustment of the stock of money and the price level.

Finally, the simple empirical evidence is in stark contrast with the adjustment process suggested by Mazumder and Wood (2013). Using the data provided by these authors (see their Table 2), one can see that the average annual rate of change of non-monetary gold decreased from 2.5 per cent in 1914–25 to 1.3 per cent in 1926–33. The rate of accumulation of monetary gold increased from 2 to 2.7 per cent in the same period. Thus, the data point to changes in the demand for non-monetary gold and changes in monetary gold stock that are opposite to those suggested by Mazumder and Wood's hypothesis.

Preliminary inspection of data on deflation also reveals the problem with Mazumder and Wood's explanation. The case of France is very instructive here. Inflation during and after the war pushed French prices far above the levels observed in the United Kingdom or the United States. In June 1928, when the gold standard was de jure re-established in France, the wholesale price index stood at the level of 611 (in 1914 it was 100). The parity adopted was 4.925 new francs for 1 old franc. Taking into account parity adjustment, one could expect that the French economy was less prone to deflation than the U.S. or British economies. The data, however, do not confirm such a conjecture (Table 1). Price deflation in France measured by the changes in wholesale prices was comparable to that experienced by the U.S. economy and almost the same as in the United Kingdom in the period that ended with the sterling crisis in September 1931. In the whole period of the Great Deflation, 1929–33, it was not weaker but more severe in France than in the U.K., U.S., or German economies.

Table 1

Relative prices of gold (based on the wholesale price indices, 1914 = 100) and deflation.

	Relative price of gold		Deflation	
	June 1928	Sept 1931	June 1928 – Sept 1931	1929–1933
France	80.7	116.8	28.0	37.7
Germany	70.4	92.7	20.8	32.0
UK	69.4	105.4	27.2	30.2
US	69.8	97.3	25.7	30.7

Note: Common base is adopted, 1914 = 100, and data are seasonally adjusted.

Source: Wholesale prices on a monthly basis: for France series m04057 and for the UK – m04053 from the on-line NBER Macrohistory Database. Data for France are corrected for the change in gold parity to make it comparable to other countries. For Germany, data are from the *Statistical Year-book of the League of Nations*. U.S. data are from the on-line Federal Reserve Economic Database.

[1] See Friedman and Schwartz (1963, pp. 282–3) for the explanation of sterilization policy in the United States.

CASSEL'S INSIGHTS ON PURCHASING POWER OF CURRENCIES

Since mere gold resumption at pre-war parities does not seem to be a convincing explanation for the dynamics of price changes both before and during the Great Deflation of 1929–33, an alternative hypothesis is offered in this Section. It is based on the concept of the purchasing power of currency promoted by Cassel and his two insights into the stability of monetary system. First, more than one country under the gold standard system is needed to stabilize the value of gold (a concept of a 'centre of stability'). Second, the value of a currency stems from 'the fact that this money possesses a purchasing power as against commodities and services' (Cassel 1922, p. 138; see also Cassel, 1916 and 1918).

Cassel's plan for the restoration of the gold standard was to reintroduce the pre-war parity between internal purchasing powers of sterling and dollar by stabilizing their values and creating in this way a centre of stability. The price level chosen for that purpose was not necessarily the pre-war level (Cassel, 1928). It should rather be the one that 'can most easily and most rapidly be obtained on both sides' (Cassel 1922, p. 262). The centre of stability 'would manifestly bring about a certain stabilisation, not only of the internal values of these currencies [dollar and sterling], but also the value of gold itself' (Cassel 1922, p. 261).[2] Moreover, it would encourage other countries to resume gold convertibility. His point was that the parity should be set with an eye to the relation between domestic and the U.K./U.S. price levels and not to the relative price of gold or pre-war parity (Cassel 1922, pp. 140–1, 260, 264–5).

Barro's model can be used to formalize the alternative hypothesis put forward in this paper. Admittedly, Barro assumes that the relative price of gold is the same across countries, but this can be easily modified. It follows from money market equilibrium in each country *j* (see equation (2)) that

$$G_{m,j} = z_j \left(P_{g,j} / P_j \right)^{-1} \quad \text{for} \quad j = 1 \ldots n \tag{5}$$

where $z_j \equiv L_j(i_j) Y_j / \Gamma_j$.

