Monetary Policy and Expectations: Market-Control Techniques and the Bank of England, 1925–1931

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The Bank of England depleted its open-market portfolio by secretly sterilizing large gold inflows. Thereafter interest rates were influenced by manipulating reported gold flows. Expectations manipulation as a monetary policy channel is modeled and estimated. A gold flow falsification was over two-thirds as effective as an open-market operation. These results contradict accepted new classical models and suggest that credibility benefits from new classical policy are small, despite current popularity among central bankers. The episode supports Peter Temin's view of interwar central bankers as nonstabilizers and enforcers of a dysfunctional classical orthodoxy.

Market control refers to "maintaining the effectiveness of Bank Rate: the problem of forcing the market to keep its rates reasonably close to Bank Rate."[1] In his 1976 book, written as an official history with full access to confidential Bank of England archives, R. S. Sayers claims that maintaining market control was a major policy concern during the interwar gold standard. Sayers's revelations, however, have received scant attention in the voluminous literature on interwar monetary policy, perhaps because he attempted no quantitative analysis of market-control problems nor proffered an explanation of how they were overcome. For example, Barry Eichengreen refers to market control only briefly in his extensive writings on interwar monetary and exchange policies. In a model explaining changes in Bank Rate, the Bank of England's discount rate, he writes: "since the Bank of England apparently was concerned with the relationship of Bank Rate to market interest rates, we enter $BR - i$ as a separate variable."[2] The qualifier "apparently" serves notice that the concern is doubted—as

The Journal of Economic History, Vol. 55, No. 3, (Sept., 1995). ISSN 0022-0507.

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This work owes its existence to the late Leonard A. Rapping, my *doktorvater*, who is sorely missed. The author thanks Claudia Dziobek, Charles Kindleberger, Martin Klein, Alan Rabin, Carl-Ludwig Holtfrerich, Manfred Neuman, Peter Lindert, and two anonymous referees of this JOURNAL for insightful comments, without implicating them for my errors. The Research Seminar at UTC and Das Institut für Internationale Wirtschaftswissenschaft at Bonn University provided constructive, stimulating environments. Financial support from the University of Tennessee, the Fulbright Kommission of Germany, and the UC Foundation is gratefully acknowledged.

[1] Sayers, *Bank*, p. 297.

[2] Eichengreen, Watson, and Grossman, "Bank Rate Policy," p. 733.

well it should be, if the Bank is assumed to have had an adequate open-market portfolio.

The failure to comprehend the circumstances surrounding the Bank of England's market-control difficulties has led to a seriously distorted view of British monetary policy during the interwar gold standard. The consensus view is that an over-valued pound resulted in chronic balance-of-payment pressures that left the Bank with too little gold, which in turn forced monetary policy to be far more restrictive than the Bank would have liked.[3] An examination of the asset side of the Bank of England's balance sheet, corrected with Sayer's data, reveals a set of problems that vitiate the consensus view. For the first half of the gold standard, the Bank of England's problem was too much gold, not too little. Nor was a lack of gold a consistent policy constraint in the second half of the gold standard. From September 1928 until the end, the primary problem was the unprecedented instability in international capital flows, which in two separate six-month periods produced a gold flow greater than the Bank's entire prewar stock of gold. Montagu Norman, the Governor of the Bank of England, considered these problems so grave that he engaged in a large-scale deception that greatly over-stated the size of the effective open-market portfolio, understated the size of the gold stock, and misstated the size and even the direction of gold flows.

Hiding the strength of the pound from the public, the government, the Bank of England's governing bodies, and the financial markets was necessary but not sufficient for the enactment of Norman's policy scenario. To maintain his grip on interest rates, Montagu Norman temporized in an extraordinary fashion: he developed the false reporting of gold flows into a new channel of monetary policy. The new policy channel was an attempt to manipulate market expectations directly, without the usual intermediary step of a change in a traditional policy instrument (bank reserves, Bank Rate, or the gold price of the pound). Strong econometric evidence reveals that the false reporting of gold flows was a powerful policy instrument, deployed mainly to keep monetary policy more restrictive than warranted by the gold-standard rules of the game.[4]

Following Thomas Sargent's well-known example, this historical episode provides a test for a current controversy in macroeconomic theory.[5] Norman's activities produced a unique data set that can be used to isolate without ambiguity an "exogenous," policy-induced change in financial-market expectations from movements in both real

[3] See for example, Eichengreen, *Elusive Stability*, p. 9; and Sayers, "Return."

[4] However, expectations manipulation was for short periods used to exaggerate the strength of the pound in order to defend the gold standard facade that protected Norman's policy independence.

[5] Sargent, *Rational Expectations*.

and nominal variables. With this data the expectations formation assumptions in the new classical macroeconomics can be probed with a simplicity and robustness heretofore impossible.

The new classical model of optimal monetary policy (hereafter referred to as the credibility model) has generated a large literature.[6] The credibility model endorses what would have been a radical policy notion in the 40 years following the Great Depression: that it is inappropriate for central banks to offset economic contractions. However, some key theoretical assumptions necessary for this policy conclusion are contradicted by the behavior of British financial markets during the interwar gold standard. As the credibility model influences current monetary policy and has received little empirical testing, this is an important result.

This article describes the difficulties of market control and then details Norman's remedies. It then presents a model of market control containing both quantity-of-reserves and expectations channels of monetary policy. The model is then estimated, and the results are interpreted. Those results contradict the credibility model.

MARKET CONTROL: THE PROBLEM

Contemporaries assumed that the control of market interest rates was unproblematic, given the official published balance sheet of the Bank of England. A contractionary open-market operation—the sale of securities from the Bank's portfolio—could have drained bank reserves, driving market interest rates towards Bank Rate.[7] During the period from 1925 to 1931 the reserves of the London clearing banks (till money and bankers' balances) seldom strayed from a narrow 180- to 200-million pound range, with the total for all banks about £40 million higher.[8] The Bank of England's reported portfolio of marketable securities never fell below £55 million, and was usually in the 65- to 100-million pound range, making it appear that bank reserves, and therefore interest rates, were firmly in hand.[9]

The ratio of reserves to deposits did not exhibit substantial short-run variation, with the exception of biannual episodes of window dressing.[10] Therefore a decline in reserves of several million pounds was sufficient to snug market rates upwards toward Bank Rate. The Bank's own estimate, provided by Ernest M. Harvey, the Deputy Governor, in evidence to the Macmillan Committee, was that a drain of five million

[6] Barro and Gordon, "Rules" and "Positive Theory"; and Canzoneri, "Monetary Policy Games."

[7] The market control problem is asymmetrical, as high rates are prevented by recourse to discounting at Bank Rate.

[8] Capie and Webber, *Monetary History*, p. 464.

[9] Ibid.; and Brown, *Gold Standard*.

[10] On window dressing, see Capie and Webber, *Monetary History*, pp. 266–69.

pounds of reserves was sufficient "to do the trick."[11] As the Bank reported that it always had more than ten times that much on hand in its securities portfolio, market control would seem to have been a textbook example of mechanical open-market operations.

There were, however, complications. The return to gold in May 1925 meant that a gold flow, unless sterilized (offset through an open-market operation), affected the monetary base, which caused the money supply to change by a multiple of the flow (approximately by a factor of ten). From the return through the second quarter of 1928 (hereafter 1928: 2) the Bank was confronted with a gold inflow of £63 million.[12] The strength of the pound was an embarrassment because Norman opted for further deflation, although, according to the gold standard rules of the game, a nonseasonal gold inflow of £10 million required an easing in monetary policy.[13]

Norman sold pound-denominated securities to sterilize the additional bank reserves created by the gold inflow. He simultaneously sold gold for dollars, lowering the Bank's reported gold stock, and bought U.S. Treasury bills with the proceeds. He also had all transactions carried out on the New York market by the New York Federal Reserve Bank so that they could not be traced to the Bank of England.[14] (see Figure 1) The U.S. Treasury bills were comingled with pound-denominated "other securities" in the Bank's published open-market portfolio and were assumed by the markets to have been pound-denominated securities.[15] In one stroke the gold inflow and the decline in the open-market portfolio were hidden.[16] Bank Rate was kept at a very high level given the abysmal state of the economy, well over the level that would have prevailed under the Bank of England's prewar reaction function.[17] With

[11] Sayers, *Bank*.

