CHAPTER V

THE MONEY AND CAPITAL MARKETS

V 0. INTRODUCTORY

The scheme of investigation used is much the same as that used in the case of the U.S.A. in "Business Cycles in the U.S.A." [1]); the reader may be referred to this publication. The main differences are:

(*a*) in the case of the U.K. no abstraction could be made from the relation with foreign money markets; (*b*) short term credits are to a very high extent demanded for the financing of foreign trade and to a small extent only — which seems even negligible — for ends of stock speculation (*c*) the relation between the C.B. and the commerical banks is different from that in the U.S.A. in that no fixed reserve ratios are legally prescribed.

A. DEMAND FOR AND SUPPLY OF SHORT CLAIMS

V 1. THE DEMAND BY BANKS FOR BONDS AND SHORT CLAIMS

(i) *Theoretical.* Efforts have been made to explain the proportion of total liabilities M'' held in the form of short claims (discounts and advances), B_s, i.e. $\overline{\overline{B}}_s/\overline{\overline{M}}''$, by

(*a*) m^s, short term interest rate,

(*b*) m^L, long term interest rate,

(*c*) $\dot{m}^L$, the rate of increase in the long term interest rate, representing the expected capital gains to be made by holding bonds. Evidently (*a*) and (*c*) should have a positive influence and (*b*) a negative one. In order to complete the picture, similar formulae could be tried for $\overline{\overline{B}}^b/\overline{\overline{M}}''$ (proportion of investments to deposits) and $\overline{\overline{M}}''^b/\overline{\overline{M}}''$ (proportion of cash on hand to deposits.)

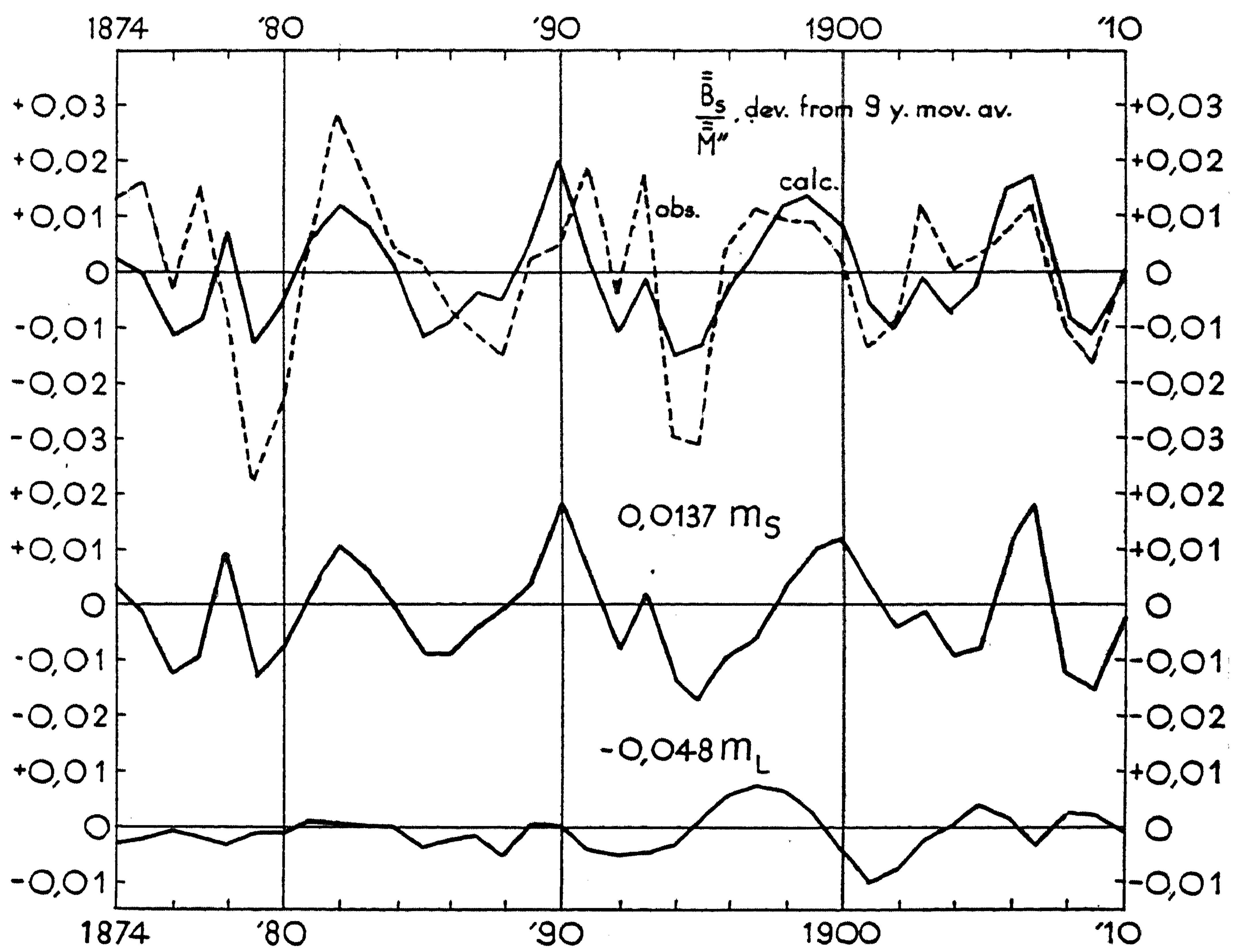
(ii) *Statistical.* The statistical test may be given in two ways, viz. 1. by calculating the deviations from 9-year moving averages of the relation $\overline{\overline{B}}^s/\overline{\overline{M}}''$, to be indicated by $\{\overline{\overline{B}}^s/\overline{\overline{M}}''\}$ and "explaining" these deviations by the variables indicated;
2. by bringing M'' to the right-hand side of the equation and testing a relation $B^s(m^s, m^L, \dot{m}^L, M'')$.
Since

$$\left\{\frac{\overline{\overline{B}}^s}{\overline{\overline{M}}''}\right\} = \left\{\frac{\overline{B}^s + B^s}{\overline{M}''+M''}\right\} \sim \left\{\frac{(\overline{B}^s + B^s)\,(\overline{M}'' - M'')}{\overline{M}''^2}\right\} \sim \frac{B^s}{\overline{M}''} - \frac{\overline{B}^s M''}{\overline{M}''^2},$$

[1]) League of Nations, Geneva 1939.

[2]) Cf. section V 2.

the result at 1 can easily be transformed into an approximation of that obtained for 2. But since there is a high correlation between B^s and M'', the result in case 2 seems, if one judges from the correlation coefficient, far more favourable than that in case 1. This is illustrated by graphs V 1 and V 11. For the sake of curiosity a graph has also been added for a third calculation where even no deviations from 9-year moving averages have been taken (V 12).



V 1. "Explanation" of demand for short claims (ratio between short claims and deposits).

The formulae found are summarised in table V, 1. The influence of $\dot{m}^L$ was found to be very small (cf., however, (iii) below). The moderate value of correlation coefficients may be attributed to the imperfect statistics. Amalgamations of banks that did not publish a balance sheet before with banks that did, cause sudden jumps in the figures which do not represent real changes. Something more will be said about this in section V 5.

For the period as a whole, the order of magnitude of the coefficients obtained in the two ways is nearly the same. For the separate periods the signs are still correct, but the magnitude of the coefficients varies rather much. Something more will be said about this at (iii). The formula chosen runs:

(V 1) $$B^s = 9.7\ m^s - 34\ m^L + 0.65\ M''$$

TABLE V 1

1. "Explanation" of deviations from 9 y. moving averages of ($\bar{\bar{B}}^s/\bar{\bar{M}}''$)

Nr.	Period ↓ / Variable → / Stand. dev.[1]) →	Regr. coefficients (and their standard errors) for m^S	m^L	$\dot{n}^L$ [2])	R
		0.66	0.077	2.54	
1	2	3	4	5	6
1	1874—1895	0.0180 ± 0.0048	—0.026 ± 0.075		0.64
2	1896—1910	0.0100 ± 0.0021	—0.064 ± 0.044		0.85
3	1874—1910	0.0137 ± 0.0030	—0.048 ± 0.026		0.62
4	1874—1895	0.0156 ± 0.0065	0.025 ± 0.086	—0.0017 ± 0.0029	0.65
5	1896—1910	0.0128 ± 0.0023	—0.058 ± 0.013	0.0011 ± 0.0005	0.89
6	1874—1910	0.0140	0.048	0.0001	0.63

1) For period 1874—1910.
2) n^L represents the price of consols, $\dot{n}^L$ its rate of increase during the year.

