



BULGARIAN NATIONAL BANK

Monetary Sector Modeling in Bulgaria, 1913 – 1945

Nikolay Nenovsky
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SUMMARY. THIS STUDY TRACES SOME FACTS OF BNB HISTORY, RESTORES MONETARY AGGREGATES, MONEY SUPPLY AND DEMAND DYNAMICS, MONEY VELOCITY AND INFLATION SOURCES. ECONOMETRIC PROCESSING OF RESTORED TIME SERIES MAKE IT POSSIBLE TO CHECK SOME MAJOR THESES: THAT INFLATION IS A MONETARY PHENOMENON PROMPTED BY DEFICITS AND QUASI-DEFICITS IN THE ECONOMY CAUSED BY GOVERNMENT BUDGET AND BALANCE OF PAYMENTS IMBALANCES; THAT DEMAND FOR MONEY IS INSENSITIVE TO INTEREST RATE CHANGES; THAT NOMINAL INCOME DYNAMICS FOLLOWS CLOSELY MONEY STOCK GROWTH, I.E. THE TRANSACTION MOTIVE IN MONEY DEMAND IS DECISIVE. WITHIN THE FRAMEWORK OF EMPIRICAL TESTING IMPULSE DIRECTION AND EFFECTS ARE STUDIED: FROM REAL ECONOMY TO MONETARY AGGREGATES (REAL BUSINESS CYCLE THEORY) AND VICE VERSA (MONETARY BUSINESS CYCLE THEORY). VAR MODELS AND GRANGER – SIMS CAUSALITY TESTS ARE USED.

KEYWORDS: Monetary history, Bulgaria, monetary regimes, economic modeling

Objects and Structure of the Study

In his preface to Stoyan Bochev's book *Capitalism in Bulgaria* (1998), which is in essence a separate piece of research, Roumen Avramov restores the tradition of modern analysis of Bulgarian monetary policy in the country's first half-century of contemporary sovereignty. The parallels with Bulgaria's new monetary history fifty years later are unequivocal.

The *objects* of our study are rather limited and may be viewed as footnotes to the study of monetary history between 1913 and 1945. This involves modeling of monetary relationships in Bulgaria and drawing some theoretical conclusions. The monetary history of the selected period is examined in the light of modern economic concepts and quantitative techniques. Within the framework of the present analysis, an attempt is made at restoring monetary statistics and constructing time series of monetary aggregates and other major macroeconomic indicators, to be used in future studies.

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This study is dedicated to the 120th anniversary of the BNB. We are indebted to Roumen Avramov who reviewed an earlier draft of the study, corrected most of our errors and inaccuracies and gave us some valuable ideas. Kalin Hristov provided additional help.

The postulate of the constitutional subordination of Bulgarian National Bank monetary policy to the state, and in particular to the budget (and hence the excuse for all monetary disasters in Bulgaria during the reviewed period) has been extensively expounded: D. Yordanov (1910), H. Chakalov (1920), S. Bochev (1924), A. Hristoforov (1946), R. Avramov (1995, 1998). We accept this as a working hypothesis and reduce it to the following underlying proposition: inflation and lev devaluation over the period under review are of purely monetary nature. Currency issue is caused in its turn by deficits and quasi-deficits in the government budget and the balance of payments which in their turn are impacted by real sector developments.

The other hypothesis we test empirically is that money dynamics is contingent on real sector development and that any manipulation of money, whatever the motivation for it, has a destabilizing effect.

The study is *organized in the following manner*: in the *first part* we investigate the historical, legislative and operational framework for BNB operations from its foundation to the end of 1945. We focus on money supply dynamics. Due to a lack of statistical data, 1946: the last year of *de jure* BNB independence is not captured. (*De facto* BNB policy was completely subordinated to governmental policy much earlier.)

In the context of these specific historical developments, in the *first part* we place a particular focus on the BNB as a lender to government. The relationship between the two institutions is marked by inequality throughout the period under review, taking the form of unscrupulous direct budget deficit financing, triggering money supply instability and hence inflation.

The *second part* reveals the sources and statistical methodology used in the construction of time series for reserve money and broad money, accompanied by brief explanations of a methodological and functional nature. An analysis of the factors that have caused the observed changes is included.

The *third part* is devoted to modeling money supply and demand, inflation and its sources. Money multiplier (and its components) and money velocity are calculated and their trends outlined.

The *fourth part* presents an empirical testing of the 'monetary – real' causality for the 1913 – 1945. An analysis based on VAR models (vector autoregressions) and the Granger – Sims causality tests examines the two extreme hypotheses: that shocks spread from money to the real economy (Friedman, M., A. Schwartz, 1963; Sims, Ch., 1972), or that

money follows real economy development (the real business cycle theory, King, R., Ch. Plosser, 1984; Romer, Ch., D. Romer, 1989). Such tests using Bulgarian historical data are carried out for the first time and they shed new light on the long-standing discussion on the role of money in the economy.

I. An Overview of Developments in the National Economy and Money Supply

Major *criteria* adopted in the periodization of monetary sector development in Bulgaria are changes in the institutional and macroeconomic frameworks. The first reflects modifications of contemporary laws on the BNB or the passage of new ones under the impact of political changes in Bulgaria, and the implementation of different stabilization programs. The second reflects the effects of a number of external and internal economic factors.

1879 – 1885

The Bulgarian National Bank was established on 25 January 1879 with the approval of its Articles of Association by the Knyaz Dondukov-Korsakov. According to the motives listed in the accompanying note (*BNB Jubilee Collection, 1879 – 1929, 1929*), the Bank was designed as an establishment to meet credit needs for the promotion of trade development. In short, during this period the BNB performed the *functions of a pure commercial bank*. It raised resources through deposits and placed its funds by lending to agricultural savings associations and municipalities or by discounting bills of exchange. The Bulgarian government allocated funds for its capital formation and the opening deposit base. Until 1885 the Bank was not capable of performing large-scale operations.

One of the peculiarities of this period is the fact that the BNB was not an issuing bank. Under a law adopted in 1880 (*the Law on the Minting Rights in the Principality*), issue was entrusted to the government. The monopolization of seigniorage is understandable given the monetary needs of the newly emerged state. However, despite the Law, evidence shows that the desired results were difficult to achieve. For instance in 1882 a mere 2.1 million nickel coins were minted, and 20 million silver leva in total for 1884 and 1885 (*Statistical Yearbook of the Bulgarian Kingdom, 1909*). At the same time, Turkish, Romanian and Russian silver coins were in circulation. The reason for the lack of ho-

mogenous circulation in the country until 1885 was inconsistent government policy (including legislation). This policy allowed the exchange of Russian silver roubles for levs at a higher rate than that in neighboring countries which boosted their import and demand for them in the country (*120 Years BNB, 1879 – 1999*).

As statistical data on money supply for this period is not representative enough, it cannot serve the purposes of our research.

1886 – 1912

From early 1884 to late 1887, after legislative intervention (*120 Years BNB, 1879 – 1999*), all foreign coins were withdrawn from circulation. This created a lev monopoly as legal tender and laid a basis for its strengthening.

In parallel with this act in 1885 a new establishment instrument on the BNB was adopted (*The Law on BNB Establishment*). Pursuant to this the Bank was granted the privilege of issuing banknotes against the obligation to maintain a 33.3 percent gold cover for banknote issue. In addition, the law provided for extended BNB commercial operations – another step seeking to enhance Bank role in national economic life.

Other implications of the amended law involved the clear statement on relationship with the government whereby BNB exposure was delimited (through a clause in an additionally created constituent Articles of Association) to 20% of paid-up capital.