[12] Ibid., vol. 3, pp. 349–54.

[13] Keynes, "Amalgamation." On Norman's policy choice, see Garrett, "Decline." Gold flow signifies the change in the Bank's holdings of gold and hard currencies.

[14] Sayers was granted access to the Bank of England's confidential records to write an official history of the Bank. He discovered the magnitude of Norman's falsifications and published a corrected record of gold flows. See Sayers, *Bank*, vol. 3, pp. 349–54. H. Clay, Norman's close friend and confidant, reported the existence of a secret reserve in 1957, but states that it was only a few million pounds. He may have known only about the very minor part of the reserve that was booked in the Issue Department, which was on the order of one to two million pounds. S.V.O. Clarke also refers to the hidden reserve, but again does not seem aware of its magnitude, which is surprising given his access to New York Federal Reserve Bank archives. See Clay, *Lord Norman*; and Clarke, *Central Bank*.

[15] Sayers, *Bank*.

[16] The ruse was successful. W. A. Brown (*Gold Standard*, p. 721) describes the great international effort among central bankers to rescue the weak pound in 1927, and this story has been repeated in other classics, such as Clarke, *Central Bank*. Far from being weak, in the two-year period from the spring of 1926 to the spring of 1928, the Bank was forced to accumulate 60 million pounds of gold and hard currencies to keep the pound from rising, marking this as the pound's strongest period in history.

[17] Economic conditions in the worst prewar years were as good or better than those during the interwar gold standard. In addition gold was far more plentiful during the interwar years. A prewar

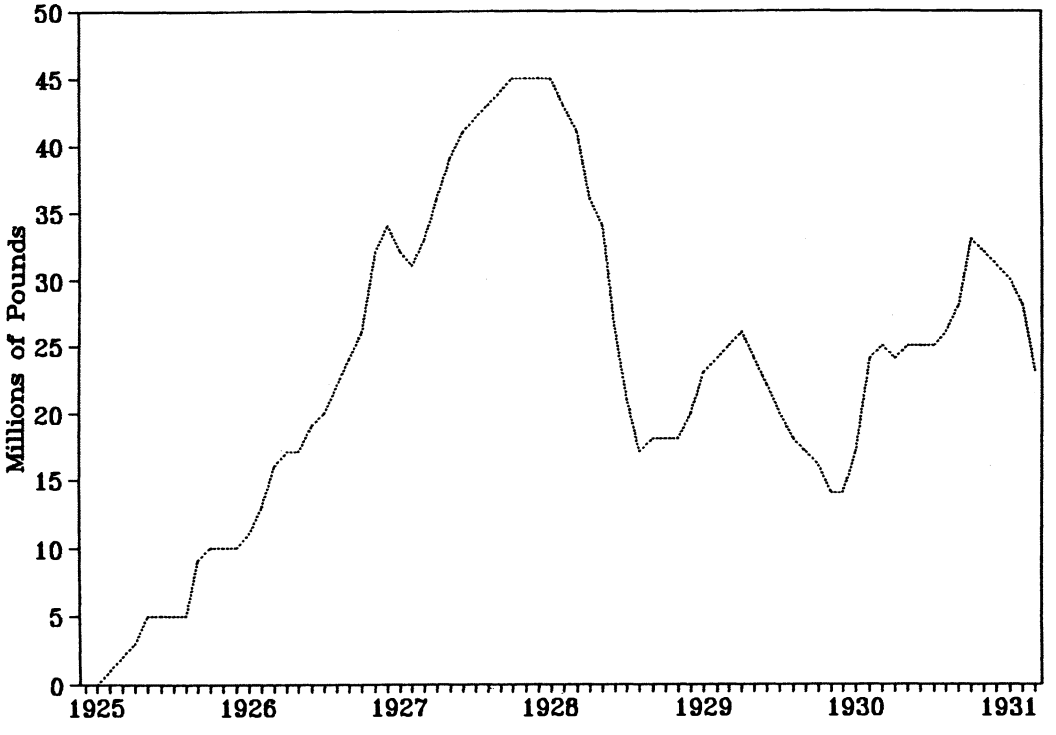

FIGURE 1

THE HIDDEN GOLD

Note: A gold inflow of £10 called for an easing of monetary policy.
Source: Sayers, *Bank*, vol. 3, pp. 349–55, monthly average.

weak business demand, high nominal interest rates, mild deflation, and plentiful short-term capital inflows, there was an incipient tendency for market rates to sag under Bank Rate. Norman responded by large and persistent open-market sales in excess of gold inflows (see Table 1). He conducted £66 million of net contractionary open-market operations from the return to gold until 1928: 2, of which £45 million were not reported. Note in Table 1 the cumulative decline in the monetary base. The continued policy of deflation after the return to gold, and particularly after the general strike of 1926, generated political controversy.[18] What support there was for continued deflation was predicated on the need to defend the gold standard.[19] Had it become public knowledge in

reaction function based on these two variables implies that Bank Rate would have been lower interwar than the lowest prewar Bank Rate, had the Bank kept the same reaction function.

[18] Note that pressure for easing in the 1920s came from all sides. Churchill as the Conservative Party's Chancellor of the Exchequer threatened the Bank with a Parliamentary Inquiry when Norman raised Bank Rate in 1925. Keynes was a prominent Liberal Party member, and, from 1922 on, was a tireless advocate for easier monetary policy. The Labour Party requested that monetary policy be governed by a tripartite board with representatives from industry and unions, to blunt the influence of the financial sector.

[19] Keynes, *Economic Consequences*; and Hawtrey, *Monetary Reconstruction*, p. 171.

TABLE 1
ESTIMATED SOURCES OF CHANGES IN THE MONETARY BASE
(millions of pounds)

Year	Quarter	Change in Discounts less Public Deposits[a]	Change in Gold	Change in Special Deposits	Change in Open-Market Portfolio	Net Change	Cumulative Change
1925	2	−1.4	0.7	0.0	−7.4	−5.5	−5.5
	3	−5.4	8.3	0.0	−3.1	−0.2	−5.7
	4	13.0	−10.3	−3.6	−0.7	−0.6	−6.3
1926	1	−8.2	−1.0	3.6	−2.1	−7.7	−14.0
	2	2.1	5.6	0.0	−6.9	0.8	−13.2
	3	−3.5	10.4	0.0	−9.0	−2.1	−15.3
	4	2.1	2.6	0.0	−4.3	0.4	−14.9
1927	1	−1.3	3.3	0.0	−5.0	−3.0	−17.9
	2	3.1	7.7	−1.9	−15.1	−6.2	−24.1
	3	−5.2	2.0	1.2	−0.1	−2.1	−26.3
	4	1.7	7.7	0.7	−5.3	4.6	−21.7
1928	1	−0.2	9.0	0.0	−10.6	−1.8	−23.5
	2	−7.9	6.6	0.0	−4.4	−6.7	−30.2
	3	4.8	4.0	−3.0	−0.8	5.0	−25.2
	4	6.6	−22.6	3.0	14.6	1.6	−23.6
1929	1	−3.2	−18.0	0.0	2.2	−19.0	−42.6
	2	−2.0	10.0	0.0	−6.9	−1.7	−44.3
	3	0.0	−13.4	0.0	6.9	−6.5	−50.8
	4	6.0	−9.6	0.0	10.3	6.7	−44.1
1930	1	−8.4	11.3	0.0	−12.1	−9.2	−53.3
	2	0.8	6.0	0.0	3.1	9.9	−43.4
	3	3.3	5.7	0.0	−3.3	5.7	−37.7
	4	1.8	1.3	0.0	−3.2	−0.1	−37.8
1931	1	−2.0	−10.0	0.0	−8.1	−20.1	−57.9
	2	2.1	11.0	0.0	−5.5	7.6	−50.3
	3	−5.2	−18.0	0.0	19.8	−3.4	−53.7
	4	5.9	−24.0	0.0	31.7	13.6	−40.1

