Appendix

ECONOMETRIC TESTS

We refer to Ch. 1, case study 1, on Federal Reserve policy strategy between 1924 and 1931.

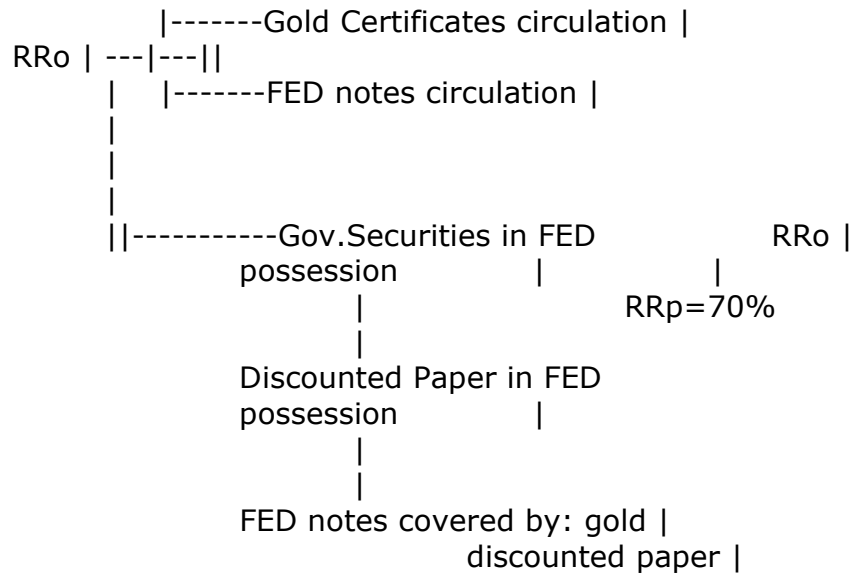
The hypothesis we verify consists of three parts. As we explain in the study, historical documents reveal that the FED managed its currency composition, also forcing the Treasury to issue gold certificates when excessive gold flowed in. Also open market operations were adopted in order to change the amount of gold and discounted paper to cover banknotes.

We expect to find a relation between the "original reserve ratio" in the period t-1, and three monetary policy variables: gold certificates (positive) Federal Reserve notes (negative), Government securities (positive).

1) Federal Reserve notes = a (∆ RROt-1)
-
2) Gold Certificates = b(∆ RROt-1)
+
3) Government Securities = c (∆ RROt-1)
+

where:
RRo is the original Reserve Ratio
And RRp is its published value after currency management
∆ represents the change in t, for t= n, between n and (n-1)

FLOW CHART



RRo has been defined as:

RRo= Gold Stock/ FED notes+ FED deposits

and represents the value of the reserve ratio before gold certificates are issued (withdrawn), in order to stabilise the reserve ratio officially published (RRp) on the value of 70%:

RRp= ∆RRo= Gold Stock - ∆Gold Certificates/ FED notes+ FED dep.

Montly data are used in every test shown hereafter. Data refer mostly to the period 1924:1 - 1931:9.

1924 is the year in which the analysis began, because open market operations had not previously been perfected. In September 1931 the run to the dollar begun, due to the Bank of England' s exit from the gold standard. We believe that the strategy described in the text was already compromised at that time, even though the monetary statute was formally reformed only later, in February 1932.

We also distinguish two sub-periods: 1924:1 - 1928:1 and 1928:1 - 1931:9, since 1928 marks the return to the international gold standard.

CROSS CORRELATION

We start by analysing the index of cross correlation between

1. FED notes, in t/ RRo t-1
2. Gold certificates, in t/ RRo t-1
3. Gov.Securities, in t/ RRo t-1

whereby the original value of the Gold Reserves in the previous period evidently is the appropriate variable to measure the Fed’s reaction.

	time	value
1.		
	24:1 31:12	-.4938
	24:1 28:1	-.1673
	28:1 31:12	-.6082
2.		
	24:1 31:12	-.3016
	24:1 28:1	-.0914

28:1 31:12	-.5662
23:1 28:1	-.8258
23:1 25:1	-.8966

3.