During the review period primary source of funds for BNB operations were deposits and current accounts. The high cost of these funds, combined with the necessity of increasing BNB contribution to the budget and relatively higher silver reserves required particular steps to strengthen the credibility of gold-backed banknotes as legal tender. To this end, the law was amended in 1891 to authorize the BNB to issue silver banknotes backed at 33.3% of face value. The Bank was obliged to convert the two types of banknotes against reserve metals upon demand. Despite its legally mandated power, the BNB made use of the right to issue silver-backed banknotes only as late as 1899. The main reason for the enforced issue of silver-backed banknotes were the dire straits of public finance¹ due to poor agricultural crops, current account deficits in the balance of payments and depletion of Bank gold reserves

¹ Unfortunately, because of the practice (applied till late 1902) of reporting the obligations of the government together with claims on current accounts and on private persons in the BNB accounting balance sheet (D. Yordanov, 1910), it is not possible to measure the latter claims and hence assess the role of government debt as a source of currency issue growth.

(120 Years BNB, 1879 – 1999). At the same time convertibility into gold was discontinued and gold-backed banknotes were to be converted into silver plus the relevant *agio* at the prevailing daily exchange rate (120 Years BNB, 1879 – 1999).

In 1902, due to good agricultural crops and receipt of external loans, some stabilization was achieved and *agio* (premium above official rate) dropped to its normal level.

The period between 1903 and 1912 is characterized by rapid economic growth. Trade balance was positive until 1909, the lev exchange rate was stable and agricultural crops were good. This helped enhance the country's credibility and in 1909 Bulgaria received its first external loan without any special guarantee. Part of this was used to repay government outstanding obligations to the BNB. During this period banknotes came to be viewed as a reliable means of payment. Deposits with the BNB, the Bulgarian Agricultural Bank and the Postal Savings Bank (major institutions in which the public's savings were concentrated) gradually increased. BNB efforts to make banknotes the primary source of funds succeeded. This marked the beginning of a long process of transforming the BNB into a typical issuing bank. The beginning was set in 1906 with the adoption of the new Law on the BNB.

Over the period until 1912 money in a broad sense, in the form of deposits, did not typically enjoy public credibility. Economic agents preferred coins and storage of savings. This conclusion is backed by a number of special studies (*D. Yordanov. Bank Review, 1910*). The lack of credibility in paper money is also associated with the bitter experience of constantly devaluating *kaymeta* (paper banknotes issued by the Ottoman government and in circulation from 1839/1840 to 1862 (*Eldem, 1999*)).

It is notable that the role of money as a means of payment and a store of value was limited. There are several reasons for this. Firstly, public living standards and savings were low. Secondly, the public still mistrusted the newly established banks and resisted entrusting its savings to them. In these conditions, it was common practice with Bulgarians to keep their temporary cash surpluses at home, only more educated individuals preferring to delegate this to someone else.

1913 – 1922

With Bulgaria's involvement in the wars economic conditions began gradually deteriorating. Agricultural output declined continuously, trade balance was negative from 1909 to 1921 (except for the 1915 –

1917 period due to military supplies to Germany which were not paid for, however), government obligations to the BNB grew rapidly, inflation accelerated and the lev devalued. The growing government budget deficit was entirely financed through banknote issue and consequently currency in circulation grew immensely. The ratio of banknote gold cover decreased dramatically (*Bochev, S., 1998*). Nevertheless, purely formally the provisions of the Law on the BNB were observed inasmuch as at the insistence of BNB management Bank's foreign receivables under military advances to Germany were reported as gold reserves.

1923 – 1928

During this short period economic conditions in Bulgaria gradually improved. Growth of government debt to the BNB and banknote issue were legally constrained (a Law on Limiting the Issue of Banknotes was adopted under pressure from the Inter-Allied Commission in 1922), inflation dropped gradually, agricultural crops improved, but trade balance stayed negative. The exchange rate stabilized thanks to the introduction of a full BNB monopoly on trade in foreign instruments of payment in late 1923. National income increased, as did the country's credibility whereby Bulgaria was granted two external loans: the Refugee Loan (1926) and the Stabilization Loan (1928). Disbursed funds were used by the government to repay its debt to the BNB and to recapitalize the Bulgarian Agricultural Bank and the Bulgarian Central Cooperative Bank, aiming to stimulate lending by them. With the adoption of the 1928 Law on the Lev Stabilization and Coin Circulation the gold-exchange monetary standard was introduced, lev convertibility was almost completely restored and BNB monopoly on trade in foreign instruments of payment was abolished. High interest rates and the stable exchange rate helped rapidly attract short-term investment which shifted into the banking system.

1929 – 1939

Following national income growth in 1927 and stagnation in 1928, in late 1929 poor agricultural crops and dramatically increased imports caused the balance of payments deficit to hit critically high levels and BNB gold exchange reserves more than halved. As a result of credit expansion and the need for refinancing, discount lending by the BNB more than doubled. The credit portfolio of the Bulgarian Agricultural Bank (BAB) increased by 40% in a year. At the end of that year the

number of overdue credits increased dramatically, signaling a credit crunch (*BNB Annual Report, 1929*).

Crisis trends evolving in 1929 intensified in 1930 and 1931 in line with falling global prices, despite improved agricultural crops and higher exports. Imports contracted to less than half, contributing to a surplus on the balance of payments current account. However, this proved insufficient to offset the withdrawal of foreign capital investment by several private shareholder banks. Consequently BNB reserves dropped drastically. Despite dramatically reduced lending, overdue loans increased steadily. In response to these negative developments a new Law on the Trade in Foreign Instruments of Payment was passed, providing for rigorous import regulation.

Business cycle negative development continued until late 1935 when the lowest point was hit and the output index measured by its physical volume fell to 87 against a base of 100 in 1927. At the same time foreign trade came under severe constraints due to enforced principles of clearing exchange of goods. The next year, 1936, marked a turning point and the beginning of a period of recovery for the Bulgarian economy. This continued until 1939 when the upper limit of the business cycle was reached. During the entire period under review a sustained trend evolved toward concentration of Bulgarian exports to Germany at the expense of other traditional foreign trade partners. The current account continued to be regulated through internal compensatory premia and clearing.

In 1936 the ratio of the lev gold cover was reduced from 33.3% to 25% and the requirement to raise the interest rate when the cover fell below the legally prescribed limit was abolished. This *de facto* devaluation was aimed at severing the relationship between money supply and depleted reserves to meet enhanced demand resulting from economic recovery. Growth gradually slowed over the next few years and a decline occurred in 1940.

1940 – 1945

In a state of war, a sustained downward trend in national income began in 1941, its value index reaching the unprecedented 72.11 against a base of 100 in 1927. In parallel with this banknote issue grew rapidly from 1941. It was covered in the BNB balance sheet under the Foreign Claims item, recorded as Other Foreign Assets. This reflected surpluses on clearing accounts with Germany, financed by the government budget. The reported deficit was directly covered by currency is-

sue. After the war ended Bulgaria's claims remained outstanding and were ultimately forfeited under the 1947 Paris Peace Treaty.

Additionally, the government began issuing treasury bills from 1942. They were granted the status of legal tender. Thus accelerated currency issue proved to be the main reason for the steep inflation rise during the 1943 – 1945 period.

II. Statistical Data: Methodology and Sources

The data used in the study was collected after a comprehensive investigation and systematization of monetary statistical principles applied during the period under review. For the purpose, a number of official sources of information were used, including:

Statistical Yearbooks of the Kingdom of Bulgaria for 1909, 1930, 1940, from which the following data were derived: population, average exchange rate, trade balance, retail price index, agricultural produce, and deposits in the banking system (with the exception of those for 1927 – 1930 for which other sources were used).