[a] Public deposits defined as public deposits less ways and means advances.
Notes: The table measures changes in Bank of England assets that reflect the sources of changes in the central bank's liabilities, which provide for changes in the monetary base. Net public deposits are not a Bank asset. Their inclusion is in effect a partial consolidation of Bank and Treasury balance sheets necessary because, holding total assets fixed, an increase in Bank of England liabilities to the Treasury necessarily means a decrease in Bank of England liabilities to the public. Special deposits are also not an asset. Their inclusion does not lead to double counting because the deposit was kept off the market and held as part of the asset category "reserve of notes and coin" in the Banking Department. The table is derived using averaged monthly data, centered midquarter.
Sources: Sayers, *Bank*; Brown, *Gold Standard*; United Kingdom, *Statistical Abstract*; and author's calculations.

the spring of 1928 that deflationary policy was three times as severe as reported and concurrently that gold inflows and the gold stock were at record levels, Norman would have been through.

Hiding the gold inflow contained political pressure for easing mone-

tary policy, but required large open-market sales from a rapidly shrinking portfolio. During 1927: 2 market rates sagged far below Bank Rate. Norman was losing control of market rates because his open-market portfolio had become too small to counteract large gold inflows in a timely fashion. Norman had a major market-control problem, though this was known only to Norman and three senior officials at the Bank who treated it as a "secret matter."[20] Sayers documents that the Committee of Treasury, the Bank of England's day-to-day governing body, was left in the dark, as was the Court, the Bank's *de jure* and, before Norman, *de facto* policy body.[21] Sayers expresses surprise at the secrecy with which open-market operations were surrounded even within the Bank's inner corridors. This extended to the point of declining to keep in the Bank's confidential archives any written records of policy decisions motivating transactions.[22] However, for Norman's policy model the utmost secrecy was essential.

The Inadequacy of the Open-Market Portfolio

Norman's deception was audacious, as it involved the abrogation of Parliamentary authority over the coin of the realm and the subversion of the ancient charter of the Bank of England. These major questions of state, however, became bureaucratic trivialities compared to Norman's daily task of convincing the financial markets that he was in control when in fact he was not. An effective open-market portfolio of well over £50 million was required to maintain control through standard open-market operations. From late 1926 until the end of the gold standard Norman never held the minimum portfolio, and normally could muster only one-fourth or less of the requisite strength (see Table 2).

The published open-market portfolio (the sum of other securities and governments) ranged from a high of £113 million in December 1925 to a low of £55.7 million in March 1930.[23] The published figures, however, overstated the actual and effective size of the portfolio by including long-term securities that were unsuitable for open-market operations and U.S. Treasury bills. The long-term securities varied from £35 to £40 million, and the dollar-denominated securities ranged from 0 to £45 million.[24] The long-term securities were held as a nest egg to provide a stable source of profits and to cover the dividend.[25] Given the peculiar institutional arrangement of using a private bank as the central bank (the Bank was not nationalized until 1946), steady profitability was of some

[20] Sayers, *Bank*, p. 298.
[21] Ibid., p. 636.
[22] Ibid., p. 298.
[23] Brown, *Gold Standard*, appendix 3A.
[24] Sayers, *Bank*.
[25] Ibid., p. 307.

TABLE 2
ESTIMATED EFFECTIVE OPEN-MARKET PORTFOLIO, 1924–1932
(millions of pounds)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1924	74.1	71.6	64.7	69.4
1925	71.9	64.5	61.4	60.7
1926	58.6	51.7	42.7	38.4
1927	33.4	18.3	18.2	12.9
1928	2.3	−2.1	−2.9	11.7
1929	13.9	7.0	13.9	24.2
1930	12.1	15.1	11.8	8.6
1931	0.5	−5.0	14.8	46.5
1932	49.0	56.3	55.9	58.1

Notes: The long-term securities holdings are conservatively set to 35 million pounds, the low end of the 35–40 range given by Sayers. I also assumed that all foreign exchange was held in the Banking Department, and small amounts, usually not more than 1–3 million pounds, were held in the Issue Department. Therefore the accuracy bounds are +3 to −5. For explanation of negative entries see the text.
Sources: Brown, *Gold Standard*, appendix 3A; Sayers, *Bank*, vol. 3, pp. 349–55; and author's calculations. The table is derived using averaged monthly data, centered midquarter.

importance.[26] In the 1920s absolute central bank independence was considered essential, and ensured only by the Bank's private status.[27] Low profits could have forced the Bank to ask for government support, strengthening the case for nationalization.

Table 2 presents the open-market portfolio with long-term securities and foreign exchange deleted. The negative entries reflect the margin of error (see table note) and the ability of the Banking Department to temporarily swap some long-term debt (and lose the income therefrom) for a portion of the short-term maturities held in the Issue Department.[28] Before the amalgamation of the Treasury note issue with the Bank's note issue in late 1928, the Issue Department held a total of £8 million in securities, of which one to two million were likely to be current maturities.

Operating Techniques

The Bank's reluctance to sell Treasury bills limited the effectiveness of open-market operations. Sayers reports only one small sale before 1930. To tighten the market, the portfolio would be allowed to run-off, and maturing bills would not be replaced. Contractionary open-market operations were therefore restricted by the maturity distribution of the portfolio. To exercise continuous control over the market, a steady stream of maturing securities was required. Because of this constraint Sayers judges that an effective portfolio of less than £20 million left the Bank unable to control the market.

[26] Eichengreen, *Elusive Stability*, pp. 133–34.
[27] Garrett, "Decline."
[28] Sayers, *Bank*, pp. 307–08.

Sayers's estimate is low. Consider that average daily maturities of Treasury bills were £10 million, which produced weekly changes in public deposits at the Bank occasionally as high as £10 million.[29] As the change in public deposits produced an inverse change of similar magnitude in bank reserves, the Bank of England could not control reserves unless they had an equivalent amount of maturing Treasury bills. Thus, even assuming two weeks were used to iron out large swings in public deposits, the Bank required minimum weekly maturities approaching £5 million. This yields a portfolio requirement of between £30 to £40 million, assuming that the Bank was able to constantly assemble a very short-term portfolio with an average maturity of three to four weeks.[30] At a minimum an additional £20 million was needed to counteract gold flows or to alter the monetary base, both of which were relevant policy concerns. The seasonal gold flow, usually held to be £10 million, also had to be sterilized, adding £5 million to the required portfolio, averaged over the year. Therefore a portfolio of about £55 million was the minimum required to maintain market control through open-market operations.[31]

Could the Bank merely have started selling Treasury bills when necessary, and thereby relaxed the portfolio-size constraint? Although sales of Treasuries were technically feasible, the Bank refrained from doing so to minimize ways and means advances. Ways and means advances were direct loans from the Bank to the Treasury, and thus, when spent, caused an equal increase in the monetary base. The government could resort to ways and means advances to pay off maturing debt. It had done so on a large scale during the war and through 1919 whenever the market was unwilling to absorb new debt issues at desired interest rates. Used in this way, a ways and means advance is equivalent to an expansionary open-market operation. This procedure was well understood by both the Bank and Treasury, and was utilized in reverse from late 1919 until year-end 1921 as the main source of deflationary monetary policy, during which time ways and means advances declined by the extraordinary sum of £500 million.[32]

Ways and means advances were largely avoided between 1925 and 1931. Outside of June and December, when regular window dressing by commercial banks and seasonal pressures resulted in average monthly ways and means advances of £5 and £9 million respectively, they seldom

[29] Brown, *Gold Standard*, appendix 3A.