2. "Explanation" of B^S

Nr.	Period ↓ / Variable → / Stand. dev.[1]) →	Regr. coeff. for: M''	m^S	m^L	R
		18.1	0.66	0.077	
1 [2])	1874—1895	0.68	8.9	—13	.
2 [2])	1895—1910	0.65	8.6	—55	.
3 [2])	1874—1910	0.65	9.7	—34	.
7	1874—1895	0.78	6.6	—13.4	0.90
8	1896—1910	0.58	8.9	—43.7	0.94
9	1874—1910	0.71	7.05	—26.2	0.90

1) For period 1874—1910.
2) Based on case bearing same number in part 1 of table.

The elasticity of supply[1]) may be calculated in the following way with the help of these formulae. First, a variation in B^s may be assumed without a variation in M''. This means that short credits are put at the disposal of those who ask for them, at the expense of the bank's liquidity. We then find an elasticity of $(dB^s/dm^s) \cdot (\bar{m}^s/\bar{B}^s) = 9.7\,(2.9/450) = 0.06$, which is very low.

Secondly a variation B^s and M'' of equal magnitude may be supposed to occur. This amounts to assuming the creation of additional credits by the banking system; in this case the elasticity would be found by assuming that a variation ΔB^s occurs in B^s and M'':

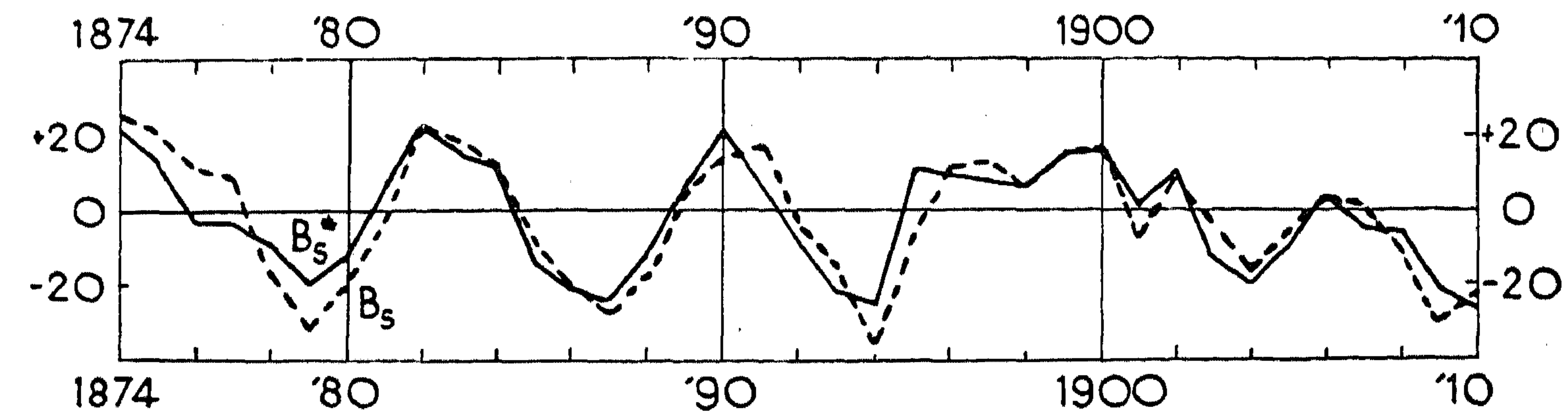
$$\Delta B^s = 0.65\ \Delta B^s + 9.7\ \Delta m^s$$

$$\frac{\Delta B^s}{\Delta m^s} = \frac{9.7}{0.35} \text{ and the elasticity} = \frac{9.7}{0.35}\ \frac{2.9}{450} = 0.18.$$

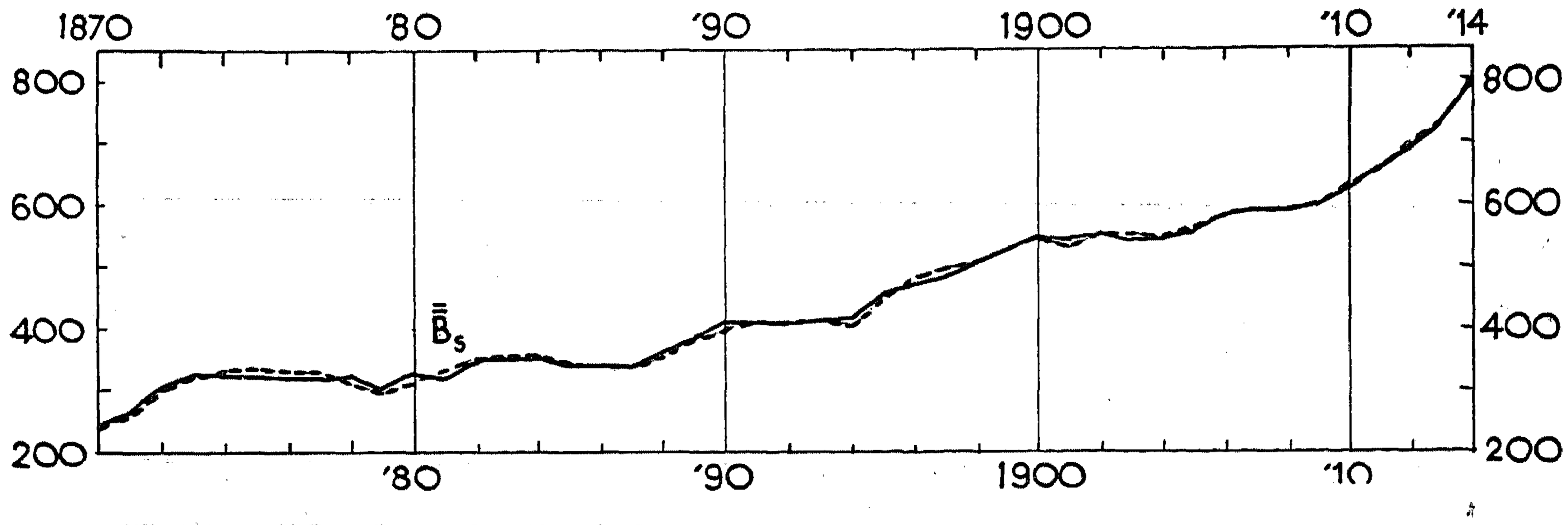
This elasticity, although about three times as high, is still a low one.

1) Cf., however, the general remarks to be made about the concept of elasticity in this case, in chapter VII, section 2.

(iii) *Standard deviations and figures for sub-periods.* In order to test the significance of the elasticities just mentioned some calculations have been made on the standard deviations of the coefficients and on their value for the two sub-periods 1874—1895 and 1896—1910. They are given in table V 1.



V 11. "Explanation" of demand for short claims (deviations from 9 y. mov. av.).



V 12. "Explanation" of demand for short claims (absolute figures).

By means of this table we find that the coefficients for m^s are pretty stable and the order of magnitude sufficiently significant to justify our conlusions on the elasticities. The coefficient for m^L is, however, positive (but insignificant) for the first sub-period. The sign of the coefficient for the rate of increase of consol prices is equally wrong for the first sub-period, but again the coefficient is insignificant. For the second sub-period, as well as for the period as a whole, these coefficients show the right sign and are significant.

V 2. THE SUPPLY OF SHORT CLAIMS (THE DEMAND FOR SHORT CREDITS)

(i) *Theoretical.* The type of credits considered here consists in discounts plus advances of all banks (as far as known statistically), including the Bank of England. The demand for these credits will come from firms, private persons and the State for:

(*a*) The financing of goods in trade, especially of imports, including the holding of stocks;

(*b*) temporary financing of investment in fixed assets (to be consolidated afterwards by capital issues);

(c) speculation at the stock exchange;
(d) financing of deficits in the State budget.