Statistical Yearbook of the People's Republic of Bulgaria, 1943 – 1946, from which the following data were derived: deposits in the banking system, consumer price index, trade balance, population, and wheat crops.

BNB Annual Reports for 1927 – 1940. These reports were used to calculate deposits with the BNB, reserve money, government liabilities to the BNB, and deposits with commercial banks.

Asen Chakalov's monograph *National Income and Expenditure in Bulgaria, 1924 – 1945*, on real and nominal national incomes.

BNB Statements including data on the size of deposits and current creditor accounts of shareholder banks for the 1924 – 1929 period.

BNB Statistical Bulletin, 1939 – 1945, presenting data on banks' deposits for the period.

Jubilee Book of the Bulgarian Agricultural Bank, 1864 – 1928. The balance sheets published in it provided data on deposits for the 1912 – 1928 period.

In the process of data collection and analysis we discovered that it was impossible to construct one of the time series on the basis of a single source (for example the *Statistical Yearbook*) and we had to calculate the amount of deposits in the banking system for the 1927 – 1930 period by adding the balance sheet indicators of major deposit institutions – BNB, BAB, the Bulgarian Central Cooperative Bank (BCCB), the Postal Savings Bank and private shareholder banks. Internal settle-

ments (where data is available) were cleared to avoid double reporting. This allowed for the time series to be extended in scope and enabled us to carry out reliable econometric tests.

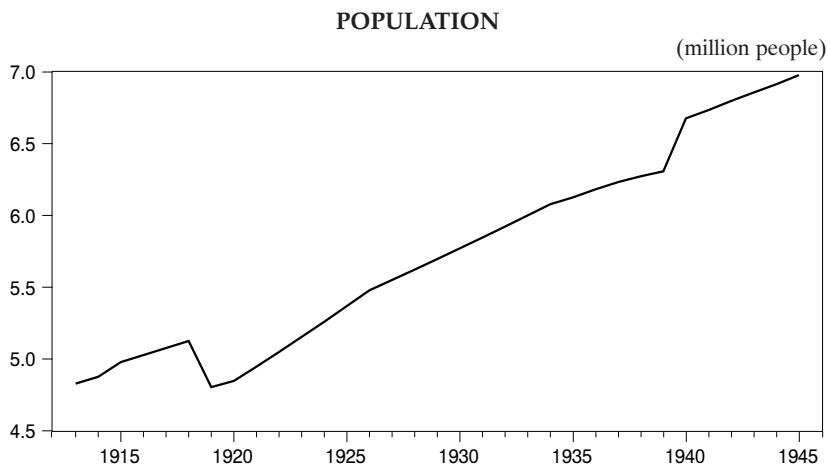
Due to changes in the country's land area and hence population, the figures for income and monetary aggregates were expressed *per capita*. This approach was introduced by Milton Friedman (*Friedman, M., 1959*).²

Real values of variables were obtained by deflating the nominal values by the retail price index against the 1913 base.

During the period under review *major macroeconomic indicators* exhibited the dynamics displayed in the charts below.

Population numbers reflect changes in the country's land area under the Treaty of Neuilly-sur-Seine and the Craiova Agreement of 1940.

Chart 1

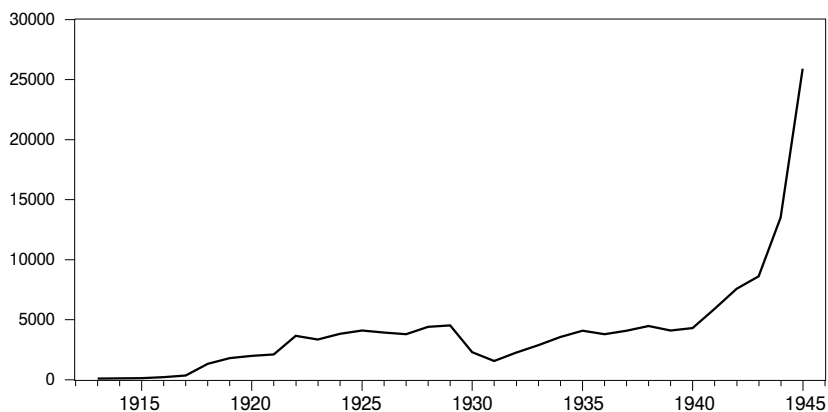


Data on the price index for the 1913 – 1922 period was taken from the *Statistical Yearbook, 1913 – 1924*, and relevant changes in the base were made to achieve compatibility. A similar procedure was applied in respect of data for 1923 – 1926 (*Statistical Yearbook, 1926*) and 1927 – 1945 (*Statistical Yearbook of the People's Republic of Bulgaria, 1946*).

² For more detail see Nenovsky, N., 1998, Chapter 2.

Chart 2

RETAIL PRICE INDEX (1913 = 100)

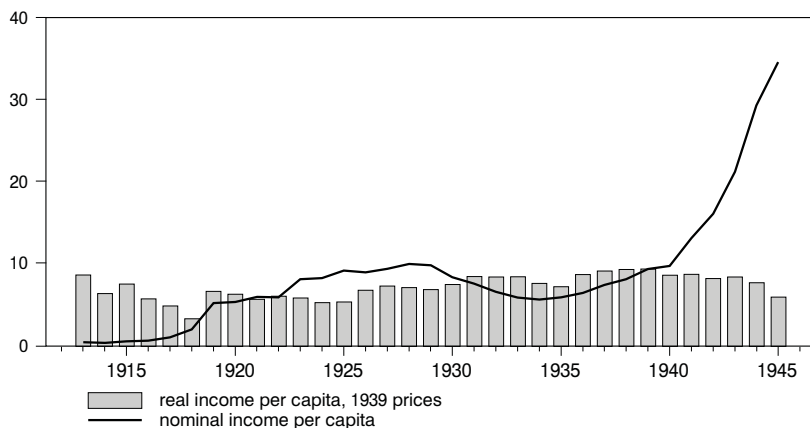


The nominal and real income figures for the 1913 – 1924 period are a rough estimate by the authors. They are approximated with physical agricultural produce and the general index of stock prices of agricultural products for the period. For the 1924 – 1945 period *A. Chakalov's (1946)* data was used.

Chart 3

REAL AND NOMINAL INCOME PER CAPITA

(thousand levs)

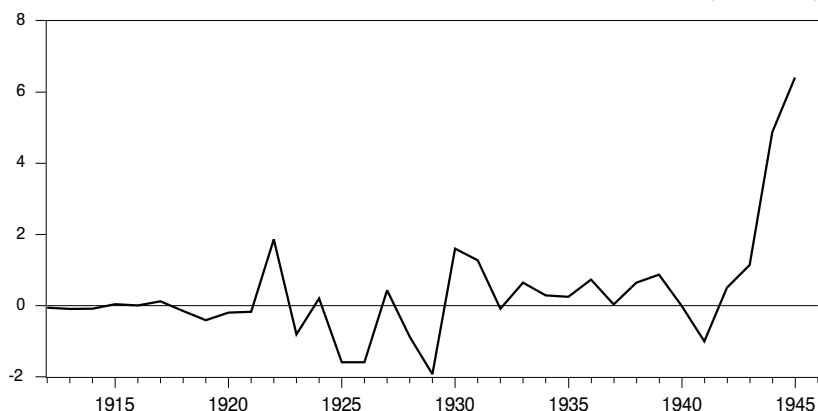


Trade balance data more or less follow agricultural produce dynamics as agricultural goods were the major items on Bulgaria's export list. It should be noted that in a number of cases the government intervened actively in foreign trade through administrative regulation of imports and exports. The continued orientation of exports to Germany and the lack of imports from that country led to the formation of a sustained positive clearing balance, particularly after 1942.