[30] Furthermore a gaming element constrained the shortness of the portfolio. Sayers details the precautions used by the Bank to avoid giving the market an indication that it was hunting for bills of a certain maturity.

[31] Sayers's estimate is only low by about £10 million for the period after November of 1928 with the amalgamation of Treasury and Bank note issues, which expanded the securities in the Issue Department. However, after November 1928 the effective open-market portfolio reached Sayers's minimum size only once, during 1929: 4 (see Table 2).

[32] Brown, *Gold Standard*, p. 202.

topped £2 million, and were frequently zero.[33] But the threat of advances remained potent. From 1927 until 1931 modest ways and means advances would have dominated monetary policy, as the Bank had no means to sterilize an advance.

MARKET CONTROL: THE REMEDY

Montagu Norman maintained his tenuous grip on the market by fully exploiting all traditional policy instruments and through the creation of a wholly new expectations channel for monetary policy. Four methods were employed: open-market operations; special deposits; coordinating public finances; and false reporting of gold flows. The quantitatively least important method of market control was using confidential special time deposits from individual financial institutions to take reserves off the market. Special deposits had to be substantial and secret, as the Bank was claiming in its published figures that it had no reason to resort to special deposits to drain reserves. Thus special deposits were difficult to use as a regular policy tool (see Table 1). Although special deposits were used only three times, each instance came during a period of market-control difficulties (see Figure 2).

Coordination of the public finances resulted from the Bank's influence over Treasury officials, which is an inversion of the "normal" mechanism found in the central bank independence literature.[34] As documented by Susan Howson the "treasury knights," a group of powerful senior civil servants, overtly supported the policy of deflation and the independence of the Bank of England from the government. They sided with the Bank against their bosses, the Chancellors of the Exchequer, whose relations with the Bank were often difficult irrespective of party affiliation.[35] These civil servants had the power to aid Norman greatly through their conduct of the public finances. Public deposits (the government's account at the Bank) increased during the period of gold inflows. From 1926: 1 to 1928: 2 the increase in public deposits and a small decline in discounting produced a £17.3-million decline in the monetary base (see Table 1). As the open-market portfolio was completely exhausted by 1928: 2 (see Table 2), contractionary monetary policy could not have been maintained otherwise. However, there were limits to such help, as padding the Treasury's balance at the bank required issuing more Treasury bills than necessary, which cost the taxpayer, and was therefore certain to draw inconvenient questions from the Chancellor of the Exchequer.

[33] United Kingdom, *Statistical Abstract*.

[34] For example, Woolley, *Monetary Politics*; and Neumann, "Precomitment." Note that Woolley also finds evidence for the U.S. of a channel of influence running "backwards" from the central bank to the administration.

[35] Moggridge, *British Monetary Policy*; and Howson, *Domestic Monetary Management*.

Norman published misleading Bank of England balance sheets that falsely reported gold flows. Up until late 1926 the gold inflow was consistently understated, but the direction of change in reported gold holdings faithfully followed actual gold holdings. Sayers states that Norman's intention in hiding gold was merely to accumulate a reserve cushion for a rainy day, and does not view the hidden gold as a market-control tool, though he admits that the secret reserves supported tighter monetary policy.[36] Sayers's position, which is consistent with the pattern from July 1925 until October 1926, may reflect Norman's original intention. However, from late 1926, just as his open-market portfolio declined below the market-control threshold, Norman did not just underreport gold inflows, but began to under-, over-, and misreport gold flows as appropriate for his market-control needs. Every possible type of false reporting was committed.[37]

The Control of Expectations

There were three steps in Norman's new policy channel. First, he convinced the markets that he could and would set market rates, and that failure to correctly judge his intentions would be costly. Second, he focused the market's attention on gold flows as the primary forecast variable for monetary policy. The last step was the boldest but the easiest to carry out: Norman simply made up whatever gold flows were convenient for market control. The first step was accomplished by overstating the size of the open-market portfolio. The cost of failure to judge policy correctly is described below.

The second step was actuated through the frequently repeated (and wholly disingenuous) assertion that the Bank would mechanically adjust monetary policy to follow the rules of the classic gold-standard game.[38] A gold cushion of £150 million was declared the minimum safe level by the Cunliffe Committee in 1918 and was accepted by financial markets and academic economists as the lower constraint after the return to gold. A gold stock of around £150 million coupled with a gold outflow indicated an increase in Bank Rate was likely. Although actual gold holdings were usually substantially above £150 million, Norman chose to publish figures that seldom strayed from the minimum safe level by more than a few million pounds, maximizing the leverage of reported gold flows on market interest rates.

The September 1927 confrontation between Norman and the discount houses illustrates the explicit connection between profitability and

[36] Sayers, *Bank*, pp. 217–19.

[37] Using monthly data and one million pounds as the discrepancy threshold the seven possible cases were reported n times: inflows underreported (n = 24); inflows overreported (n = 10); outflows underreported (n = 7); outflows overreported (n = 9); outflows misreported as inflows (n = 4); inflows misreported as outflows (n = 9); correct reports (n = 16) (author's calculations from Sayers, *Bank*, vol. 3, pp. 349–55).

[38] Brown, *Gold Standard*.

changes in monetary policy, the link between current market behavior and expectations. The recorder of the meeting noted:

> [Norman] was not at all satisfied with the way the market had been conducted in the last six months. . . . This would not do and they [the discount houses] must keep it firm and stable. He knew how to deal with them if they didn't [satisfy Norman with their rates] and could keep them in the Bank as long as he liked. If Bank Rate did go up it would be to 5.5 [from 4.5]. Market could never force Bank either to raise or lower Bank Rate whereas the Bank could force the market to keep rates firm. Governor wants to know in the next day or two whether the Market is willing and able to comply.[39]

Five days later the discount house committee meekly replied that the market "considers the Governors remarks have helped them and they can do as he wishes."[40]

Norman's proffered scenario called for a rise in Bank Rate supported by open-market operations. To restore reserves the London clearing banks would call in their overnight money, the chief source of finance for the discount market's bill portfolio. To pay off their call-loan borrowing, the discount houses would be forced "into the Bank," forced to discount their portfolios at Bank Rate, a full 2 percent above the call-money rate.[41] Thus Norman was threatening to force the discount houses to liquidate their highly leveraged portfolios at rates 3 percent above those contemplated when the portfolios were purchased (the 2 percent differential between call money and Bank Rate plus a 1 percent increase in Bank Rate). Given the thin margins and low capital levels in the discount business, this would have produced severe losses.

Despite Norman's weekly meetings with the discount houses' governing body, he waited to deliver his ultimatum until the pound's seasonal autumn weakness, when the market was already nervous about an increase in Bank Rate, five months after the market-control incident began.[42] Why Norman had simply not drained sufficient liquidity out of the market at the time of the incident was probably puzzling to the discount houses, but the dire consequences of Norman's threat made it unlikely that anyone would call his bluff, if anyone could have even conceived that he was bluffing. In fact, he was. His portfolio was empty.

THE MODEL

This section will model the effectiveness of monetary policy conducted through two separate channels: the traditional mechanism through changes in the quantity of reserves and the expectations channel. The model is based on the standard money-multiplier mone-

[39] Sayers, *Bank*, p. 282.
[40] Ibid., p. 282.
[41] Capie and Webber, *A Monetary History*, pp. 313–14.
[42] Sayers, *Bank*, p. 274.

tary model, with additional consideration of the microfoundations of the determination of the reserve-to-deposit ratio that forms the basis of a money multiplier. This results in a flexible reserve-to-deposit ratio based on market-driven profit-maximizing behavior.