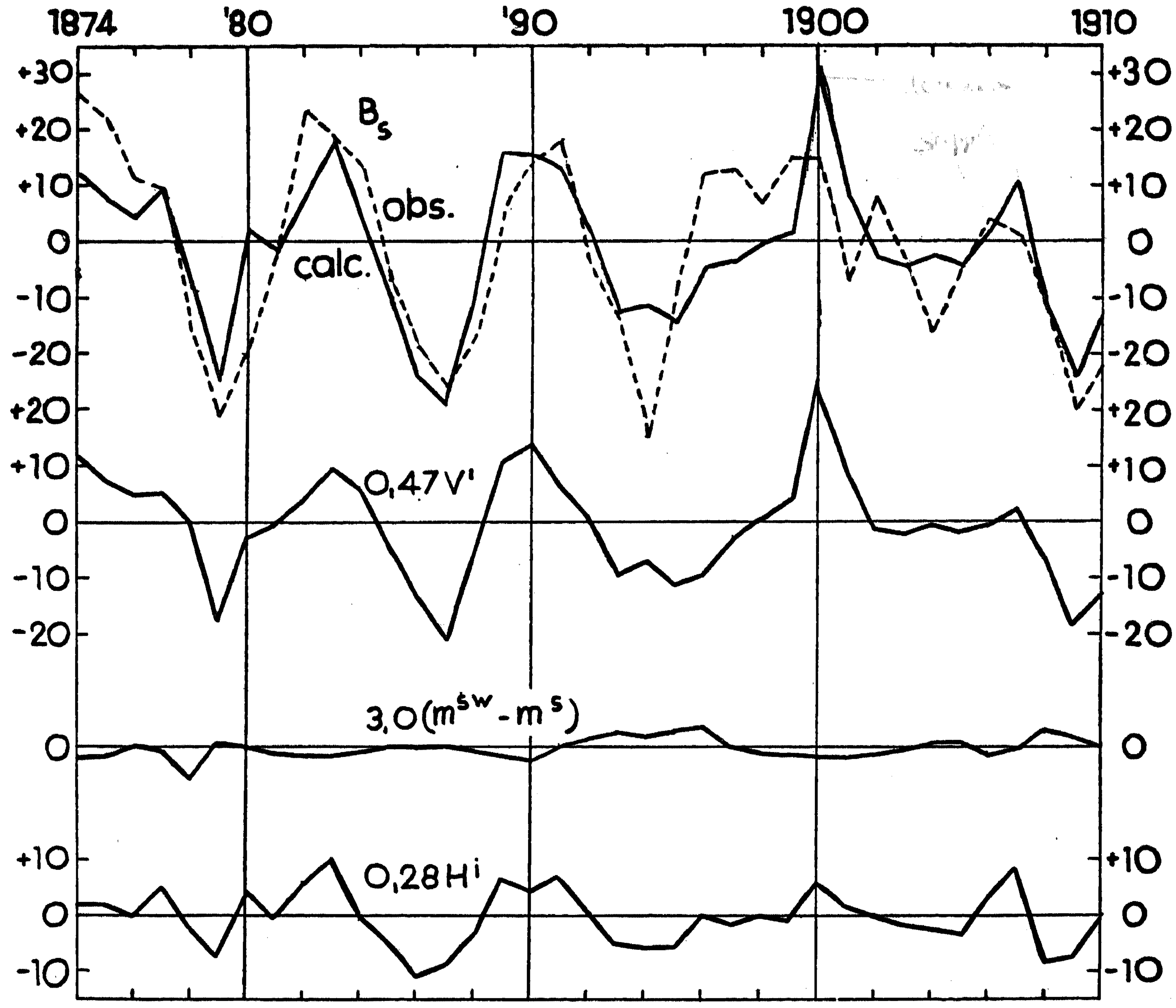
In the Macmillan Report we see that the amounts for (c) were not very large in 1925 [1]; it has been assumed that they may be neglected for our purpose. Figures with regard to treasury bills show that these are negligible too.

The following factors seem to be most relevant for the "explanation" of the fluctuations in discounts and advances B^s:

(a) total value of imports, $U^i + X^i + Y^i$;
(b) the value of investment in durable goods V'; and
(c) $m^{Sw} - m^S$, the difference between foreign and home short-term interest rate.

Apart from the amount of imports, the distance over which they are displaced may play a rôle.

(ii) *Statistical.* With the variables mentioned rather a satisfactory explanation is obtained, the regression equation being:



V 2. "Explanation" of supply of short claims.

[1]) Report of the Committee on Finance and Industry, London 1931; of a total of £ 1600 for deposits, £ 820 mln were lent as advances and only £ 30 mln to the stock exchange.

$$(V\ 2) \qquad B^s = 0.28\ (U^i + X^i + Y^i) + 0.47\ V' + 3.0\ (m^{Sw} - m^S)$$

The coefficient for $U^i + X^i + Y^i$ would point to an average duration of credits (if granted for all imports and for no other commodities) of 0.28 year or about 3 months, which seems reasonable. In reality, part of the credits will be given on other commodities and hence the average term may be below 3 months.

The coefficient for V' would point to an average duration of advances for investment purposes of almost six months, including all investments which are not financed in this way. The actual duration for those financed by bank credits may therefore be longer.

In this connection it is interesting to note that there is a lag of about six months between the rate of increase in short credits $\dot{B}^s$ and capital issues $\dot{C}$. Capital issues might thus be considered as the consolidation of bank credits taken out half a year before.

The coefficient for $m^{Sw} - m^S$ corresponds to an elasticity of the demand for short credits of $-\ 3.0\ \frac{\bar{m}^s}{\bar{B}^s} = -\ 3.0\ \frac{2.9}{450} = -\ 0.02$, which is remarkably low.

(iii) *Comparison with other countries.*

(*a*) In the United States [1]) the demand for speculative purposes is far more important. The elasticity is also found to be about zero.

(*b*) In the United Kingdom, after the war [2]), the demand for short credit by the Government was much larger. The elasticity that may be calculated for the figures given in the paper referred to is of the order of magnitude of 0.1 to 0.2, but the figures relate to discounts only. Still it is a low figure.

(*c*) For the Netherlands [3]) about the same situation as that for England is found to exist.

B. THE DEMAND FOR AND SUPPLY OF MONEY

V. 3 THE DEMAND FOR COIN (M^c)

(i) *Theoretical.* Means of payments consist of:

(*a*) coin, especially gold,

(*b*) bank-notes,

(*c*) deposits.

The total value of silver and copper coin was considerably less than that of gold in circulation. Bank notes outside the B.o.E. practically do not fluctuate. In this section the total gold stock outside the B.o.E., which equals the cumulation of (imports—exports—increase in gold stock of B.o.E.), is considered. This gold is used for (1) industrial purposes and

[1]) Business Cycles in the U.S., p. 80—82.

[2]) Cf. Het verband tusschen de vraag naar korte kredieten en de rentestand in Engeland en Nederland, De Nederlandsche Conjunctuur, 1937, p. 118.

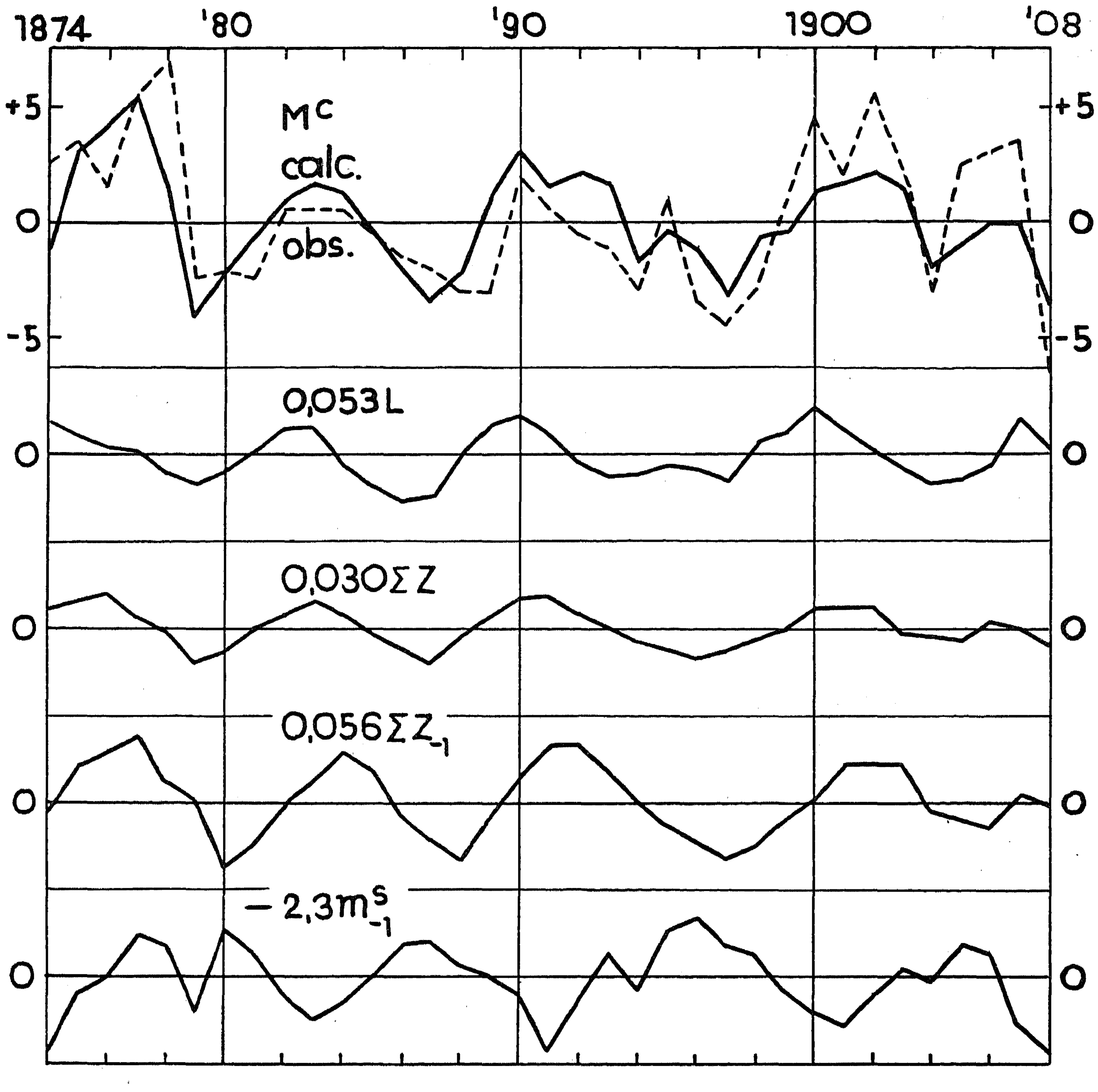
[3]) Cf. the article just quoted.