Chart 4

TRADE BALANCE DYNAMICS

(billion leva)



III. Modeling the 1913 – 1945 Monetary Dynamics

This part deals with modeling major monetary relationships: money supply and demand, multiplier and velocity of money, the relationship between money supply and nominal and real national income, the relationship between currency issue and inflation, the impact of government liabilities on inflation.

The study of the money market may be reduced to analysis of money supply and money demand, and gaps between them manifesting themselves as inflation.

Money Supply Dynamics

Money supply is both institutionally set (part of reserve money) and the result of economic agents' behavior: multiplier and part of reserve money sources (mainly BNB internal claims).

Reserve money per capita is calculated as a sum of the amount of issued banknotes and commercial banks' balances on current accounts with the BNB.

Chart 5

BANKNOTES PER CAPITA

(levs)

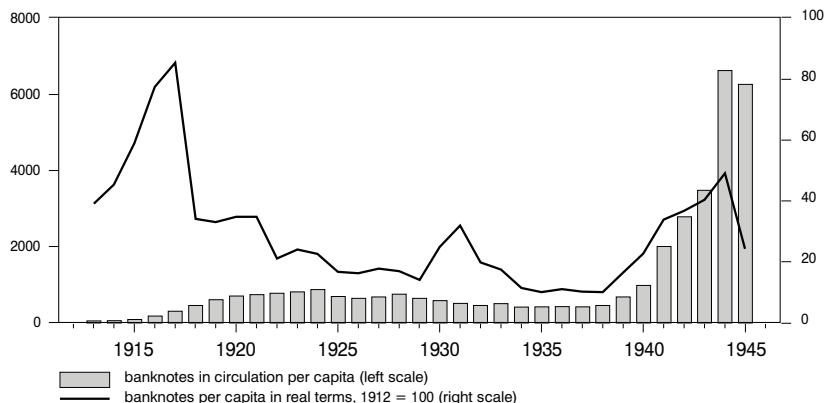
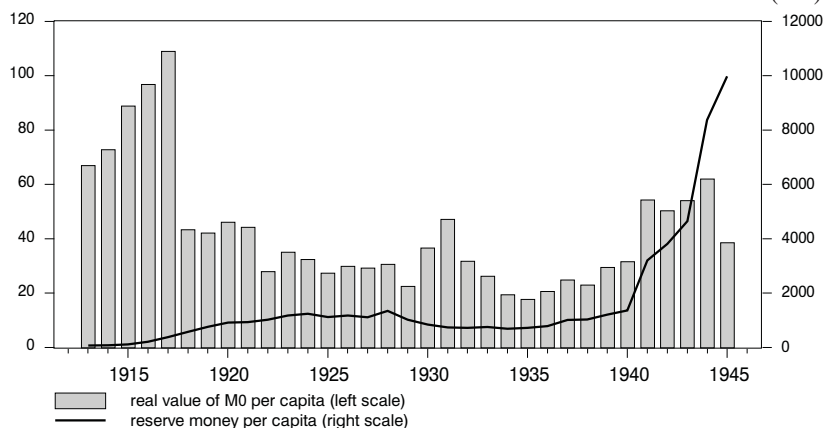


Chart 6

RESERVE MONEY PER CAPITA

(1912 = 100)

(levs)



Deposits (quasi-money) per capita reflected the propensity to savings in monetary instruments (e. g. deposits).

Chart 7

DEPOSITS PER CAPITA

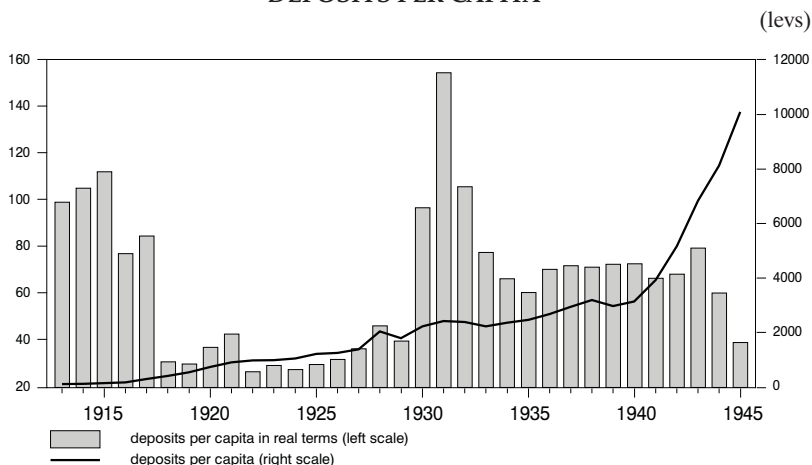
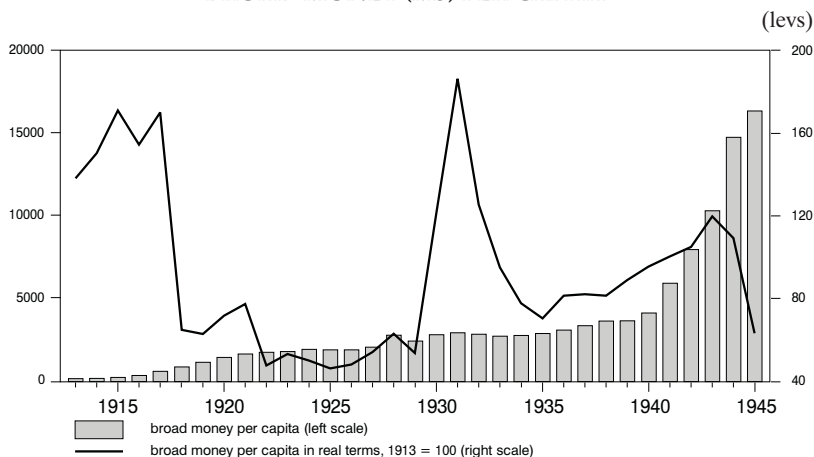


Chart 8

BROAD MONEY (M3) PER CAPITA



Broad money included banknotes in circulation, current accounts with the BNB and commercial banks (except for current accounts with the BNB), time and savings accounts and deposits of orphans with the Bulgarian Agricultural Bank, the Bulgarian Central Cooperative Bank, the Postal Savings Bank, private shareholders and popular banks (after 1927).

Deposits with the BNB consisted of the following balance sheet items: current and deposit accounts of the government, time deposits of the government, other current accounts, and other time deposits.

Data displayed on Chart 8 clearly indicates that in high inflation and deflation periods (at relatively stable nominal interest rates) the real value of currency dramatically changed. For instance, the real value of currency in circulation *per capita* declined drastically in the inflationary 1918 – 1920 period and increased between 1930 and 1932, a period of deflation.

Money Multiplier and Its Components

Money multiplier indicates economic agents' behavior and the stability of money multiplier plays a key role in macroeconomic developments.

In the period under analysis multiplier average value was 4.28, ranging between 2.4 and 5.7. Multiplier variance was 21%, measured through the standard deviation as a percentage of the average for the period (see the table on p. 24). Money multiplier behavior was unstable and cyclical. Impulses prompting changes in the money multiplier depended on shocks in the amount of banknotes in circulation which caused changes in the *currency in circulation/deposits* (C/D) ratio.³ Money supply shocks occurred as a result of deficit financing by currency issue. The review of money multiplier fluctuations indicates that they coincided with strong fluctuations in the banknote issue in the 1915 – 1920 and 1940 – 1945 periods.⁴

It would be reasonable to expect that between 1934 and 1936, when the entire financial system was caught in a debt crisis, economic agents would prefer to hold cash. However, this did not happen. Most probably this crisis was not characterized by runs on banks, turning into panic. This is confirmed by the behavior of the *banknotes in circulation/quasi-money* ratio displayed on Chart 10.