24:1 31:9	-.6390
24:1 28:1	-.2379
28:1 31:12	-.4501
28:1 31:9	-.7945

The correlation value between gold certificates and RRo is particularly strong in the 1923/25. The sign of the coefficients in the function is the one we expected.

Otherwise, a general conclusion, supported also by other regressions not reported here, is that data answer in the period 1928:1 - 1931:9 better than in previous sub-period. This might indicate that the strategy described in the study better explains the FED's action in the years of the Crash and of the Great Depression than in the period before.

Data on FED notes show a strong auto-regressive tendency, as the next table shows, reporting the cross-correlations between FED notes at time t and at t-1 in the general period of analysis as well in two significant sub-periods:

time	value
24:1 31:12	-.8101
24:1 28:1	-.7084
28:1 31:12	-.8099

This means the issue of money shows a continuous flow in the short run.

REGRESSIONS

a) FED notes (NOTE)

The "original" Reserve Ratio in t-1 can only partly explain the circulation of FED notes in t (Regr. a1, Regr. a2); the coefficient is negative as we expected, but the historically documented reaction of FED notes to Rro involved probably a small quantity of notes over the total volume issued and circulating.

The volume of FED notes is in fact better explained by the change occurred in the same variable in the previous quarter (Regr. a3; Regr. a4), as already shown by the simple cross-correlations.

A possible explanation lies in the "passivity" of the FED in accommodating member banks' demand for credit, also implied by the "Riefler-Burgess" doctrine (see also Toma, 1989, p.104). This result yet represents one more proof of the FED's inability to control the supply of money - against Friedman and Schwartz's interpretation.

b) Gold Certificates (GOLDCER)

The data is well explained by RRo at time t-1. The first regression (OLS, levels) already shows the influence of RRo in t-1 on the circulation of gold certificates; a strong auto-regressive character and a certain instability are also present in the series.

Regression 2 and 3 (Regr. b2, b3) (logarithms) are obtained using the Box-Jenkins ARMA method; they show the importance of the auto-regressive component (AR, 1 lag), as well as the MA (January) and MA seasonal (December) components.

c) Government Securities (USSEC)

The flow of Government Securities, i.e. the movement in Government Securities possessed by the FED, is surprisingly well explained by the 2-months lagged value of RRo (Regr. c1). The relation is positive, as we expected, and is significant.

Since the series showed a certain degree of instability, it has been differentiated , and analysed with the Box-Jenkins method.

Therefore, not USSEC but D1USSEC is the dependent variable in Regr. c1; in Regression c2, the same dependent variable is expressed in logarithms. In Regression c3, the c2 is expressed in levels (LUSSEC, the first L is for logarithms), in order to show the actual value of R squared.

Regr. a1

DEPENDENT VARIABLE D1LNOTE
FROM 1924:1 UNTIL 1931:12
TOTAL OBSERVATIONS 96 SKIPPED/MISSING 0
USABLE OBSERVATIONS 96 DEGREES OF FREEDOM 92
R**2 .55573657 RBAR**2 .54124972
SSR .88338500E-01 SEE .30987112E-01

DURBIN-WATSON 1.92024025
Q(27)= 24.5486 SIGNIFICANCE LEVEL .599741

NO.	LABEL	VAR	LAG	COEFFICIENT	STAND.ERR	T-STATISTIC
1	CONSTANT	0	0	.1117320E-01	.3304970E-02	3.380725
2	D1RRO	43	1	-.3285960	.1201013	-2.735989
3	DUMMY1	45	0	-.1202687	.1166442E-01	-10.31073
4	D1LNOTE	63	2	.2451896	.7267824E-01	3.373631

Regr. a2

DEPENDENT VARIABLE D1NOTE
FROM 1924:1 UNTIL 1931:12
TOTAL OBSERVATIONS 96 SKIPPED/MISSING 0
USABLE OBSERVATIONS 96 DEGREES OF FREEDOM 92
R**2 .57243094 RBAR**2 .55848847
SSR 274559.51 SEE 54.629136
DURBIN-WATSON 1.97792143
Q(27)= 18.9450 SIGNIFICANCE LEVEL .87197