(2) circulation. Mr HAWTREY [1]) states that with a total of net imports of £ 214 mln (1858—1914), the increase in monetary circulation probably did not exceed £ 80 mln.

Therefore in an "explanation" of total gold outside the B.o.E., M^c, factors must be included explaining (1), as well as (2). Industrial demand per unit of time will largely depend on Z and may be on Z_{-1}. So the accumulated stock of this demand at any moment from the beginning of the period onwards will depend on ΣZ and ΣZ_{-1}.

Demand for circulation purposes will depend on smaller incomes which may be represented by L and, as expecially Mr HAWTREY maintains, the short rate of interest m^s. Thus the following series have been included:

$$(a) \quad \Sigma Z, \qquad (b) \quad \Sigma Z_{-1}, \qquad (c) \quad L \quad \text{and} \quad (d) \quad m^s$$



V 3. "Explanation" of demand for coin.

(ii) *Statistical.* Since ΣZ and ΣZ_{-1}, by their nature, do not show abrupt changes, the sudden fluctuations in M^c must be explained by

[1]) A Century of Bank Rate, London—New York—Toronto 1938.

(*c*) and (*d*) above. As to m^s, a considerably better result was found *if a lag of one year was supposed to exist*, although this might seem strange. Whenever no lag was applied, a positive instead of a negative influence was found.

The results of various calculations are given in table V 3. The formula chosen is, for the reasons set out:

$$M^c = 0.053\,L + 0.030\,\Sigma Z + 0.056\,\Sigma Z_{-1} - 2.3\,m^s_{-1} \qquad \text{(V 3)}$$

TABLE V 3

Nr.	Period ↓	Regression coefficients for:				R
	Variable →	L	ΣZ	ΣZ_{-1}	m^s_{-1}	
	Stand. dev. →	19.9	27.6	27.5	0.68	
1	2	3	4	5	6	7
1	1874—1809	0.053	0.030	0.056	—2.28	0.682
2	1874—1895 [1])	0.072	—0.015	0.059	—1.23	0.760
3	1896—1908	0.073	0.118	0.068	—4.35	0.884

[1]) Excluding 1878 (panic).

The elasticity of circulation with respect to interest rates can only be evaluated very roughly in the following way. According to JEVONS [1]) the circulation outside the B.o.E. was about £ 80 mlns in 1868. During the period 1858—1914 the increase was estimated at £ 80 mln; therefore the average circulation over the period 1878—1914 may have been some £ 120 mln. The average bank rate of interest was 2.9 %. The elasticity of M^c with respect to m^s is:

$$\frac{dM^c}{dm^s} \cdot \frac{\bar{m}^s}{\bar{M}^c} = -\,2.3\,\frac{2.9}{120} = -\,0.056$$

which is a very low figure.

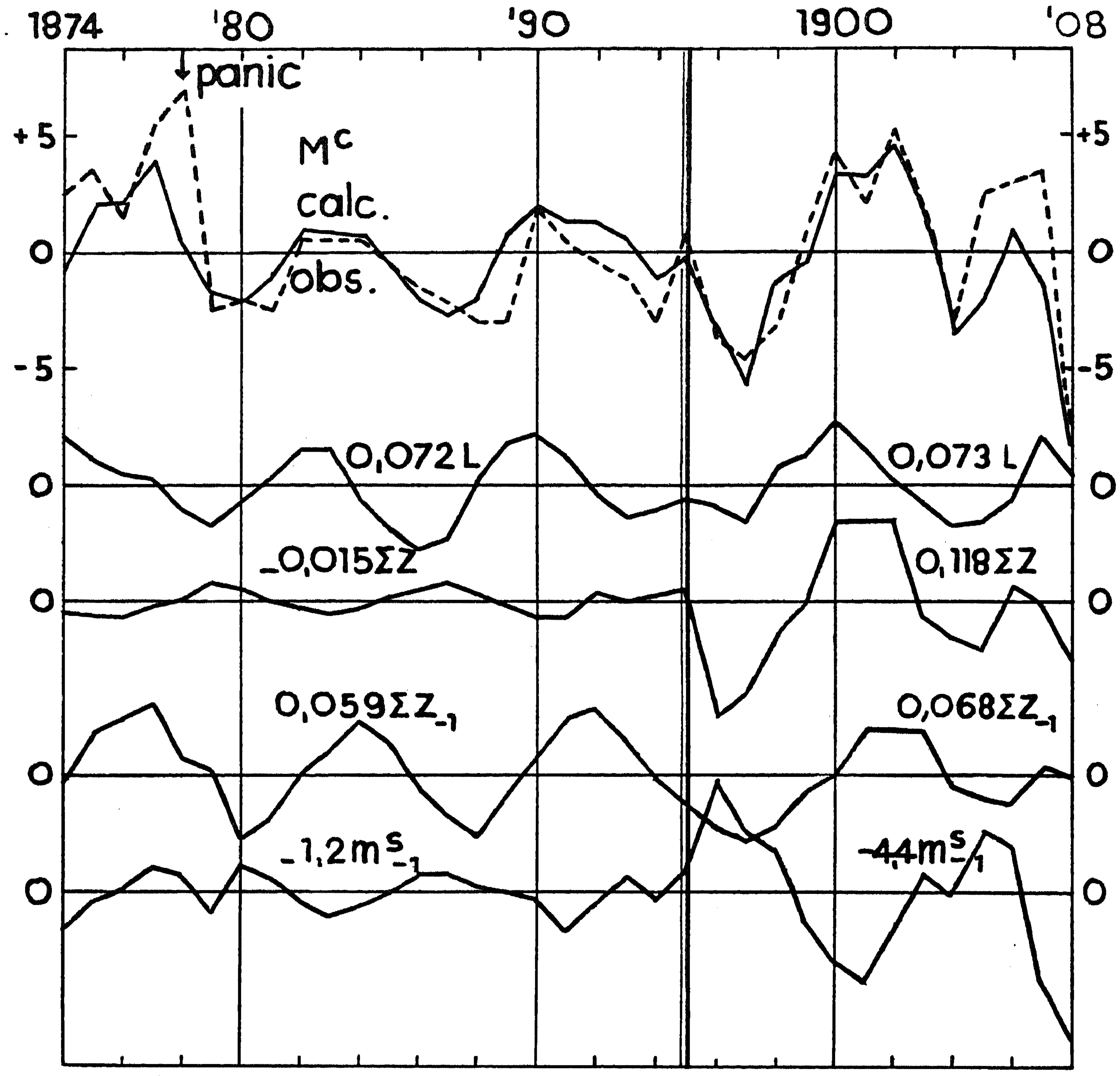
Graph V 3 shows that there is a large deviation between actual and calculated figures in 1878; this is due to the confidence crisis in that year.

There appears to be a large difference between the periods before and after 1895.

The coefficients for m^s_{-1} show about the same proportion as the average figures for circulation itself for the two sub-periods; this would mean that the percentage increase caused by a given decrease in interest rates had not changed very much. The sum of the two coefficients for ΣZ and ΣZ_{-1} is 0.044 for the first and 0.186 for the second period; this means that the industrial demand for gold would have shown much wider fluctuations in the second period than in the first, with the same fluctuations in general profits. Since the two coefficients for L do not diverge, the demand for circulation purposes would seem to be in a constant proportion to total wages for both periods. Unfortunately the figure is higher than

[1]) Quoted by Mr HAWTREY, loc. cit. p. 41.

the one found for the period as a whole. The influence of L is not very great, however.



V 3′. "Explanation" of demand for coin (two sub-periods).