³ This ratio is a money multiplier component.

⁴ It is supposed that the values of money multiplier for 1913 – 1926 were undervalued due to lack of complete data on deposits for the entire national financial system. For instance, the sample did not cover deposits with popular banks between 1913 – 1926 which had a very small market share at the time. There was no data on private bank deposits in the 1915 – 1918 period. The share of private bank deposits is based on the assumption that the deposit indicator for private banks was 64.33% of state-owned banks, which was the average value in 1914 and 1919.

Chart 9

MONEY MULTIPLIER (Broad Money/Reserve Money)

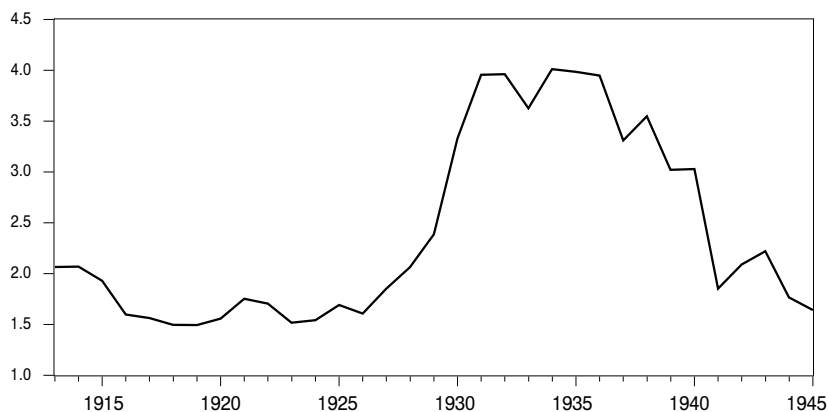
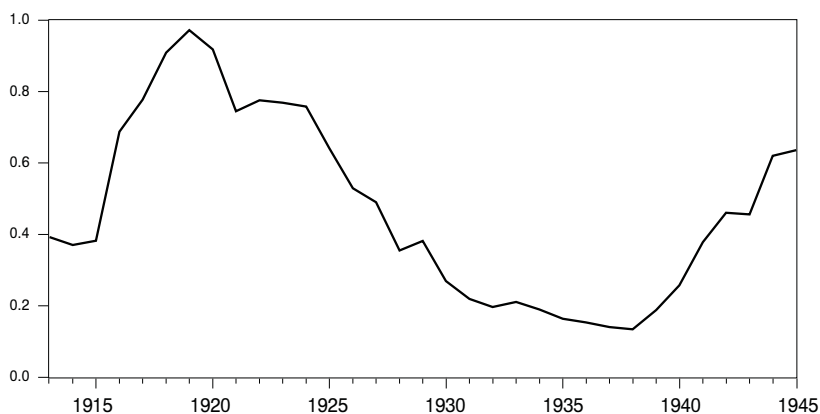


Chart 10

BANKNOTES IN CIRCULATION/QUASI-MONEY



The banknotes/quasi-money ratio reflects economic agents' preferences to use transaction and savings instruments. Theoretically, the lack of shocks in money supply help maintain this ratio stable. In the long run, it was influenced primarily by the evolution of financial mediation and development of new instruments. But data on the review period indicates quite the opposite: an absence of such stability due to excess banknote supply.

Money Supply and National Income

Per capita nominal national income growth displayed ‘strikingly’ similar dynamics to the growth of currency in circulation and broad money *per capita*. Harmonized movements of nominal income and monetary aggregates occurred in other countries as well. In support of this fact, it is reasonable to mention the study of Milton Friedman and Anna Schwartz on the US economy.

Chart 11

DYNAMICS OF CHANGES IN NOMINAL NATIONAL INCOME AND CHANGES IN CURRENCY IN CIRCULATION

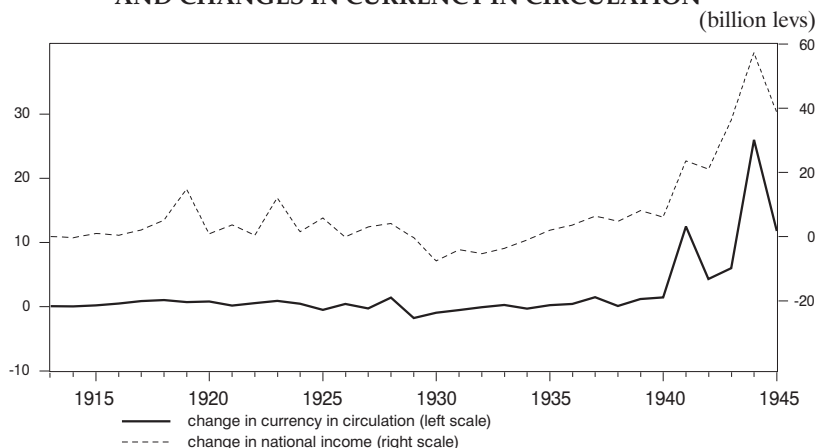
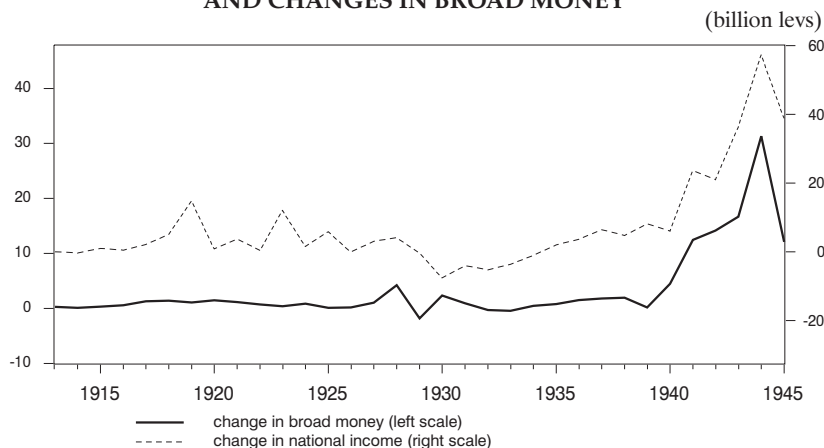


Chart 12

DYNAMICS OF CHANGES IN NOMINAL NATIONAL INCOME AND CHANGES IN BROAD MONEY



Direct dependence between nominal income growth *per capita*, currency in circulation and broad money *per capita* are displayed in the chart below (scale *per capita*).