The crucial observation is that since gold can flow from one country to another the relative prices of gold will tend to equalize in the medium term

$$P_{g,j} / P_j = P_g / P \quad \text{for} \quad j = 1 \ldots n \tag{6}$$

where P_g / P is the (common) medium-run level of the relative price of gold. Assuming for simplicity that the world stock of monetary gold, $G_m = \sum_{j=1}^{n} G_{m,j}$, is approximately constant over time, one can use equation (5) to arrive at the medium-run level of the relative price of gold

$$P_g / P = \sum_{j=1}^{n} z_j \Big/ G_m \tag{7}$$

Using the medium-run equilibrium condition (6) it is straightforward to find the medium-run stock of monetary gold stock, $\bar{G}_{m,j}$, for each country

$$\bar{G}_{m,j} = G_m z_j \Big/ \sum z_j \tag{8}$$

[2] Cassel (1922, p. 263) clarified that the value of gold would be of 'an essentially higher degree of stability' if it were determined by the value of dollar and sterling than by the value of one currency.

Equations (5) and (8) imply that if the relative price of gold in a given country is above its medium-run level ($P_{g,j}/P_j > P_g/P$) then the medium-run level of monetary gold stock is above actual stock ($\bar{G}_{m,j} > G_{m,j}$). Thus, gold will flow into such a country putting a downward pressure on the relative price of gold. The opposite is true for a country with the relative price of gold below its medium-run level.

It is true that in the long run P_g/P will indeed return to its steady state level which—as demonstrated by Barro (1979)—does not depend on the monetary policy of a single or even all the countries under the gold standard. Such an adjustment, however, does not undermine the medium-run adjustment. Both these adjustment processes can work simultaneously.

Mazumder and Wood's hypothesis rests on the long-run adjustment process, whereas the alternative hypothesis rests on the medium-run adjustment. As it is clear from the analysis above, the medium-run adjustment process is driven by differences *between* countries and not *within* a given country. Thus, according to the alternative hypothesis under the gold standard the relative prices of gold gravitate to one another and not necessarily to the long-run level implied by the conventional gold standard model.

TWO HYPOTHESES CONFRONTED

Both hypotheses are presented in a similar way to facilitate their comparison and empirical analysis in the next Section.

Mazumder and Wood (2013) assume that the pre-war relative price of gold is an approximately good description of the steady state of P_g/P . Thus, their hypothesis, denoted as H_{MW}, can be summarised as

$$\mathrm{H}_{MW}: \quad \pi^{MW}_{j,t} \to 100 \quad \text{where} \quad \pi^{MW}_{j,t} \equiv \frac{P^g_{j,t}}{P_{j,t}} 100 \quad \text{for} \quad j = 1 \ldots n \tag{9}$$

and all P^g's and P's are indices 1913 = 100. In other words, the post-war relative prices of gold were expected to return to the common pre-war level. Any deviation from this level would mean that gold was too cheap (expensive) and more deflation (inflation) was needed to restore the long-run equilibrium.

According to the alternative hypothesis, it is the relation between the relative prices of gold across countries that matters. It can be expressed as

$$\mathrm{H}_C: \quad \pi^C_{j,t} \to 100 \quad \text{where} \quad \pi^C_{j,t} \equiv \frac{P^g_{US,t}/P_{US,t}}{P^g_{j,t}/P_{j,t}} 100 \quad \text{for} \quad j = 1 \ldots n \tag{10}$$

where the United States are treated as a baseline country. The ratio $\pi^C_{j,t}$ is an equivalent to the real exchange rate of a currency *j* against the U.S. dollar. Since the real exchange rate compares purchasing power of two currencies, it is justified to say that the hypothesis H_C is focused on the relative purchasing power of a currency. The currency *j* is overvalued in real terms against the U.S. dollar if $\pi^C_{j,t}$ is above 100. If so, one should expect deflation in that country in excess of that in the United States or at least lower inflation than in the United States in the medium run. The opposite would be true for a country with undervalued currency.