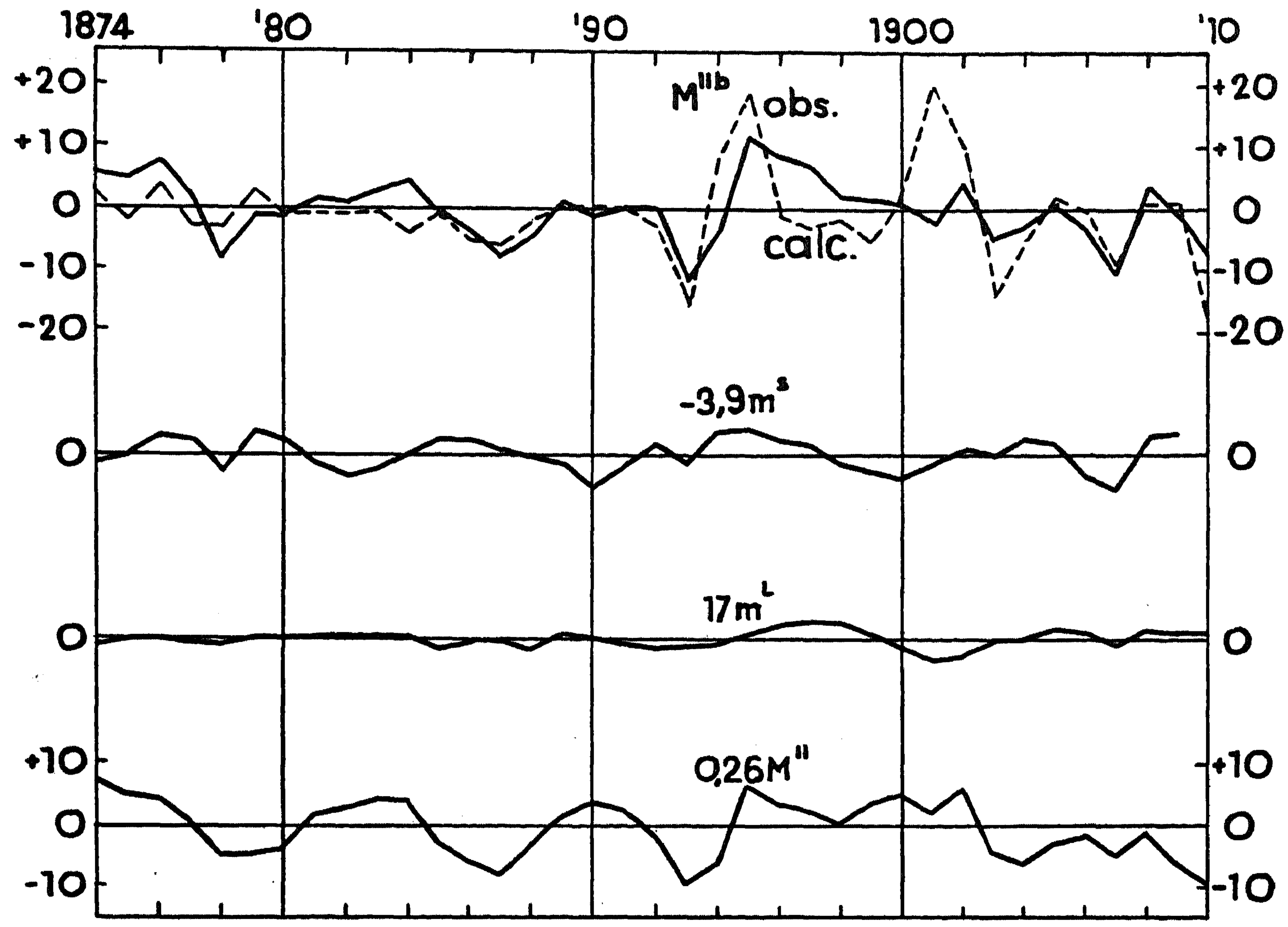
V 4. THE DEMAND FOR CASH BY BANKS, M''^b

(i) *Theoretical.* The same theory has been applied as at V 1, where the ratio of "short claims" to deposits was "explained" by the two interest rates.

(ii) *Statistical.* Similarly to the procedure followed in section V 1, two kinds of calculations have been made. The results are given in table V 4. The agreement between the figures obtained by the two methods is less good; this may be due to the figures for M''^b being smaller with possibly a corresponding degree of error. Nevertheless, the order of magnitude of the coefficients is the same in both results.

The equation chosen is:

$$M''^b = -3.9\, m^s + 17\, m^L + 0.21\, M'' \qquad \text{(V 4)}$$



V 4. "Explanation" of demand for coin by banks.

We may derive the elasticity of the demand for cash under the assumption that total assets remain constant; it is found to be:

$$- 3.9 \frac{\bar{m}^s}{\bar{M}''^b} = - 3.9 \frac{2.9}{173} = - 0.065$$

If we had used the second method, we should have found $-$ 0.062.

As compared with the figure for the elasticity of the demand for coin (section V 3), which was $-$ 0.056, it is of the same order of magnitude, perhaps somewhat higher.

TABLE V 4
"Explanation" of M''^b

Nr.	Period ↓ / Variable → / Stand. dev. [1]) →	M''	m^S	m^L	R
	Stand. dev. [1]) →	18.1	0.66	0.077	
3 [2])	1874–1910	0.26	−3.9	17	.
4	1874–1895	0.18	−4.06	−1.48	0.67
5	1896–1910	0.35	−4.07	30.6	0.75
6	1874–1910	0.24	−3.18	18.1	0.68

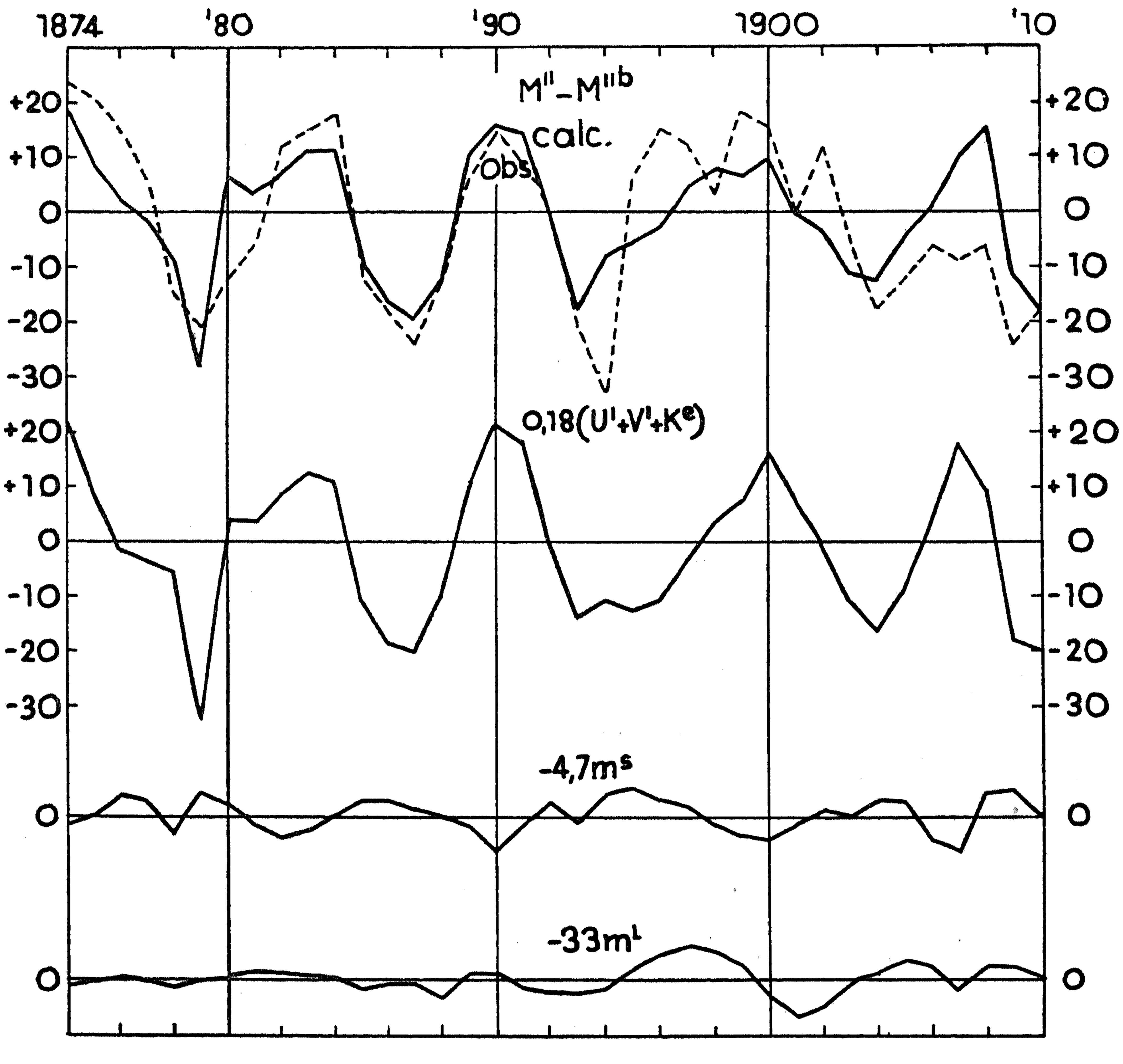
[1]) For period 1874–1910.
[2]) Based on "explanation" of ($\bar{\bar{M}}''^b/\bar{\bar{M}}''$) by m^S and m^L, cf. table V 1 and text.