The existence of an optimal reserve-to-deposit ratio in the money-multiplier model is justified by the following logic. Assume profit-maximizing banks and depositors who are return maximizing and risk averse. Banks' expected profits are ceteris paribus a negative function of their reserve-to-deposit ratio (hereafter *RD*) because reserves earn no interest. Depositors' expected utility is an increasing function of *RD* because the reserves act as a buffer; reserves increase the likelihood of full and timely deposit repayment. Assuming second order conditions for a unique solution exist, banks increase reserves until the value of the marginal utility to the depositor is driven down to the marginal cost of reserves, which is the opportunity cost of not purchasing earning assets.

The long-run trend value of *RD* is given by

$$RD_t = RD_{t-n} - a_0 n \tag{1}$$

with the reserve-to-deposit ratio at time t, RD_t, set equal to a trend value, $RD_{t-n} - a_0 n$, where a_0 is the monthly long-term trend change in *RD* calculated from a base time period of $t - n$. The long-term trend reflects a decline in *RD* caused by changes in banking technology, payment habits, especially the spread of checking, the secular evolution of risk-taking behavior by banks, the evolution of depositors' risk-aversion preferences, and the state of financial market regulation, to name the most important factors. These long-term trend factors are commonly assumed to be independent of monetary policy and of constant cumulative effect through the period, giving rise to the constant or constant-trend money multiplier.[43]

However, monetary policy will cause a deviation from the trend by altering the short-run profit-maximizing *RD* ratio. Three mechanisms through which monetary policy necessarily alters the optimal short-run *RD* ratio are the opportunity cost of holding reserves; maturity transformation; and costly portfolio adjustment. The first mechanism implies that the *RD* ratio is negatively related to the opportunity cost of holding reserves, which is measured by the Bank prime bill rate (hereafter *BL*).

Maturity transformation, with the term structure of bank assets longer than liabilities, causes the current period *RD* ratio to be positively related to an expected increase in future *BL* rates. For example, if *BL* rates are expected to increase then it may be optimal to postpone the acquisition of earning assets and increase reserves until after rates go up. Costly portfolio adjustment, with nonlinearities so that the total cost of adjustment is less if accomplished gradually, implies that

[43] See for example Friedman and Schwartz, *Monetary History*.

borrowing at Bank Rate may be advantageous to stretch out portfolio adjustments. Reserves substitute for adjustment borrowing at Bank Rate. Thus current reserve levels are positively related to the expected future cost of adjustment borrowing at Bank Rate.

Combining equation 1 with the three short-run factors in linear form yields

$$RD_t = RD_{t-n} - a_0 n - a_1 BL + a_2 BR^e + a_3(BL^e - BL) \tag{2}$$

with BL the bank prime bill rate, representing opportunity cost of holding reserves, and BR^e and BL^e are expected Bank Rate and the bill rate respectively.

Given the gold standard, monetary policy is constrained in the long run to monetize gold inflows and demonetize gold outflows. To prevent unending increases or decreases in the stock of high-powered money the central bank is forced to follow a policy of setting rates such that the long-run gold flow is zero. A linear implementation of expected BR given this condition is

$$BR^e = BR_t - a_4 DG \tag{3}$$

where DG measures gold inflows.[44]

Let the expected difference between Bank Rate and the bill rate be equal to the current difference, so that expected changes in BR forecast expected changes in BL. This yields the following:

$$BL^e = BL + BR^e - BR \tag{4}$$

Justification for the expectation underlying equation 4 is that the central bank is believed to have an adequate open-market portfolio and thus will act to maintain the effectiveness of Bank Rate, defined as maintaining a target differential between market rates and Bank Rate by moving market rates into line with a given Bank Rate.

Substituting equations 3 and 4 into 2, forming and solving for $BR - BL$ yields the following:

$$BR - BL = a_0 n/a_1 + (1/a_1) RD_d + ((a_1 - a_4)/a_1) BR + ((a_2 a_3 + a_3 a_4)/a_1) DG \tag{5}$$

RD_d is the d month difference in the reserve-to-deposit ratio. Equation 5 is suitably formulated to evaluate the channels through which monetary policy maintains market control with a given Bank Rate. The efficiency of open-market operations can be derived from the RD_d coefficient. The DG coefficient measures the impact of shifts in expec-

[44] A gold-flow model is formed implicitly by substituting equation 3 into equation 2 and solving for DG. This is a sensible model only under restrictive assumptions, including, but not limited to the special case that there is no expectation of a change in parity (meaning the gold standard will be maintained forever), and foreign conditions are constant. The simplicity of the model should erode its ability to track markets when either do not hold.

tations produced by reported gold flows. If the central bank is willing to issue fraudulent gold flow data that is accepted at face value, a new policy channel is opened.[45]

MODEL ESTIMATION AND INTERPRETATION

Equation 5 is essentially an interest-rate model. Rewrite equation 5 as

$$BL = BR - A \tag{6}$$

where A is the right hand side of equation 5 and consider that the well-known fixity of BR for long periods during the interwar gold standard meant that it does not perform as a proxy for movements in BL. Interest-rate models are notoriously difficult to estimate, unless in the interest of expediency a lagged dependent variable or proxy for same is introduced, which is clearly not the case here. However, with RD entered as a 12-month moving average, this model estimates well.[46] The results are reported in Table 3. All coefficients have the expected sign and are significant, except for BR, which is *a priori* indeterminant as the structural parameters a_1 and a_4 may be close in size. This indicates that the level of Bank Rate did not affect its effectiveness. Intercept dummy variables are deployed for events beyond the simple structure of the model.[47]

The 12-month gold inflow ($GOLD_{12}$) and the three-month gold inflow ($GOLD_3$) and two dummy variables are used to measure the impact of

[45] Using the instruments-targets approach, note that a central bank with an adequate gold stock and an adequate open-market portfolio has two independent instruments, as bank reserves and the gold stock may be independently adjusted to reach two targets, domestic interest rates and the gold price of the currency, respectively. With only gold as an instrument, Norman could have targeted either the gold price of the pound or interest rates but not both. The creation of a second independent instrument (false gold flows) allowed Norman to simultaneously pursue two targets. The instruments-targets approach is a short-run analysis, as the size of the gold stock and the open-market portfolio are not independent in the long run.

[46] Using a 12-month moving average is convenient because it eliminates distortions in the RD ratio caused by seasonality and the window dressing referred to above.

[47] See note 44 for some of the events that must be captured by dummies. In the sample period the general strike and the end of the Wall Street boom are events that led to expectations of easier monetary policy. See Sayers, *Bank*. In addition there was a traditional seasonal pattern in bill rates, with tightness in the fall and ease in the winter and early spring. Separate intercept dummies are fitted for the Great Depression and events causing tightness in the market. The September 1927 confrontation with the discount houses described above is taken as the beginning of a period of tightness. Two additional periods of tightness, one in late 1928, and the other in 1929 were caused by the extraordinary run up of New York time deposit rates during the Wall Street boom and the attendant outflow of short-term capital from London. See Brown, *Gold Standard*, pp. 724 and 727. The *EXP BR NARROW* intercept dummy derives from expected declines in Bank Rate, defined as the month including an actual decline in Bank Rate, and two episodes where W. A. Brown declares that the market believed a cut in Bank Rate was imminent (the periods around May 1927 and June 1928). Ibid., pp. 715 and 724. A broad version of this dummy variable includes more of the period of the 5 percent Bank Rate in 1926 and 1927, as the market was extremely dubious that 5 percent could be maintained in the face of a depressed economy and deflation. The market was eventually proven right, but not until April 1927.