The hypotheses H_{MW} and H_C are not independent one from another: the former can be seen as a special case of the latter. The return of the relative price of gold to its pre-war level (H_{MW}) is sufficient but not necessary for the convergence of relative purchasing powers (H_C). Moreover, the convergence of relative purchasing powers (H_C) is necessary but not sufficient for the return of the relative price of gold to its pre-war level (H_{MW}). Because of these relations one can expect three basic empirical results. First, both hypotheses can be rejected by data suggesting that the gold standard model needs revision. Second, both can be supported by the empirical analysis. In such a case, long-run adjustment would be strong enough to explain the Great

Deflation, so the H_{MW} hypothesis should be given precedence over the alternative H_C. Third, empirical evidence can lend support to the H_C hypothesis and reject the H_{MW} hypothesis. This would suggest that the medium-run adjustment is robust with tight linkages between relative prices of gold across countries and the long-run adjustment is sluggish and cannot explain the Great Deflation.

The common feature of both hypotheses is that a certain ratio, $\pi_{j,t}^{MW}$ or $\pi_{j,t}^{C}$, adjust to its equilibrium level. Thus, both imply the following price-adjustment equation:

$$\Delta\pi_{j,t}^{\mathrm{H}} = \beta_0^{\mathrm{H}} + \beta_1^{\mathrm{H}}\left(\pi_{j,t-1}^{\mathrm{H}} - \overline{\pi}\right) + u_{j,t}^{\mathrm{H}} \tag{11}$$

where $\mathrm{H} = MW$ for Mazumder and Wood's hypothesis and $\mathrm{H} = C$ for the hypothesis based on Cassel's insights. A constant $\overline{\pi}$ is the equilibrium level, and under both hypotheses it is expected to be 100.

Two important restrictions on the parameters of equation (11) are imposed by each hypothesis. First, β_1^{H} should be negative. Otherwise the adjustment would run in the wrong direction, i.e. any deviation of the relative price of gold or relative purchasing power of currency from their equilibrium levels would increase over time even if there were no disturbances ($u_{j,t}^{\mathrm{H}} = 0$). It is also important that β_1^{H} is large enough to imply a non-negligible speed of adjustment (economic significance). Second, since the equilibrium levels implied by both hypotheses are 100, i.e. the relative prices of gold return to their pre-war level (H_{MW}) or they gravitate to one another (H_C), coefficient β_0^{H} is expected to be insignificant. If it turns out to be significant then the implied equilibrium level would be $\overline{\pi} - \beta_0^{\mathrm{H}} / \beta_1^{\mathrm{H}}$. For instance, if $\beta_0^{\mathrm{H}} > 0$ (and $\beta_1^{\mathrm{H}} < 0$) then the implied equilibrium level is above the one suggested by the hypothesis.

DATA AND EMPIRICAL RESULTS

Annual data on the relative price of gold were collected for 26 countries: Argentina, Australia, Austria, Belgium, Bulgaria, Canada, Chile, Denmark, Egypt, France, Germany, Greece, Hungary, India, Italy, Japan, the Netherlands, New Zealand, Norway, Peru, South Africa, Spain, Sweden, Switzerland, the United Kingdom and the United States. The sample covers period of 1925–35. All the data are from various issues of the *Statistical Yearbook* published by the League of Nations.

Equation (11) resembles the equation used in unit root tests. Indeed, if π^{H} is a non-stationary $I(1)$ process, then one should expect β_1^{H} to be insignificant. In other words, if a unit root is found in π^{H} the adjustment mechanism implied by the hypothesis H does not work and therefore the hypothesis should be rejected. Since the dataset covers 26 countries the relevant tests are panel unit root tests. The results are provided in Table 2.

The general finding from these tests is that the results are inconclusive for both relative price of gold and relative purchasing power. In specifications with the intercept only, the null of unit root is not rejected, but this is not the case in specification with the trend. Moreover, no matter which specification is used, the Levin, Lin and Chu tests suggest that both variables are stationary but the opposite is implied by the PP tests.