(iii) *Comparison of elasticity with respect to long-term and short-term interest rates; expectations on short-term rate.* It is interesting to note that the coefficients obtained for m^L and m^s in relations V 1 and V 4 show roughly the same ratio of 3.5 to 1. This means that a change in long-term interest rate is taken "more seriously" than an equal one in short term rates, a change of 0.01 % in long term rates being equivalent to one of 0.035 % in short term rates. Possibly this may be interpreted by saying that changes in short-term rates are believed to be temporary and expected, in the long run, to be reduced to about 30 % (1/3.5) of their average annual value; "in the long run" meaning as far as bankers are in the habit of looking ahead.

V 5. THE DEMAND FOR DEPOSITS

Total amount of deposits minus cash held by banks has been compared with an index of total value of production, $U' + V' + K^e$, and the short term and long term rates of interest, m^s and m^L. A fairly good explanation, without lag, can be obtained (cf. graph V 5) by the formula:

(V 5) $$M'' - M''^b = 0.18\,(U' + V' + K^e) - 4.7\,m^s - 33\,m^L$$



V 5. "Explanation" of the public's demand for deposits.

It would follow that the elasticity of demand for this type of money is $-4.7\ (2.9/506) = -0.027$ with respect to the short-term and $-33\ (2.9/506) = -0.19$ with respect to the long-term rate of interest, the total of which is some 2 to 4 times as high as the figures found for coin held by the public and for cash held by banks respectively, but still rather low and decidedly inelastic.

Residuals obtained in banking correlations. Some more attention may now be given to the residuals obtained in the "explanation" of banking figures (relations V 1, 2, 3, 4, 5). If these are chiefly due to the changing degree of completeness of the figures — depending on amalgamations, etc. — they must be similar in the various cases. In fact, the residuals for cases V 2 and V 5, where absolute banking figures are used, are large and they show a high correlation. Relations V 1 and V 4 are of another type: here ratios between two banking items are the series to be explained. These ratios are probably not so much affected by the incompleteness of the statistics. Their residuals are, in fact, of another time shape; but hardly less unsatisfactory. Evidently the banking figures are a very weak spot in the whole system.

V 6. THE SUPPLY OF MONEY: THE PRICE FIXATION EQUATION FOR THE SHORT-TERM INTEREST RATE, m^s

(i) *Theoretical.* The short-term interest rate is represented, in our system, by the Bank of England rate. Its annual figures show very little difference with regard to market rate; it is only for shorter intervals that important deviations occur.

The theory used distinguishes three groups of forces that determine m^s:

(*a*) The situation of the B.o.E., represented by the "free gold stock" $Au' = Au$ (gold stock) $- M'$ (notes in circulation) $+ C^F$ (fiduciary circulation), the movements of which run almost parallel to those of Au.

(*b*) The situation of the commercial banks, which may be characterised by the amount available for additional credits $R^b = 0.9\ M''$ (deposits) $- B^s$ (discounts + advances), the factor 0.9 being the result of deducting 10 % of deposits which are to be considered as a liquid reserve.

(*c*) The situation abroad, represented by the total Au^w of French, German and American gold stocks and the tendencies of the balance of payments as indicated by the short fluctuations in capital exports K^e.

This latter variable has been introduced on the following considerations. The purpose of discount policy was to defend the gold stock and, more generally, the position of sterling. Statistics clearly show that gold reserve alone can only very imperfectly explain the year to year fluctuations in m^s, even if account is taken of Mr Hawtrey's inference that [1]) after 1896 "a new standard of reserve requirements had come into vogue. Up to 1890 a fall of the reserve to £ 10.000.000 or thereabouts had been the normal signal for a high Bank rate. After 1896 the critical point

[1]) Loc. cit. p. 112.

was somewhere about £ 20.000.000." Mr HAWTREY also points to this fact when saying [1]) that the reserve or the reserve in the near future was the governing factor. It is not sufficient, however, to introduce a lead in gold reserves. Even then the correlation would be poor. It must be assumed that also movements in the rate of exchange within the gold points influenced the decisions of the B.o.E. Since annual averages of exchange rates are not available statistically, an indirect way of measuring them has been used. Such movements may primarily have been caused by the most fluctuating items in the balance of payments and those showing the smallest elasticity with respect to exchange rates. Capital export seems to be the outstanding item in this respect.

(ii) *Statistical.* The results of some calculations are given in table V 6. It will be seen that the correlation obtained with Au' as the only explanatory series is poor. The supplementary series mentioned at (*c*) seems to be significant. It is remarkable that in none of the calculations the series R^b gets any perceptible influence. This would mean that the position of the Gentral Bank practically determines the short rate of interest and that an independent influence of commercial banks does not exist.

TABLE V 6

Nr.	Period ↓	Regression coefficients for:				R
	Variable →	Au'	Au^w	R^b	K^e	
	Stand. dev. →	2.78	9.4	14.5	17.6	
1	2	3	4	5	6	7
1	1875–1910	–0.131	–0.023			0.655
2	1875–1910	–0.121		–0.005		0.58
3	1875–1910	–0.135	–0.023	–0.001		0.67
4	1875–1910	–0.129	–0.013		0.017	0.78
5	1875–1910	–0.128	–0.014	–0.000	0.017	0.79

The formula chosen is:

(V 6) $$m^s = -\,0.129\ Au' - 0.013\ Au^w + 0.017\ K^e$$

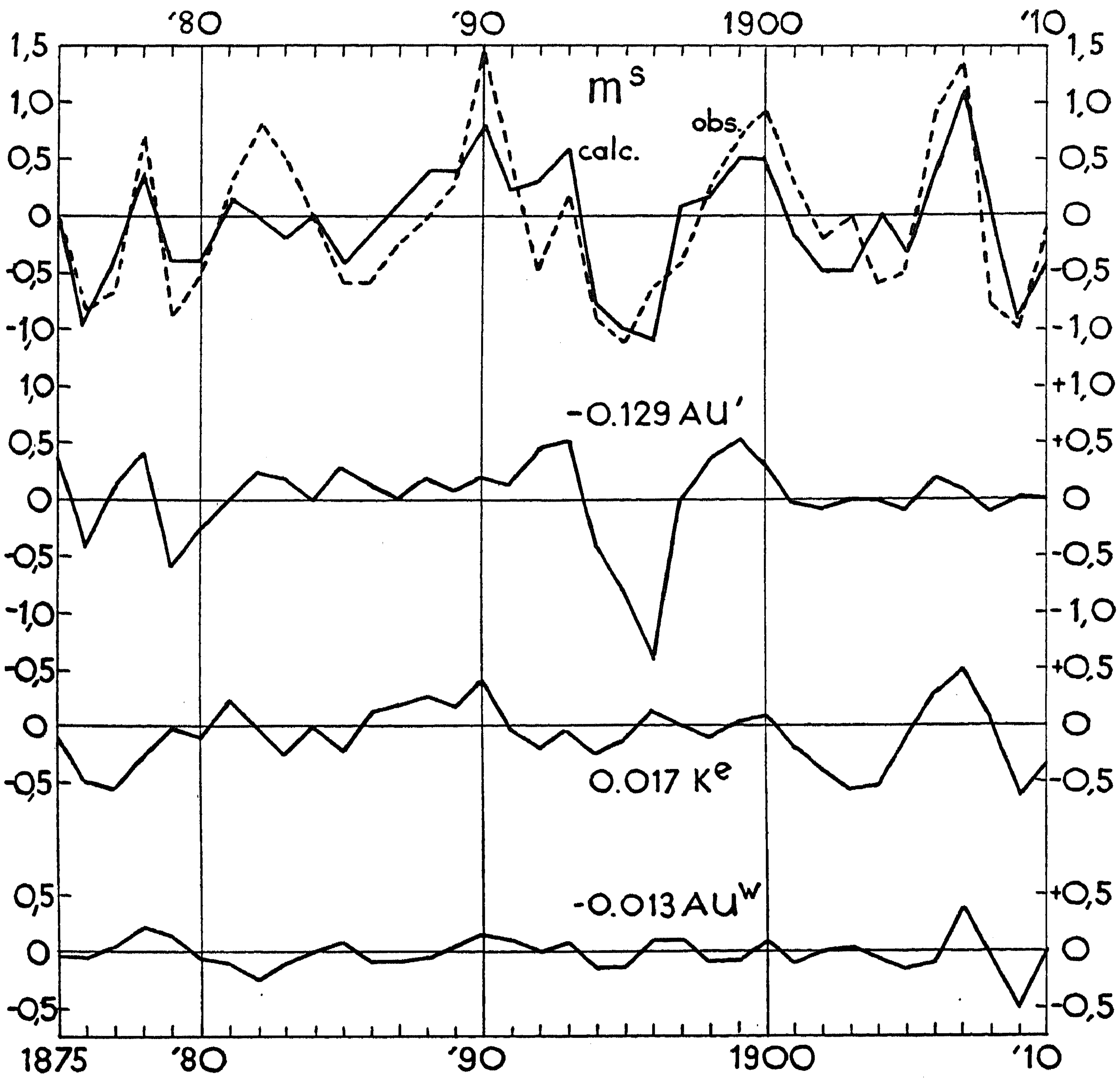
The elasticity (or rather, the inverted flexibility of the interest rate with respect to note circulation) may now be calculated in the following way. An increase by 1 million £ in M' (notes), meaning an equal decrease in Au', gives an increase by 0.13 % in m^s, corresponding to an elasticity of 1.2. Hence, whereas the demand for money was found to be highly inelastic, the *supply appears to be fairly elastic* [2]).