TABLE 3
MARKET CONTROL REGRESSIONS
DEPENDENT VARIABLE: *BR* − *BL*, MAY 1925 TO AUGUST 1931

Independent Variables	(1)	(2)	(3)	(4)
Constant	0.241	0.196	0.265	0.372
RD_4	206	146	144	137
	(7.70)	(5.34)	(5.50)	(5.83)
$GOLD_3$	0.0106	0.0107	0.00842	0.00774
	(4.77)	(5.42)	(4.09)	(4.29)
$GOLD_{12}$	0.00864	0.00991	0.0102	0.00942
	(4.68)	(5.95)	(6.39)	(6.64)
$GOLD^2$	0.000128	0.000142	0.000127	0.000120
	(3.29)	(4.10)	(3.80)	(4.07)
CONFLICT	−0.00923	−0.00838	−0.00793	−0.00627
	(2.77)	(2.82)	(2.79)	(2.41)
BANK RATE	0.0329	0.0482	0.0284	—
	(1.06)	(1.73)	(1.03)	
SEASONAL + SPECIA.	0.189	0.164	0.158	0.123
	(5.08)	(4.91)	(4.95)	(4.19)
DEPRESSION	0.276	0.253	0.223	0.218
	(4.36)	(4.48)	(4.11)	(6.55)
TIGHT	—	−0.176	−0.147	−0.112
		(4.36)	(3.68)	(3.08)
EXP BR NARROW	—	—	0.109	—
			(2.71)	
EXP BR BROAD	—	—	—	0.177
				(5.17)
MSE	0.0184	0.0146	0.0133	0.0108
R^2	77.4	82.5	84.2	86.9

Notes and Sources: *BR* is the average monthly Bank Rate and is derived from the author's calculations. *BL* is the three-month prime bank bills, average of daily highs, listed in Brown, *Gold Standard*, p. 713. RD_4 is the four-month change in the 12-month moving average of reserves to deposits in London clearing banks; see Capie and Webber, *Monetary History*. $GOLD_3$ is the three-month change in published gold, average of weekly figures; see Sayers, *Bank*. $GOLD_{12}$ is the 12-month change in published gold, average of weekly figures; see Sayers, *Bank*. $GOLD^2$ is the square of the sum of $GOLD_3$ and $GOLD_{12}$ when the sum is less than zero. *CONFLICT* is a slope dummy for $GOLD_{12}$. Where $GOLD_{12}$ and $GOLD_3$ are each greater than two and of opposite signs, it is set to one if $GOLD_{12}$ is negative and negative one if $GOLD_{12}$ is positive. *SEASONAL + SPECIAL* is an intercept dummy for seasonal ease, from January through April and for two months around the General Strike and two months after the Wall Street crash. *DEPRESSION* is an intercept dummy for the period from January 1930 to June 1931. *TIGHT* is an intercept dummy for the periods from September 1927 to March 1928, from August 1928 to January 1929, and from April 1929 to September 1929; for further details, see the text. *EXP BR NARROW* is an intercept dummy for expected Bank Rate reductions, defined as the month prior to reduction and April through June 1926 and May through June 1928; see Brown *Gold Standard*, pp. 715 and 724. *EXP BR BROAD* is the same with the addition of February through July 1926 and January through March 1927; for further details, see the text. The figures in parentheses are *t*-statistics.

gold flows on market control.[48] Both gold flow coefficients are highly significant, even though substantial colinearity exerts a downward bias on the reported *t*-statistics. The 12-month gold flow is a measure of

[48] Two- and four-month gold inflows produced coefficients of similar magnitudes but slightly lower *t*-statistics. One-month inflows were not significant, as is appropriate given their reduced information content. Flows longer than four months had a steady decline in significance, as is appropriate, for, the longer the flow, the less new information was added to that given by the 12-month flow.

performance undistorted by seasonal factors, whereas the three-month flow is timely, so that both are required for informational efficiency. The inclusion of both gold flows is also suggested by contemporaneous discussions.[49]

A test for asymmetrical nonlinearity in the reaction of $BR - BL$ to gold flows is conducted through the slope dummy variable $GOLD^2$, which is the square of negative observations of the sum of $GOLD_{12}$ and $GOLD_3$. It is positively related to the $BR - BL$ spread, indicating a nonlinearity, in other words, a single very large reported gold outflow had less effect on market rates than a steady drain. There was no evidence that the relationship was symmetrical, possibly because very large gold inflows were not often reported in the period.

The market response to conflicting information from the gold flow variables was tested with the slope dummy *CONFLICT*. The market had a significant and substantial optimistic bias, which highlights the depth of the market-control problem. If 12-month gold was positive (an inflow) and three-month gold negative, then the 12-month gold coefficient would roughly double, virtually canceling the negative impact of the short-term outflow. In the opposite case the 12-month coefficient drops close to zero; the negative 12-month gold flow was ignored, allowing the positive short-term inflow to lower rates.

Figure 2 shows the behavior of the $BR - BL$ spread and the fit obtained from regression 3 (the results reported in Table 3, column 3). All the regressions in Table 3 produce quite similar traces. Regression 3 is chosen for detailed interpretation because of the more conservative specification for the expected decline in Bank Rate dummy variable. However, all four of the regressions produce the same qualitative conclusions discussed below.

Interpretation

From regression 3 the coefficient on RD_4 indicates that a £1-million open-market operation caused a 2.46 basis point change in market rates.[50] The *GOLD* coefficients show that purporting a one-million pound gold flow produced a 1.82 basis point change in market rates. The response of market rates to published gold alone, without any change in the level of reserves, is remarkable, as it is almost as large as that produced by an actual open-market operation of equivalent size. In addition the high *t*-statistics on the gold flow coefficients indicate that the market response was consistent and fairly precise.[51] It could readily be used as a channel for monetary policy.

[49] For example, see Keynes, "Amalgamation."

[50] For example a £10 million open-market purchase will add £10 million to both the numerator and denominator of the *RD* ratio. This will increase RD_4 by a maximum value of 0.001707 after four months, using the average levels of reserves and deposits for the period.

[51] See the note for Table 3.

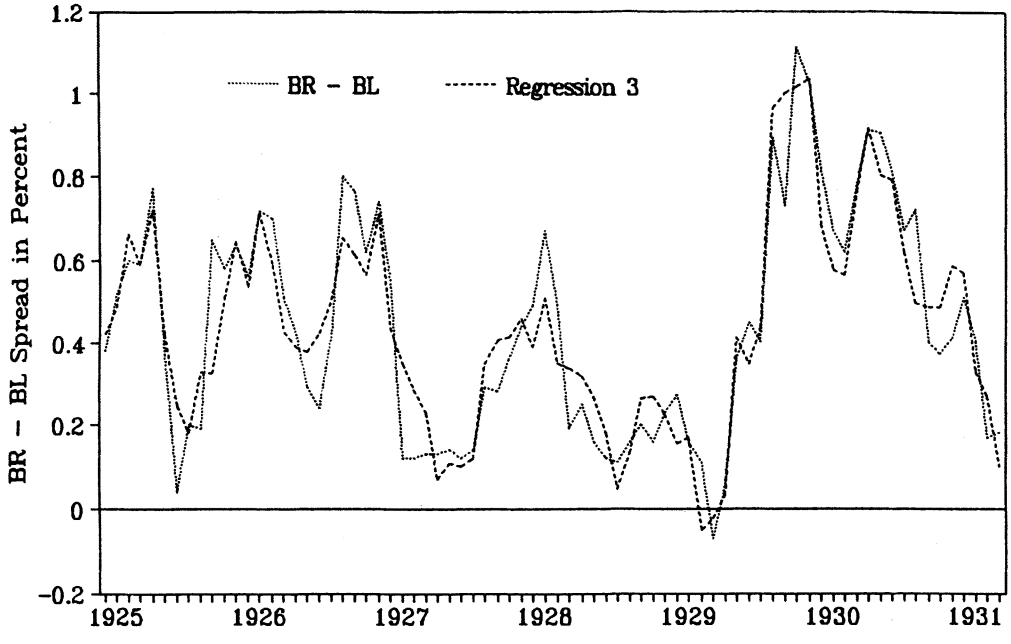

FIGURE 2

THE SPREAD BETWEEN BANK RATE AND MARKET RATES ACTUAL (*BR* − *BL*) AND PREDICTED (REGRESSION 3)

Note: Regression 3 refers to the results reported in Table 3, column 3.