The ambiguity of the results could be related to the fact that unit root tests have low power to reject the (false) null of unit root. Thus, equation (11) is used to estimate directly β_1^{H} and then residuals, $u_{j,t}^{\mathrm{H}}$, are checked for stationarity. The results for the period 1927–35 are presented in Table 3. Three alternative estimation methods have been used for each hypothesis: OLS, cross-section fixed effects and period fixed effects.[3] Regression (1) shows that the adjustment coefficient β_1 is negative as expected but insignificant. Even

[3] The random effect specification is rejected: p-values in Hausman test are less than 0.1 except the regression for relative purchasing power with random period effects (with p-value marginally greater than 0.1).

if it were significant, the implied pace of adjustment would be very slow with the half-life of a shock more than six years. Thus, there is little empirical support for the H_{MW} hypothesis. Results of the OLS regression (4) for the relative purchasing power are different: not only is adjustment statistically significant but the coefficient is large and important from an economic point of view. The half-life of a shock is slightly less than two years. The alternative hypothesis H_C gains more support from the data.

Table 2

Panel unit root tests for the relative price of gold and real exchange rate

Test	Relative price of gold		Relative purchasing power	
	Intercept	Intercept and trend	Intercept	Intercept and trend
Null: Unit root (assumes common unit root process)				
Levin, Lin and Chu t*	-2.4235***	-24.3864***	-3.4035***	-9.0773***
Breitung t-stat		2.0850		-2.1524**
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	2.5304	-3.7583***	-0.6302	-1.3898*
ADF - Fisher Chi-square	24.4232	116.655***	56.7032	77.8710***
PP - Fisher Chi-square	7.5378	14.3798	37.6095	51.7670

Notes: tests are for the log of variable. Schwartz Information Criterion is used for lag length selection. ***, **, * indicate statistical significance at 1, 5 and 10 per cent, respectively. Calculations performed with the Eviews 8.

Table 3

Competing hypotheses: relative price of gold adjustment to pre-war level (H_{MW}) vs. adjustment to common level (H_C), 1927–1935.

	H_{MW}: dependent variable: log change in relative price of gold			H_C: dependent variable: log change in real exchange rate		
	(1)	(2)	(3)	(4)	(5)	(6)
Adjustment	-0.0976 (-1.5348)	-0.1143 (-1.5254)	-0.2113** (-2.4774)	-0.2851*** (-2.7671)	-0.5203*** (-3.0670)	-0.2085** (-2.4495)
Intercept	0.0260 (1.0573)	0.0248 (0.9033)	0.0375** (2.0830)	-0.0036 (-0.1671)	-0.0092 (-0.4314)	-0.0041 (-1.0841)
R-squared	0.20	0.25	0.48	0.11	0.25	0.47
Adj. R-squared	0.19	0.15	0.45	0.10	0.15	0.44
DW stat	1.68	1.77	1.69	1.80	1.88	1.68
Observations	226	226	226	217	217	217
No. of countries	26	26	26	25	25	25
Fixed effects	none	cross-section	period	none	cross-section	period
Fixed effects tests:						
F test	–	0.5352	14.4117***	–	1.5797**	17.7254***
LR test	–	14.7795	97.0317***	–	39.4803**	113.6559***

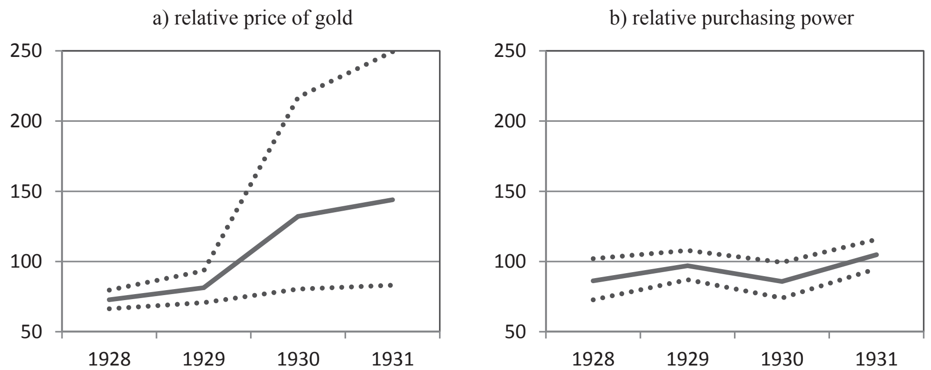
Notes: t-statistics are in brackets. The cross-section SUR (PCSE) method has been used to obtain robust standard errors (this estimator is robust to cross-equation (contemporaneous) correlation and heteroskedasticity). One lag of dependent variable is included to eliminate serial correlation. Null in the *F* test and likelihood ratio (LR) test is that the fixed effects are redundant. ***, **, * indicate statistical significance at 1, 5 and 10 per cent, respectively. Calculations performed with the Eviews 8.