(iii) *Comparison with other countries.* Differences with regard to the post-war system of the U.S.A. [3]) are:

[1]) Loc. cit. p. 40.

[2]) Cf., however, the general remark to be made on the meaning of the concept of elasticity in this case, in chapter VII, section 2.

[3]) Business Cycles in the U.S.A., 1919–1932, chapter IV.



V 6. "Explanation" of fluctuations in short term interest rate.

(*a*) in the U.S. there is a rigid relation between the amount of deposits M'' and the situation of the central banks, which does not exist in the United Kingdom;

(*b*) the elasticity of supply is found to be 0.29 for notes and 1.3 for deposits [1]).

(iv) *Some attempts to arrive at other approaches.* Some interesting difficulties arose when an attempt was made to establish other formulae which, although they led to negative results for our investigation, may be communicated as school examples of some of the dangers involved in correlation analysis.

This attempt started with the assumption that, apart from the two "interior" factors (*a*) and (*b*) mentioned above (cf. (i)), an influence had to be assumed by the "tension" between foreign and home rates of interest $m^{sw} - m^s$ or of foreign rates m^{sw}, leading to a formula:

(V 6 3 1) $$m^s = -\mu_1 Au' - \mu_2 R^b + \mu_3(m^{sw} - m^s)$$

or, which comes to the same thing, a formula

[1]) Business Cycles in the U.S.A., p. 82—88, by means of which these figures may be calculated.

(V 6 3 2) $$m^s = -\mu'_1 Au' - \mu'_2 R^b + \mu'_3 m^{sw}$$

Indeed, (V 6 3 1) reduces to (V 6 3 2) if

$$\mu'_1 = \frac{\mu_1}{1 + \mu_3},\ \mu'_2 = \frac{\mu_2}{1 + \mu_3},$$

or, inversely, (V 6 3 2) reduces to (V 6 3 1) if

$$\mu_1 = \frac{\mu'_1}{1 - \mu'_3},\ \text{etc.}$$

Both formulae were taken as a basis for a correlation analysis and yielded considerably higher correlation coefficients than the formula without a third explanatory variable. However, μ_3 was found to be negative and even -1, which has no economic meaning and even leads to a formula without m^s altogether, whereas μ'_3 was found to be exactly $+1$, which, in the case of a complete parallelism between m^s and m^{sw} (the hypothesis we need for making our system a quasi-closed one, cf. chapter VIII) would again eliminate m^s altogether.

Another interpretation of (V 6 3 2) was tried by assuming that the first two terms represented some "theoretical" interest rate m^{sT} and that the correction for exterior influences has to take the form:

$$\mu'_3(m^{sw} - m^{sT})$$

leading to a formula:

$$m^s = m^{sT} + \mu'_3(m^{sw} - m^{sT})$$

$$m^s = (1 - \mu'_3)m^{sT} + \mu'_3 m^{sw}$$

or where $(1 - \mu'_3)m^{sT}$ stands for $-\mu'_1 Au' - \mu'_2 R^b$.

But this interpretation fails too since the value found, $\mu'_3 = 1$, makes $1 - \mu'_3 = 0$, meaning that a term with m^{sT} is excluded.

The most reasonable interpretation of equation (V 6 3 2) seems to be that it "explains" m^{sw} in terms of m^s, which, for the period of the hegomony of the London money market seems nearer to the real causal connections than an interpretation the other way about.

C. THE PUBLIC'S DEMAND FOR BONDS AND SHARES

V 7. THE SHARE PRICE EQUATION

(i) *Theoretical* [1]). Assuming joint demand for bonds and shares, the demand equation for shares will be:

$$C = \Gamma_1 A + \Gamma_2 n - \Gamma_3 m^L + \Gamma_4 Z + \Gamma_5 \dot{n}$$

where C is the nominal value of all shares held (deviations from 9-year moving average);

$\overline{\overline{A}}$ is the total market value of all shares and bonds in the hands of the public: $\overline{\overline{A}} = \alpha_1 \overline{\overline{n}}\, \overline{\overline{C}} + (\alpha_2/\overline{\overline{m}}^L)\ \overline{\overline{B}}^p$ ($\overline{\overline{B}}^p$ nominal value of all bonds held

[1]) For a fuller treatment of this theory cf. J. TINBERGEN, Business Cycles in the U.S.A., 1919—1932, League of Nations, Geneva 1939, and J. TINBERGEN, The Dynamics of Share Price Formation, Review of Economic Statistics, XXI (1939), p. 153. Cf. also: O. DONNER, Bestimmingsgründe der Aktienkurse, Vierteljahrshefte zur Konjunkturforschung, Sonderheft 36, Berlin 1934.

by the public, a_1 and a_2 figures depending on the units of measurement);

n is the share price index;

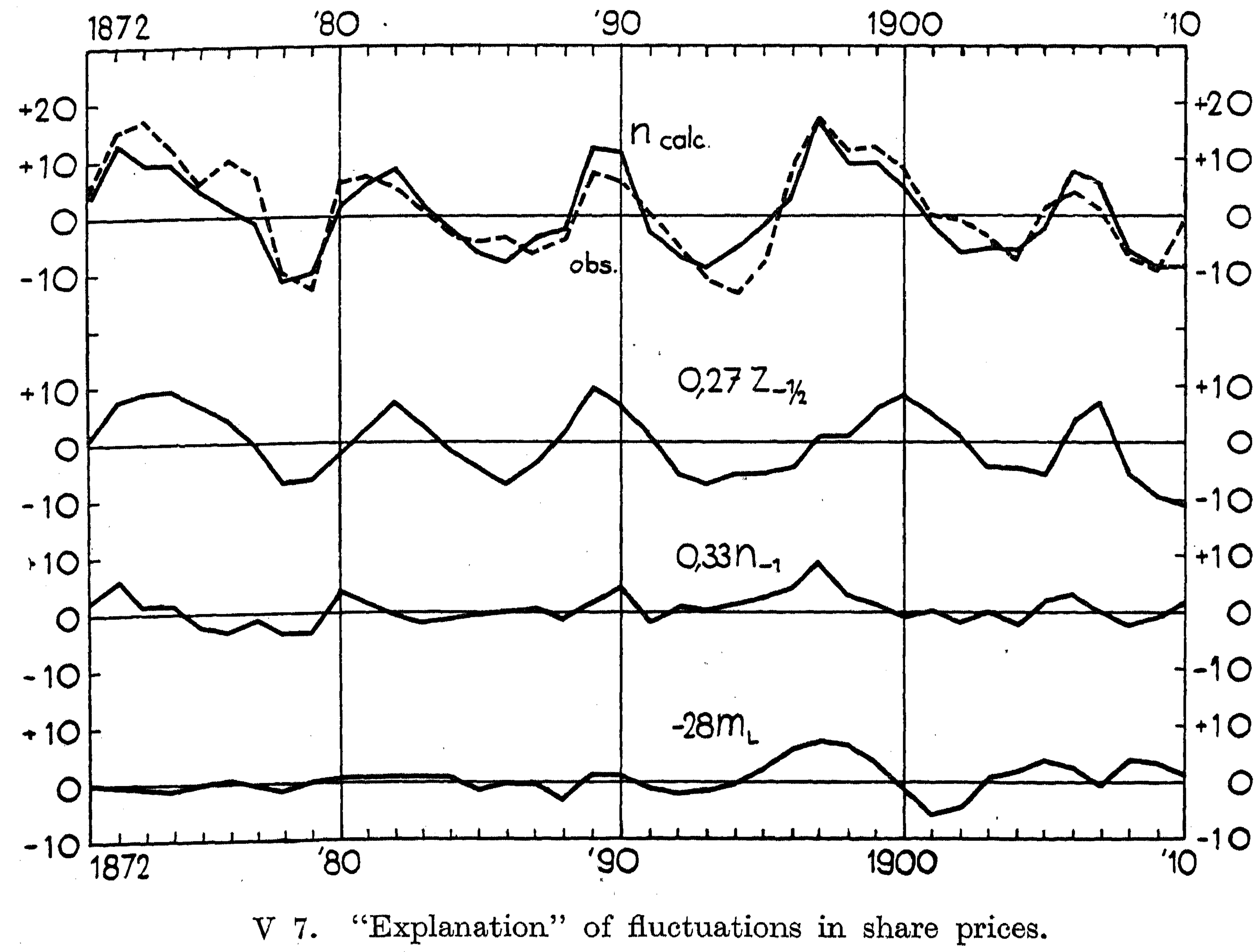
m^L the long-term interest rate, and

Z non-workers' income.