Chart 13

RELATIONSHIP BETWEEN CHANGES IN CURRENCY IN CIRCULATION AND CHANGES IN NOMINAL INCOME

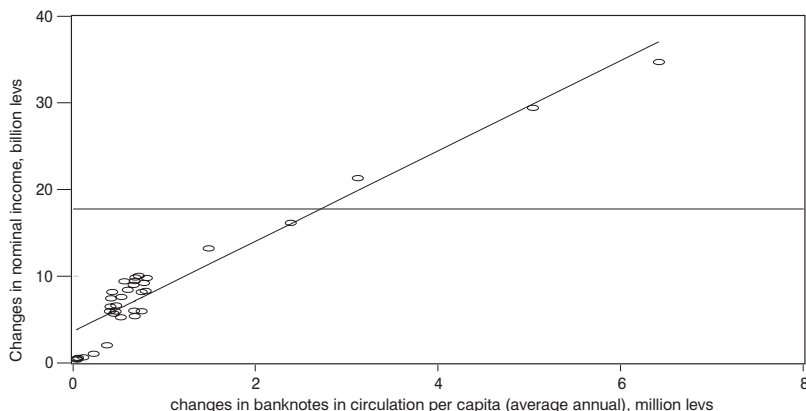
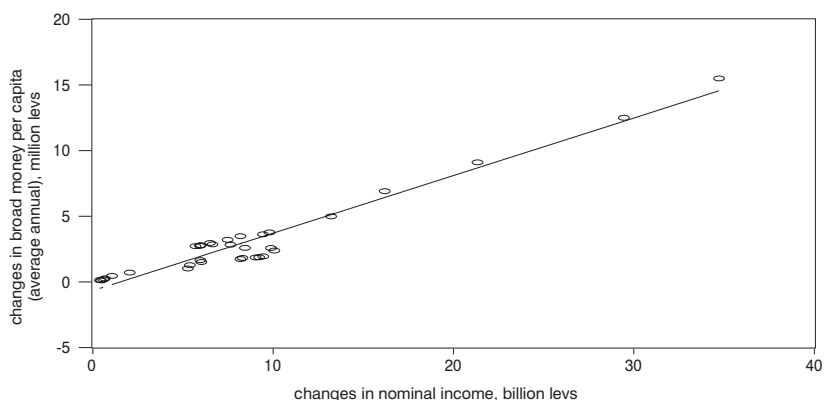


Chart 14

RELATIONSHIP BETWEEN CHANGES IN BROAD MONEY AND CHANGES IN NOMINAL INCOME

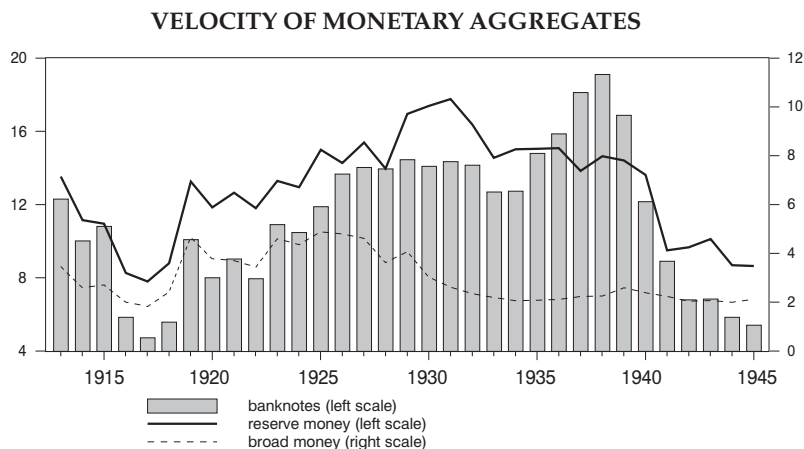


There are two fundamental ratios which are always included in the historic studies of monetary links: the *national income/monetary aggregate* ratio (establishing the velocity of money) and the reciprocal *mon-*

etary aggregate/national income ratio (defining money balances per unit of income (*Friedman, M., 1958, 1968*). Based on the latter ratio Milton Friedman calculated the *number of weeks* needed to cover *per capita* income with money balances in various countries (*Friedman, M., 1968*).

The *velocity of money* measured by banknotes, reserve and broad money displayed the following dynamics:

Chart 15



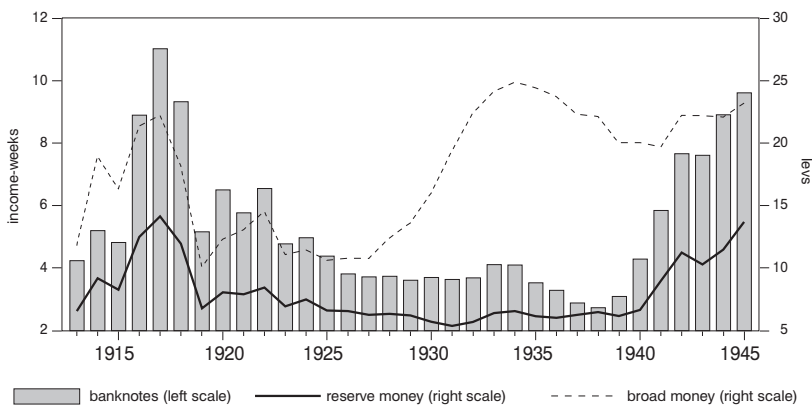
An increase in the velocity of money in the high inflation 1917 – 1920 period was reasonable. This was clearly pronounced in banknotes. The chart also displays the *downward trend* in money velocity (particularly after 1930 – 1931), which coincided with trends in other countries over this period (*Friedman, M., 1959*).⁵

According to Milton Friedman, real (and not nominal) currency amount is of decisive significance for economic analysis. A real quantity is “money expressed in goods and services which can buy”, or money equivalent to the number of income-weeks (*Friedman, M., 1969, p. 67*). Thus, *money balances* (banknotes, reserve money and broad money) are indicator of an economy’s monetization. For Bulgaria this indicator in the period under review displayed the following dynamics:

⁵ According to Friedman, in the long-run money velocity tends to decrease, since velocity depends on permanent income developments. Besides, money is “a luxury good” (that is its elasticity is >1). For details, see Nenovsky, N., 1998, p. 72.

Chart 16

MONEY BALANCES EXPRESSED IN INCOME-WEEKS



The *banknotes/income* ratio ranged from 0.06 to 0.07 until 1940. Then the ratio started to increase gradually, reaching a high of 0.22 in 1944. Expressed in income-weeks, this was three to four weeks until 1940 and 11 weeks in 1944. These indicators proved similar to those in other countries in the period under review (*Friedman, M. 1968, 1969*). According to Milton Friedman's calculations, in the period under review⁶ banknotes in circulation expressed in income-weeks for various countries were as follows: India, seven weeks; Yugoslavia and Greece, six; Turkey, five; the USA, four; Israel, four. Lower values of this indicator for the USA and Israel were attributable to the structure of money supply. In the latter two countries deposits accounted for a bigger share and monetization of the economy was stronger as a whole. The dramatic increase in 1940 (the amount of banknotes held by the public was equivalent to 11 income-weeks) coincided with the beginning of intensive banknote issue by the BNB and a period of high inflation, which marked the economy's demonetization.

The table on page 24 shows *major characteristics of time series of analyzed variables (average, median, maximum, minimum, standard deviation and volatility measured as a percentage of standard deviation of the average for the period)*. From 1940 this trend was reversed, resulting in stronger fluctuations of monetary indicators for the 1940 – 1945 period compared with relative stability of the 1927 – 1939 period. The same conclusion is valid for the 1913 – 1922 period.

⁶ *Friedman, M. (1969), op. cit., pp. 67 – 71.*

The variables used are as follows:

M3/N	– broad money <i>per capita</i> ;
M0/N	– reserve money <i>per capita</i> ;
BN	– amount of banknotes <i>per capita</i> ;
DD/N	– deposits (quasi-money) <i>per capita</i> ;
GD	– government debt;
GD/N	– government debt <i>per capita</i> ;
M	– money multiplier;
V0	– velocity of banknote circulation;
V1	– velocity of reserve money circulation;
V2	– velocity of broad money circulation;
Y/N	– nominal income <i>per capita</i> ;
YR/N	– real income <i>per capita</i> ;
P	– price index;
S	– BNB discount rate;
BNC	– banknote cyclical component;
M3C	– M3 cyclical component;
M0C	– reserve money cyclical component;
DDC	– quasi-money cyclical component;
YC	– real income cyclical component.