NO.	LABEL	VAR	LAG	COEFFICIENT	STAND.ERR	T-STATISTIC
1	CONSTANT	0	0	20.81814	5.8250173	3.573885
2	D1RRO	41	2	-863.3005	219.7158	-3.929170
3	DUMMY1	43	0	-222.1082	20.83100	-10.66239
4	D1NOTE	40	1	.2210645	.7156956E-01	3.088807

Regr. a3

DEPENDENT VARIABLE AD1LNOTE
FROM 1924:1 UNTIL 1931:12
TOTAL OBSERVATIONS 96 SKIPPED/MISSING 0
USABLE OBSERVATIONS 96 DEGREES OF FREEDOM 93
R**2 .61691344 RBAR**2 .60867502
SSR .76173931E-01 SEE .28619478E-01
DURBIN-WATSON 2.10853461
Q(27)= 14.9801 SIGNIFICANCE LEVEL .969710

NO.	LABEL	VAR	LAG	COEFFICIENT	STAND.ERR	T-STATISTIC
1	CONSTANT	0	0	.1175585E-01	.3054658E-02	3.848498
2	DUMMY1	45	0	-.1244819	.1081654E-01	-11.50847
3	AD1LNOTE	69	1	.2276553	.3493243E-01	6.517018

Regr. a4

DEPENDENT VARIABLE D1LNOTE
FROM 1924:1 UNTIL 1931:12
TOTAL OBSERVATIONS 96 SKIPPED/MISSING 0
USABLE OBSERVATIONS 96 DEGREES OF FREEDOM 91
R**2 .61747422 RBAR**2 .60065990
SSR .76062424E-01 SEE .28911085E-01
DURBIN-WATSON 2.06908584
Q(27)= 14.8107 SIGNIFICANCE LEVEL .972004

NO.	LABEL	VAR	LAG	COEFFICIENT	STAND.ERR	T-STATISTIC
1	CONSTANT	0	0	.1175872E-01	.3085795E-02	3.810595
2	DUMMY1	45	0	-.1243436	.1098813E-01	-11.31617
3	D1LNOTE	63	1	.2071449	.6704007E-01	3.089867
4	D1LNOTE	63	2	.2410245	.6704313E-01	3.595066
5	D1LNOTE	63	3	.2354183	.7018822E-01	3.354100

Regr. b1

DEPENDENT VARIABLE GOLDCER
FROM 1923:3 UNTIL 1931:9
TOTAL OBSERVATIONS 103 SKIPPED/MISSING 0
USABLE OBSERVATIONS 103 DEGREES OF FREEDOM 100
R**2 .98032546 RBAR**2 .97993197
SSR 74921.675 SEE 27.371824
DURBIN-WATSON 1.93352189
Q(30)= 77.0958 SIGNIFICANCE LEVEL .512283E-05

NO.	LABEL	VAR	LAG	COEFFICIENT	STAND.ERR	T-STATISTIC
1	CONSTANT	0	0	-156.0131	46.62985	-3.345778
2	RRO	26	1	252.1508	53.05473	4.752654
3	GOLDCER	28	1	.8964855	.1686920E-01	53.14334

Regr. b2

DEPENDENT VARIABLE GOLCER
FROM 1924:2 UNTIL 1931:9
TOTAL OBSERVATIONS 92 SKIPPED/MISSING 0
USABLE OBSERVATIONS 92 DEGREES OF FREEDOM 87
R**2 .93220263 RBAR**2 .92908551
SSR 59868.070 SEE 26.232399

DURBIN-WATSON 1.96171852
Q(27)= 24.5245 SIGNIFICANCE LEVEL .601092

NO.	LABEL	VAR	LAG	COEFFICIENT	STAND.ERR	T-STATISTIC
1	CONSTANT	1	0	491.0409	181.7820	2.701262
2	RRO	2	1	501.9217	172.2305	2.914244
3	AR	3	1	.8723274	.3635865E-01	23.99229
4	MA	4	1	.3127653	.1110463	2.816529
5	MA_SEAS	5	12	.4456080	.1116753	3.990210