Figure 3 displays the relative use of the reserve-based and expectations-based channels of monetary policy. The expectations channel is defined as the difference in the *BR* − *BL* spread caused by misstating gold flows. The initial tightening from 1925: 4 to 1926: 1 was carried out through the traditional channel, as was the slight easing around the general strike in 1926: 2 and 3. From 1926: 3 until 1928: 2 the use of the expectations channel grew steadily. In this Norman had little choice, given his shrinking open-market portfolio. Although the reserve channel was very active in this period, the expectations channel became the dominant policy conduit. Norman brought market interest rates 30 basis points closer to Bank Rate through understating gold inflows in this period, and prevented at least two cuts in Bank Rate that would otherwise have been forced on him.

Beginning in 1928: 2 rapidly changing conditions caused Norman to embark on a number of policy adventures. First, he successfully manipulated Parliament. By uncharacteristically reporting gold inflows in 1928: 2 and misreporting gold outflows as inflows in 1928: 3, he was able to have a more restrictive limit legislated for the fiduciary issue (the amount of the currency issue not backed by gold) established with

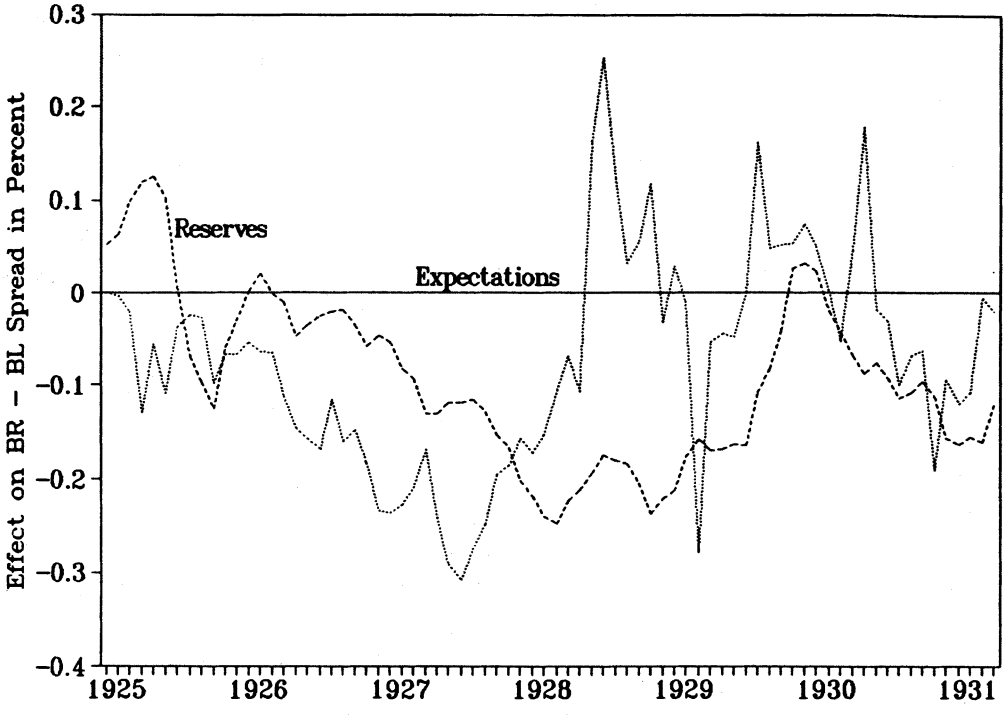

FIGURE 3

THE CHANNELS OF MONETARY POLICY AND THEIR EFFECTS ON THE BANK-RATE–MARKET-RATE SPREAD

Notes: A negative reading indicates that the channel was being used to tighten the markets. For example, in early 1928 the expectations channel raised market rates by about 0.3 percent and changes in bank reserves by an additional 0.12 percent compared to the market rates that would have eventuated had gold flows been reported accurately and the bank reserves-to-deposit ratio remained unchanged.

amalgamation of the Treasury and Bank of England note issues.[52] Although Keynes protested that the low fiduciary issue was unwise because it needlessly tied down an additional £40 million of gold as note cover, Norman knew that, as of the summer of 1928, his problem was too much gold, not too little.[53] Events were, however, soon to prove Keynes correct. Although Norman published the largest holding of gold in the Bank's history in September, actual gold flows had turned substantially negative.

From August 1928 to February 1929 an enormous gold outflow of £45 million occurred, the largest ever experienced up to that time. The regression model indicates that, had the true gold outflow been published, the $BR - BL$ spread would have been driven far into negative territory (−0.14), which is consistent with a market expectation of a rise in Bank Rate of 2 percent or more. Although counterfactual history is a

[52] Garrett, "Decline," pp. 893–97.
[53] Keynes, "Amalgamation."

perilous enterprise, it seems likely that, had Norman not reversed course by greatly underreporting the outflow to hold down market rates, Great Britain would have abandoned the gold standard in the first quarter of 1929.[54] The £45-million gold loss—had it been published—would have started a run against the pound, precipitating an even larger gold outflow, leaving little choice but to drastically raise Bank Rate or end convertibility (see footnote 45). This episode indicates the flexibility of the expectations channel, as well as its durability, for Norman used it in a similar manner on two other occasions.[55]

THE EXPECTATIONS CHANNEL AND NEW CLASSICAL MONETARY POLICY MODELS

The dominant new classical model of optimal monetary policy (hereafter the credibility model) derives from the work of Robert Barro and David Gordon. Optimal policy choice in a game theory setting provides the basis for the innovative result that central banks should limit or cease deliberate stabilization activity.[56] The policy conclusion may even hold given asymmetric information, the normal requirement for policy activity in a model with the efficient market assumption. With the central bank in possession of information not available to the market that conflicts with market expectations (in other words, the market is wrong), the literature concludes that it is probably inadvisable for the central bank to act upon its superior information or to reveal the information to the market in an attempt to improve the accuracy of market expectations.[57] This counterintuitive result pertains because of time inconsistency in monetary policy, which in turn is caused by the assumption that the central bank has an output target above full employment output.[58]

The credibility problem emerges if markets believe that central

[54] Note that a smaller £35-million gold loss succeeded in driving Britain off gold in 1931. Had Britain abandoned gold in 1929: 1, subsequent world history would be unrecognizable. With Britain off gold it is less likely that Bruening, the German Chancellor, would have been forced to keep Germany on gold with the strict deflationary policies of 1930–1931 (see Holtfrerich, "Was the Policy"). The deflationary policies produced the mass unemployment that led to Hitler's surprising electoral strength in 1931, which elevated him from the status of a crank to a serious political figure, with subsequent success in fund raising and eventual electoral victory in 1933. Peter Temin (*Lessons*) also argues that the Great Depression would have been milder if Great Britain had left gold in 1929, though he does not refer to the late 1928 episode but to the strains on the exchanges of ten months later, at the height of the Wall Street boom, a somewhat less serious case.

[55] This is seen in the spike upward in the expectations channel in Figure 3 in the fall of 1928.

[56] Canzoneri, "Monetary Policy Games"; and Barro and Gordon, "Positive Theory."

[57] Oh and Garfinkel, "Strategic Considerations."