MONETARY INDICATORS

	BN	M0/N	M3/N	DD/N	M	V0	V1	V2
1913 – 1926								
Average	488.3330	694.8099	1118.607	630.2740	1.684270	9.372226	5.868399	3.512008
Median	615.1650	837.1099	1279.278	635.7571	1.602419	10.04803	6.185378	3.581197
Max.	861.3549	1237.583	1907.841	1247.321	2.068191	13.66263	8.246224	4.875609
Min.	39.09078	66.93018	138.1750	99.08424	1.492996	4.715528	2.849244	1.823651
Standard deviation	303.7677	448.6956	715.6698	428.8356	0.200171	2.665617	1.668502	1.061443
Volatility	0.62	0.65	0.64	0.68	0.12	0.28	0.28	0.30
1927 – 1945								
Average	1479.453	2223.472	4958.174	3478.721	2.859336	12.73670	7.310857	2.670143
Median	634.4062	1065.327	3004.001	2566.779	3.023414	13.98461	7.864446	2.240551
Max.	6629.446	9977.211	16361.55	10094.48	4.010457	19.10504	10.32467	4.791280
Min.	402.9252	688.2196	1882.615	1247.321	1.607221	5.410049	3.480176	1.993616
Standard deviation	1897.519	2633.053	4178.813	2331.648	0.914036	3.976224	2.150436	0.884319
Volatility	1.27	1.18	0.83	0.65	0.30	0.32	0.30	0.29
1913 – 1945								
Median	633.5176	1012.111	2719.844	2031.431	2.062134	11.88240	7.145090	2.586722
Max.	6629.446	9977.211	16361.55	10094.48	4.010457	19.10504	10.32467	4.875609
Min.	39.09078	66.93018	138.1750	99.08424	1.492996	4.715528	2.849244	1.823651
Standard deviation	1556.281	2189.491	3781.332	2314.017	0.921237	3.874940	2.093083	1.001521
Volatility	1.43	1.36	1.10	0.98	0.38	0.34	0.31	0.34

Money Demand Dynamics

Data⁷ reveals that national income and transaction motives played a key role in money demand dynamics. In the period under review, interest rates did not affect money demand and they were not the true price of money.⁸ Consequently, there was no statistically significant portfolio motive in the money demand function.

This conclusion reflects the inefficiency of interest rate (discount rate) as an anti-inflationary and monetary policy instrument. Intentionally or not, the BNB did not actively employ discount interest. Adjustments in discount reflect real sector state, and particularly the economy's need for credit.

The assessment of money demand function through the two major and most precisely defined aggregates (real balances of money in circulation and real balances of broad money) is summarized in the following equations. (Coefficients should be read as elasticity.)

The variables used in regressions are as follows:

M0 – reserve money;

M3 – broad money;

B – money in circulation;

P – retail price index based on 1913⁹

N – number of individuals;

Y – national income;

S – BNB discount rate;

Demand for broad money

$$\log(M3/PN)_t^d = 12.84 + 0.70 \log(Y/PN)_t^d + AR(1)$$

(7.63) (7.91) (16.69)

$$R^2 = 0.86 \quad R^2_{adj} = 0.85 \quad DW = 2.31 \quad F = 0.00$$

Demand for cash

$$\log(B/PN)_t^d = 11.13 + 0.68 \log(Y/PN)_t^d + AR(1)$$

(4.41) (5.08) (9.51)

$$R^2 = 0.86 \quad R^2_{adj} = 0.85 \quad DW = 1.46 \quad F = 0.00$$

⁷ Tests on stationarity of time series are included in the Appendix.

⁸ For a similar analysis of money demand in India over the same period, see: Darrat, A., M. Webb, 1986. It confirmed the opinion that interest rates were formed in the real sector as a link between savings and investment.

⁹ Thus $\pi = \log[P/P(-1)]$ is the inflation rate measured through the retail price index.

If the BNB discount rate is included in the money demand function, equations are as follows:

Demand for broad money

$$\log(M3/PN)_t^d = 12.59 + 0.68 \log(Y/PN)_t^d - 0.09 S + AR(1)$$

(7.23) (7.48) (-0.31) (13.98)

$$R^2 = 0.86 \quad R^2_{adj} = 0.84 \quad DW = 2.22 \quad F = 0.00$$

Demand for cash

$$\log(B/PN)_t^d = 10.30 + 0.63 \log(Y/PN)_t^d - 0.06 S + AR(1)$$

(3.87) (4.58) (-0.13) (7.75)

$$R^2 = 0.86 \quad R^2_{adj} = 0.85 \quad DW = 1.27 \quad F = 0.00.$$

Although a minus sign appears before the discount interest in both equations, it is not a statistically significant member of regression (see t-statistics).

These assessments confirm the monetarist view that the interest rate is not an opportunity cost of money in the long run, and that it is an ineffective instrument for influencing the public's monetary behavior.

IV. Monetary Aggregates and Inflation

The study of inflation regression dependence on money supply (broad money M3) reflects the close direct link between them. Elasticity is measured at 1.03. The regression equation is as follows:

$$\log(P)_t^d = -7.1 + 1.03 \log(M3/N)_t^d + 0.72 AR(1)$$

(-25.5) (5.8) (5.7)

$$R^2 = 0.95 \quad R^2_{adj} = 0.94 \quad DW = 1.66 \quad F = 0.00.$$

The dependence of inflation on banknotes in circulation was stronger since banknotes were the major legal tender. This reflects low popularity of treasury bills with a 3% interest rate coupon, issued after 1942 and used as legal tender. The regression of banknotes with the inflation rate displays the following equation:

$$\log(P)_t^d = -5.02 + 0.55 \log(B/N)_t^d + AR(1)$$

(-3.15) (2.72) (12.9)

$$R^2 = 0.94 \quad R^2_{adj} = 0.938 \quad DW = 1.58 \quad F = 0.00.$$

The analysis of regression dependence between *government debt and inflation* changes proves that the increase in currency in circulation is prompted by government debt. The results displays a strong positive link and high elasticity of 0.85. The increase in the government debt by

1% between 1927 and 1945 prompted similar inflation growth, which confirms the above hypothesis.

The regression equation (government debt and inflation) is as follows:

$$\log(P)_t^d = 7.82 + 0.69 \log(GN)_t^d + AR(1)$$

(29.3) (4.86) (5.85)

$$R^2 = 0.95 \quad R^2_{adj} = 0.94 \quad DW = 1.71 \quad F = 0.00.$$

The increase in government debt stock combined with reserve money growth (mostly banknotes) results in enhanced monetization, a subject of study in the following regression.

The manner of government debt financing and the positive clearing balance with Germany were the two key factors behind price instability in the economy between 1940 and 1945. This is proved by the strong interdependence between the change in the nominal amount of monetary aggregates and amount of government debt, indicating a high degree of monetization of the budget deficit and balance of payments deficit in the economy.