Regr. b3

DEPENDENT VARIABLE LGOLDCER
FROM 1924:1 UNTIL 1931:9
TOTAL OBSERVATIONS 93 SKIPPED/MISSING 0
USABLE OBSERVATIONS 93 DEGREES OF FREEDOM 88
R**2 .94585838 RBAR**2 .94339740
SSR .72738613E-01 SEE .28750220E-01
DURBIN-WATSON 1.91455382
Q(27)= 30.8941 SIGNIFICANCE LEVEL .275508

NO.	LABEL	VAR	LAG	COEFFICIENT	STAND.ERR	T-STATISTIC
1	CONSTANT	1	0	6.326474	.2000076	31.63116
2	RRO	2	1	.5747449	.1892245	3.037370
3	AR	3	1	.8893355	.3108261E-01	28.61200
4	MA	4	1	.2643608	.1150349	2.298093
5	MA_SEAS	5	12	.3704752	.1116825	3.317218

Regr. c1

DEPENDENT VARIABLE D1USSEC
FROM 1924:1 UNTIL 1931:9
TOTAL OBSERVATIONS 93 SKIPPED/MISSING 0
USABLE OBSERVATIONS 93 DEGREES OF FREEDOM 86
R**2 .20059619 RBAR**2 .14482383
SSR 199834.26 SEE 48.204296
DURBIN-WATSON 2.07462993
Q(27)= 24.2729 SIGNIFICANCE LEVEL .615137

NO.	LABEL	VAR	LAG	COEFFICIENT	STAND.ERR	T-STATISTIC
1	CONSTANT	1	0	5.701930	8.315590	.6856916

2	D1RRO	2	2	682.5111	257.2687	2.652911
3	AR	3	1	-.6833747	.2605787	-2.622527
4	MA	4	1	.7644345	.2587491	2.954346
5	MA	5	2	.4093379	.1345058	3.043273
6	MA	6	3	.4219441	.1475888	2.858918
7	MA	7	4	.3011959	.1030721	2.922187

Regr. c2

DEPENDENT VARIABLE D1LUSSEC
FROM 1924:1 UNTIL 1931:9
TOTAL OBSERVATIONS 93 SKIPPED/MISSING 0
USABLE OBSERVATIONS 93 DEGREES OF FREEDOM 86
R**2 .22743175 RBAR**2 .17353164
SSR 1.6867958 SEE .14004965
DURBIN-WATSON 2.10998141
Q(27)= 19.1605 SIGNIFICANCE LEVEL .864080

NO.	LABEL	VAR	LAG	COEFFICIENT	STAND.ERR	T-STATISTIC
1	CONSTANT	1	0	.1816309E-01	.2486494E-01	.7304700
2	D1RRO	2	2	1.845304	.7299925	2.527839
3	AR	3	1	-.5226730	.1492234	-3.502621
4	MA	4	1	.7287471	.1527499	4.770852
5	MA	5	2	.3951846	.1339976	2.949191
6	MA	6	3	.1683774	.1272548	1.323152
7	MA	7	4	.4046558	.1063829	3.803768

Regr. c3

DEPENDENT VARIABLE LUSSEC
FROM 1924:1 UNTIL 1931:9
TOTAL OBSERVATIONS 93 SKIPPED/MISSING 0
USABLE OBSERVATIONS 93 DEGREES OF FREEDOM 85
R**2 .90693841 RBAR**2 .89927452
SSR 1.5952294 SEE .13699418
DURBIN-WATSON 2.06734310
Q(27)= 18.0496 SIGNIFICANCE LEVEL .902080

NO.	LABEL	VAR	LAG	COEFFICIENT	STAND.ERR	T-STATISTIC
1	CONSTANT	0	0	6.005935	.2372616	25.31356
2	D1RRO	2	2	1.264091	.5502262	2.297402
3	AR	3	1	.3240953	.16716340	1.938794

4	AR	4	2	.4985745	.1533969	3.250226
5	MA	5	1	.8037147	.1657078	4.850192
6	MA	6	2	.4656130	.1491503	3.121770
7	MA	7	3	.2018272	.1393225	1.448633
8	MA	8	4	.3863463	.1129915	3.419252