[58] The motivation for central bankers' longing for inflationary surprises as the means to a very temporary increase in output is strained in the literature. For example, see Oh and Garfinkel, "Strategic Considerations." Even more dubious is the assumption by Rogoff, "Optimal Degree"; and Lohmann, "Optimal Commitment" that "conservative" central bankers have identically excessive output targets.

bankers will create an inflationary surprise to reach an above full-employment output target and set their period ahead price level expectations accordingly.[59] Given this expectation, the central bank can either validate the expected inflation, with output remaining at full employment, or can surprise the market with a noninflationary policy, causing a blip downward along the Friedman-Lucas supply curve.[60] Welfare losses result, either through the central bank's inflation bias or an output loss. However, through repeated forbearance, the central bank can teach the market that it has forsworn inflationary surprises. In other words, it can build up a credible record as an inflation fighter. This establishes a "reputational equilibrium" that solves the time inconsistency problem, because credibility, or, rather, the lower steady state inflation rate it permits, is more valuable to the central bank than a one-period output enhancement.[61] To maintain credibility the central bank must cease stabilizing the economy, lest this be interpreted as an attempt at an inflationary surprise.

Expectations play a crucial, specific, and simple role in the credibility model. They are not independent of policy but always react against policy to minimize the effect of expected policy on the real equilibrium. The real equilibrium is autonomous and is independent of policy.[62] Expectations are the market mechanism that makes policy ineffective. In the new classical macroeconomics, expectations are strictly beyond the reach of policy makers.

The findings presented here, however, indicate that expectations play a more complex role than specified by new classical economists. Given the institutional arrangements of British financial markets during the return to gold, expectations had little or no tendency in the short run to enforce a real equilibrium that was policy invariant. On the contrary, expectations were manipulated at will by the Bank of England, successfully and repeatedly driving the market hither and yon. Expectations manipulation was more than merely statistically significant: the empirical results show that from the middle of 1926 onwards it was quantitatively as or more important in the execution of monetary policy than changes in the monetary base (see Figure 2).

Admittedly the institutional arrangements of the interwar gold standard, to say nothing of Montagu Norman, were unique. However, in the credibility model the general case of a central bank that lies is specifically considered, and the conclusion is reached that lying has no effect

[59] Kydland and Prescott, "Rules"; Barro and Gordon, "Rules"; and Garfinkel and Oh, "Strategic Discipline."

[60] See for example Driffill, "Macroeconomic Policy Games"; and Persson, "Credibility."

[61] Barro and Gordon, "Rules"; and Canzoneri, "Monetary Policy Games."

[62] That is, the standard rational expectations model contains sufficient assumptions so that the solution for the differential equation specifying the time path of real output does not contain policy variables. Alternative assumption sets lead to solutions with policy parameters affecting real output, but I characterize these as nonstandard RE models.

on market outcomes.[63] Yet, the Bank of England was consistently able to steer markets merely by lying, without adjusting a policy instrument. The results directly contradict the most basic assumptions over the behavior of expectations found in the new classical macroeconomics in general and credibility models in particular.[64]

The results may be summarized as follows. Markets can not tell when a central bank is lying. They then have the option to accept all or reject all forecast information emanating from the central bank. Under such circumstances the credibility model asserts that private financial markets reject all central bank information. This is possible because the financial markets' private information is assumed to be almost complete. However, the results presented here contradict this assumption and lend support to the opposite case: the markets' private information is so incomplete that they can not dispense with central-bank sources. The implication for the credibility model is devastating because pervasive ignorance and uncertainty allow the central bank to maintain its position as a disseminator of forecast information even if the central bank is guilty of extreme dishonesty, as under Norman. Under these circumstances monetary policy will be an effective instrument to stabilize the economy against both money demand and real shocks, which contradicts the core result found in the large and influential credibility-model literature.

CONCLUSION

The role played by the interwar monetary policy system in the genesis and propagation of the Great Depression is a source of controversy. Charles Kindleberger writes:

> I have failed to persuade large numbers of scholars that the depression was a worldwide phenomenon in origin and interaction rather than an American recession that, extended by policy errors on the part of the Federal Reserve System into a U.S. depression, spilled abroad.[65]

Recently support has increased for Kindleberger's "internationalness" hypothesis and in particular the role played by the *internationally shared* characteristics of the macroeconomic policy system. The three most important features of the macroeconomic policy system were fiscal policy constraints through balanced budget policy rules or laws; the independent central bank as the uncontested policy authority; and

[63] Canzoneri, "Monetary Policy Games"; and Oh and Garfinkel, "Strategic Considerations."

[64] The problem may not lie with the assumption of rational expectations per se, but may originate from the assumption of rational expectations in conjunction with the "equilibrium always" assumption and the trivialization of information and transactions costs. See Buiter, "Macroeconomics"; Garrett, "Economic Policy"; and Tobin, "Are New Classical Models."

[65] Kindleberger, *World*, p. xvi.

the gold standard as the system's enforcer.[66] The postwar international financial order was managed by central bankers who were not stabilizers, whether of a Monetarist (stabilizing the money supply) or Keynesian (stabilizing the level of output) variety.[67] Montagu Norman's policy model and his policy choices lend clear support to the new interpretation. Much of the earlier literature explicitly or implicitly assumes interwar central bankers were stabilizers. Conclusions dependent upon this premise must be reevaluated.

A new issue over the role played by the interwar policy regime interpreted as a policy rule has been fostered by new classical macroeconomic models and the importance they attribute to policy rules in determining expectations and thus market outcomes. The argument runs so: markets anticipate and adjust for monetary policy conducted according to the standards of the ruling policy regime. If the policies of 1929 to 1932 were consistent with the policy regime, then, no matter how deflationary, the markets should have anticipated the policy actions and automatically acted to keep real variables relatively unaffected. The conclusion from within a strict new classical paradigm is that either the policies were exceptionally deviant from the policy regime or they were not major causal forces.

The older literature from both the Keynesians and the Monetarists indicates that the policy regime called for central bankers to act as stabilizers.[68] Thus, a sudden and unexpected move to deflationary policy was a violation of the policy regime and is therefore consistent with both contractionary monetary policy playing a causal role in the Great Depression and the validity of the standard rational expectations macromodel.

Peter Temin, and Keynes for that matter, take the opposite view, arguing that interwar central banks did not assign a high priority to stabilization.[69] Under this position either monetary policy did not play an important causal role or the standard rational expectations macromodel fails to fit events. Barry Eichengreen has frequently modeled interwar central banks as stabilizers, but lately seems to be moving toward a neutral position, stating that the nature of the interwar monetary policy regime needs further research.[70] Kindleberger, Temin, and Eichengreen all believe that monetary policy was one of the causal forces of the Great Depression. This sets the stage for a confrontation between economic historians and new classical macroeconomic theo-

[66] Temin, *Lessons*; Garrett, "Decline"; Eichengreen, "Origins"; and James, "Financial Flows."

[67] Temin, *Lessons*.

[68] For Keynesians, see Moggridge, *British Monetary Policy*; and Howson, *Domestic Monetary Management*. For Monetarists, see Friedman and Schwartz, *Monetary History*.

[69] Temin, *Lessons*; and Keynes, *Economic Consequences*.

[70] Eichengreen, "Origins."

rists, with the latter boldly claiming that anticipated contractionary monetary policy in the 1920s did not depress output.[71]

The results presented here provide evidence that the monetary policies of the Bank of England in the early years of the Great Depression were consistent with the policy regime, and that, if anything, the policies were slightly less contractionary than indicated by the norms of the 1920s. Although further qualitative and quantitative analysis is required, this finding indicates an inconsistency between the new classical model and the conclusion of economic historians that monetary policy mattered in the Great Depression.

Finally, the behavior of British financial markets is shown to be inconsistent with the microfoundations of the new classical model—expectations not only moved in a policy reinforcing rather than a policy negating direction, but expectations became a reliable, systematic policy instrument. One of Thomas Sargent's hopes is fulfilled—economic history proves to be fertile ground for testing the accuracy of complex macroeconomic theory—though the outcome is probably not what he had expected.

[71] Sargent, *Rational Expectations*; for contra see Garrett, "Economic Policy."

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