The role of A is to be compared with that of income in the demand equations for common goods. The variables $\bar{\bar{n}}$ and $\bar{\bar{m}}^{L-1}$ are the prices of the two "commodities", whereas Z (representing profits) and $\dot{n}$ (rate of increase in share price index) are two factors indicating the attractiveness of shares, which is variable; Z represents the attractiveness to the investor, $\dot{n}$ the attractiveness to the speculator. As an indicator of the attractiveness to "speculation" in bonds, $\dot{m}^L$ might equally have been included, but it was found to be unimportant, Substituting for $\bar{\bar{A}}$ its value, we get a relation between C, B^p, n, m^L, Z and $\dot{n}$. Here C and B^v are only trends and are therefore not to be separated; in addition they are not very interesting in view of our cyclical analysis.

This leads to an equation containing only n, m^L, d and $\dot{n}$, which may be considered as an equation telling in what way share prices are, in the short run, related to bond yield.

(ii) *Statistical.* Lags were introduced for Z and $\dot{n}$; they have been chosen so as to give the best fit and do seem reasonable. The lag in the influence of Z — found to be half a year — must be understood as a lag in the availability of information concerning the financial situation of



V 7. "Explanation" of fluctuations in share prices.

concerns [1]). That in the influence of $\dot{n}$ is a combination of two lags. First shares must be observed a certain time before a rise or a fall can be stated with some degree of certainty — irregular and even perhaps seasonal fluctuations disturbing, to some extent, the impression. And secondly there may still be a certain psychological lag. The views about a share must spread before the public is aware of it.

The following results were obtained.:

$$\begin{array}{llllll} \text{(V 7)} & 1871\text{—}1910 & n = (0.27 \pm 0.03)Z_{-\frac{1}{2}} & + (0.33 \pm 0.10)\dot{n}_{-1} & - (28 \pm 10)m^L \\ & 1871\text{—}1895 & n = 0.33\ Z_{-\frac{1}{2}} & + 0.21\ \dot{n}_{-1} & + \ 3\ m^L \\ & 1896\text{—}1910 & \dot{n} = 0.19\ Z_{-\frac{1}{2}} & + 0.53\ \dot{n}_{-1} & - 15\ m^L \end{array}$$

It will be seen that the sign for m^L in the first period cannot be accepted; it is just on the margin of what the standard error would suggest as possible. The other coefficients are all within $3 \times$ the standard error found for the whole period. The coefficient for m^L in the first formula is satisfactory in so far as it corresponds with what proportionality between $\overline{\overline{n}}$ and $1/\overline{\overline{m}}^L$ would require. The coefficient 0.33 points to a moderately speculative attitude. In graph V 7 it may be seen that the 1894—1897 boom is partly to be attributed to the fall in m^L, partly, however, to the term with $\dot{n}$.

(iii) *Factors rejected.* 1. Instead of $\dot{n}$, $\dot{n}'$ has been tried, which equals $\dot{n}$ for $\dot{n} > 0$ and equals 0 for $\dot{n} < 0$. This would be reasonable if bullishness should occur more frequently than bearishness, as was found to be the case in the United States after the war. However, no appreciable improvement of the correlation was obtained; and since $\dot{n}$ is a simpler concept from the mathematical viewpoint, it was retained.

2. A comparison with the chief foreign shares which could be thought of as competitive, viz. Amercian railway shares, showed that none of the characteristic deviations, which in our explanation are ascribed to the speculative term, can be explained by the movements in those shares.

(iv) *International comparison.* Table V 7, 3 compares the results obtained for various countries and periods as given in the article quoted above. The units are chosen according to the principle indicated in the title.

The most striking difference between the various countries appears to be the regression coefficient obtained for $\dot{n}$, i.e. the speculation intensity as far as it is based upon the rate of increase of the share price index itself. The maximum coefficient was found for the United States 1919—1932; the next important coefficients were those for the United Kingdom and Belgium in pre-war years. Anyhow, the coefficient found seems to be reasonable.

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[2]) Cf. DONNER, loc. cit., who finds that between 1870 and 1888 share prices depended on dividends earned half a year or three quarters of a year before, whereas after 1888 they depended on dividends at the moment of earning. In our case a calculation with Z unlagged showed less good results; this may be due to the uncertainty in the timing of Z (cf. section I·2).

TABLE V 7 3

The Explanation of Share-Price Fluctuations by Dividends, Long-Term Interest Rates and the Rate of Increase in Share Prices, Lagged: Summary of Regression Coefficients Obtained

(Units: share prices, average over period studied = 100; dividends in per cent of nominal capital; long-term interest rate in per cent; rate of increase in share prices, same unit as corresponding share price index. No trend eliminations have been performed, except where the contrary is stated. Dividends are taken at moment of earning, not at moment of declaration or distribution).

Country	Period	Regression Coefficients [1])			Ratio of Regr. Coeff. [1]) to Values Required by "Simple Static Law"		Observations
		Divi-dends (d)	Interest rate (m_{Lb})	Rate of increase in share prices [2]) ($\dot{n}$)	Divi-dends	Interest rate	
United States	1919—1932	*14*	*22*	2.50 (½)	*0.91*	*0.91*	Curvilinear infl. of $\dot{n}$
United States [3])	1872—1895	25	—19	0.43 (¼)	0.54	1.00	[4])
United States [3])	1895—1914	20	—36	0.36 (¼)	0.64	1.52	
United Kingdom	1871—1910	[5])	—25	0.33 (1)	[5])	0.72	Deviations from 9 yr. mov. averages for all series
Germany	1870—1913	7.4	—32	—0.04 (½)	0.63	1.22	
Belgium	1870—1894	[6])	— 9	0.22 (½)	*0.30*	*0.30*	Trend term included since dividend figures are money amounts.
Belgium	1895—1912	[6])	—14	0.51 (½)	*0.43*	*0.43*	
Netherlands.	1922—1937	19	—26	—0.11 (½)	0.74	0.77	Correlation only 0.95
Netherlands.	1922—1937	16	— 4	....	0.64	0.13	Correlation 0.98 [7])
Netherlands.	1922—1937	*17*	*—21*	....	*0.71*	*0.71*	Correlation 0.97 [7])
Neth. East Indies	1922—1937	4.7	—29	—0.21 (1)	0.61	0.82	Correlation only 0.93
Neth. East Indies	1922—1937	8.4	—30	—0.49 (½)	1.05	1.02	Correlation 0.98 [8])
Neth. East Indies	1922—1937	9.8	—30	—0.17 (1)	1.22	1.00	Correlation 0.98 [8])

[1]) Cases where the coefficients for dividends and interest rates have been given an *a priori* ratio are printed in italics.

[2]) Lags applied are in parentheses (in years); they are the lags giving the best correlations, estimated graphically.

[3]) Railway shares only.

[4]) I.e., the influence is assumed to be zero for values of the rate of increase in prices under 20 and linear for higher values.

[5]) Since dividend figures are not available, profit, figures were taken which cannot be expressed as a percentage of capital; in addition they also contain interest payments which do not affect their cyclical variations, but do affect their level.

[6]) Dividends not given as a percentage of capital, but in money amounts.

[7]) Difference between American and Dutch share price index numbers included as additional variable; i.e., the correlation calculations have been made with the American index as an additional variable (and the charts have been drawn correspondingly), but afterwards the formula was transformed to one where the difference just quoted appeared as additional variable. In symbols: $n = v_1 d + v_2 m + v_3 \dot{n} + v_4 n_{USA}$ was transcribed into $(1 - v_4)n = v_1 d + v_2 m = v_3 \dot{n} + v_4(n_{USA} - n)$.

[8]) Difference between Dutch and N.E. Indies share price index numbers included as additional variable, cf. note 8.