Source: Author's regressions based on data collected from various issues of the *Statistical Year-book of the League of Nations* .

Since the unexplained variation of the dependent variable is rather large in both regressions (R's-squared are low) it could be useful to add fixed effects. Thus, cross-section fixed effects are introduced in regressions (2) and (5). The picture, however, does not change substantially: the H_{MW} hypothesis still receives less support than the alternative H_C. The speed of adjustment is greater in both cases with the half-life of a shock equal to less than six years for H_{MW} and one year for H_C. Tests of significance of fixed effects show that the effects are redundant in regression (2) but not in regression (5).

Finally, the regressions with period fixed effects are run. The results of regressions (3) and (6) are quite similar one to another: adjustment speed is both statistically and economically significant (the half-life of a shock is slightly less than three years) and fixed effects are found not to be redundant. Before concluding that both hypotheses gain comparable support when this specification is used, it is worthwhile examining period fixed effects in more detail. Generally, they are supposed to account for any time-specific effect (Baltagi, 2005, p. 33). According to equation (11) they, together with the intercept β_0, modify the equilibrium level of variable π.

In Figure 1 such modified equilibrium levels of π *implied* by regressions (3) and (6) together with minus/plus two standard error bands are illustrated. Figure 1 covers the period in which the gold standard was fully in operation. According to the H_{MW} hypothesis the restoration of the gold standard with pre-war parities was 'a sufficient explanation' of the Great Deflation (Mazumder and Wood, 2013). Thus, one would expect the implied equilibrium level of the relative price of gold to stay close to 100, i.e. the pre-war level. This, however, is not the case: the implied equilibrium was around 80 in 1929 and then jumped to more than 130 in 1930 (the degree of uncertainty around this estimate is large). The picture looks much more promising for the H_C hypothesis: the implied equilibrium level of relative purchasing power was not only quite close to 100 but its fluctuations were moderate.



Notes: dotted lines are minus/plus 2 standard errors; delta method was used to derive standard errors.

Figure 1. Implied equilibrium levels of relative price of gold and relative purchasing power.
Source: Author's calculations.

All the regressions have been run on the shorter sample of 1927–1931, i.e. excluding the period when the international gold standard started to disintegrate after the sterling crisis in September 1931. The results are very similar to those in Table 3 (not reported).

Overall, empirical evidence supports the view that the relative prices of gold were not so much driven towards their pre-war levels as gravitated to those in other countries. The hypothesis H_C, therefore, provides a more accurate description of the actual price behaviour than the H_{MW} hypothesis.

CONCLUSION

This paper re-examines the hypothesis that the seeds of the Great Deflation of 1929–33 were sown by the central banks who decided to resume gold convertibility at pre-war parities. These were inappropriate and implied overvaluation of the currencies because the price levels were far above the levels recorded in 1914.

It is demonstrated that the adjustment mechanism implied by that hypothesis was far from being effective due to the sluggishness of changes in non-monetary demand and loose observance of the rules of the game of the gold standard by the central banks. Moreover, rough data on rates of change in the demand for non-monetary gold, changes in monetary gold stock and on deflation in four major economies do not lend support to the adjustment implied by that hypothesis.

The alternative hypothesis, that the relative prices of gold tended to gravitate to one another, is put forward. It builds on the conventional gold standard model and Cassel's insights on purchasing power of currency. Both hypotheses are tested empirically. It is found that long-run adjustment implied by Mazumder and Wood's hypothesis was rather weak, whereas the medium-run adjustment implied by the alternative hypothesis was indeed strong and robust. In other words, changes in the relative prices of gold were driven by the differences *between* countries and not *within* a given country (the *absolute* deviation from the pre-war level).

Though the results invalidate the hypothesis on the inevitability of the Great Deflation the interesting question about its causes remains. On the one hand, price movements were not driven by the *absolute* deviation from the pre-war level; on the other hand, the tendency of the relative prices of gold to attract one another says nothing about the changes of the common medium-run level of the relative price of gold. Thus, one needs to look for the explanation that clarifies what triggered the movement of the common medium-run level of the relative price of gold, not only to its pre-war level but much above it. This is left for further research.

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