The regression equation (government debt and banknotes) is as follows:

$$\log(BN/N)_t^d = 9.65 + 0.53 \log(GD/N)_t^d + MA(2) + AR(1)$$

(1.09) (2.47) (2.65) (13.11)

$$R^2 = 0.97 \quad R^2_{adj} = 0.96 \quad DW = 1.88 \quad F = 0.00.$$

The regression equation (government debt and broad money) is as follows:

$$\log(M3/N)_t^d = 1.86 + 0.67 \log(GD/N)_t^d + AR(1)$$

(1.6) (4.91) (19.91)

$$R^2 = 0.99 \quad R^2_{adj} = 0.98 \quad DW = 1.92 \quad F = 0.00.$$

V Studying the Direction of the Money Variables – Real Variables Impulses

The impulse direction from money to the real economy is an indispensable but insufficient condition for employment of various monetary policy instruments. If this is so, the next step will be to find if the effect is positive, *i.e.* whether it offsets and stimulates the real economy; or if the effect is negative, resulting in disequilibrium and repression of the real sector development.¹⁰

¹⁰ *The theory of the real business cycle holds that monetary aggregates behavior follows*

Chart 17

DYNAMICS OF CYCLICAL COMPONENTS OF REAL INCOME AND BANKNOTES

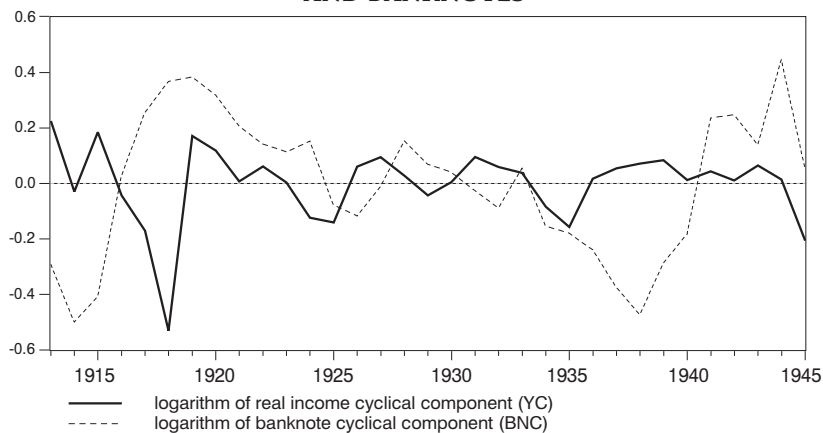
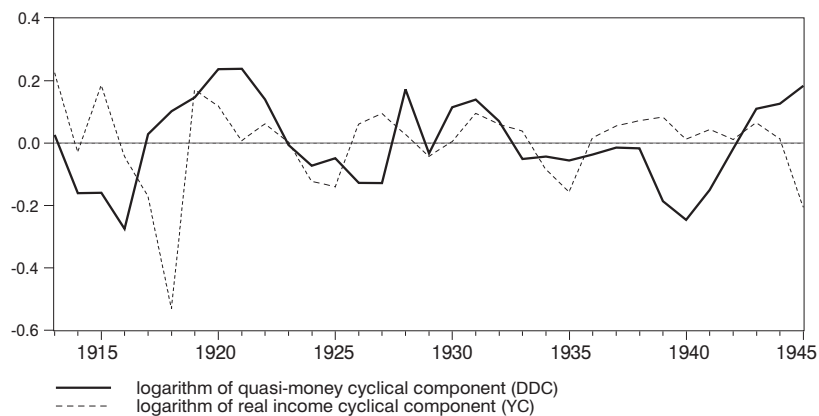


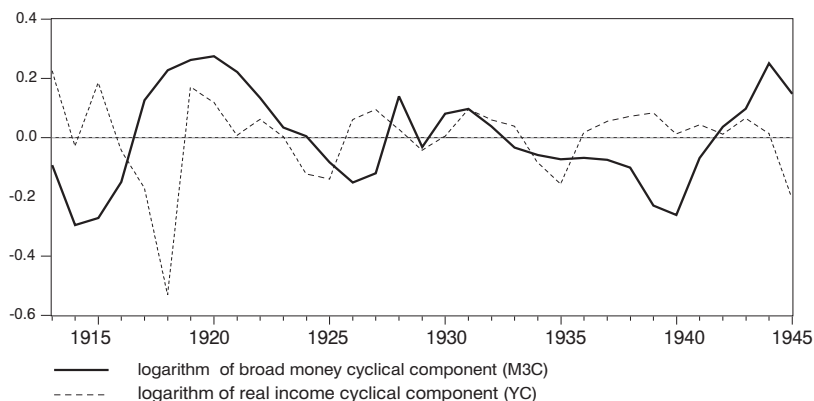
Chart 18

DYNAMICS OF CYCLICAL COMPONENTS OF REAL INCOME AND QUASI-MONEY



real sector development (reverse causation) and adapts to various types of shocks, associated mostly with supply. In these models money supply is endogenous, and various monetary instruments employed by the central bank are ineffective and have variable effect on economic agents.

Chart 19

DYNAMICS OF CYCLICAL COMPONENTS OF BROAD MONEY
AND REAL INCOME

This chapter aims to answer the first question: the *monetary – real sector* impulse direction. In this study the methodology (borrowed from the theory of the real business cycle) of Hodrick – Prescott (1997)¹¹ and Kydland – Prescott (1990) is used. It consists of several consecutive procedures.

First, based on the Hodrick – Prescott filter¹² logarithmic series of income, prices and monetary aggregates should be decomposed into trend and cyclical components.

Charts 17 and 18 display *movements in cyclical components* of real income and banknotes, and real income and quasi-money.

Second, dynamics of *cyclical components* obtained for these variables are compared and their dependence is studied using the Granger – Sims causality test¹³ and the VAR model built by them.¹⁴

¹¹ The filter constituted in 1981 by Hodrick, F., E. Prescott has been widely used in recent years, but it was officially published in 1997.

¹² The formula of this filter is:

$$\min \{ \Sigma c_t^2 + \lambda \Sigma [(g_t - g_{t-1}) - (g_{t-1} - g_{t-2})]^2 \},$$

where $c_t = y_t - g_t$ and y_t is the variable in question, c_t – its cyclical component, g_t – its trend, and λ – a positive figure. The higher the value of λ , the better the adjustment of the series. When λ tends to infinity, then g_t tends to linear trend. For details, see Hodrick, R., E. Prescott (1997).

¹³ Within this test the variable Y causes X at a particular volume of information if the present value of X may be better predicted using previous values of Y than without them. This may be presented as a minimized variance of the predicted value and to be summarized: $\sigma^2(X_{t+1}|X_t, Y_t) < \sigma^2(X_{t+1}|X_t)$.

¹⁴ For more details about VAR models, see Hamilton, J. (1994).

Major conclusions are as follows (results of the tests are included in the Appendix):

1. The hypothesis of a lack of causation of variances of banknote cyclical component on real income cyclical component is rejected.
2. The hypothesis of a lack of causation of variances of reserve money cyclical component on real income cyclical component is rejected.
3. The hypothesis of a lack of causation of variances of broad money cyclical component on real income cyclical component is rejected.
4. The hypothesis of a lack of causation of variances of quasi-money cyclical component on real income cyclical component is not rejected.

In general the above links indicate causation *directed from monetary variables to the real sector*. This proves the hypothesis that impulses of instability in the economy are caused by monetary aggregates.

The third step in the analysis is building a *VAR model*, consisting of cyclical components of monetary and real variables. Within the VAR model variance decomposition and response to shocks for various variables are used.

Reserve money and banknotes are considered *outside money* (controlled by the BNB), and quasi-money as *inside money* (endogenously determined by the public).¹⁵ Consequently, the results of tests on bilateral causation are checked again as to: (1) whether developments in supply of banknotes and reserve money (controlled and determined by the central bank) influence the real income cyclical component; (2) whether developments in the quasi-money cyclical component influence the real income cyclical component; (3) whether developments in the quasi-money cyclical component depend on real income developments.

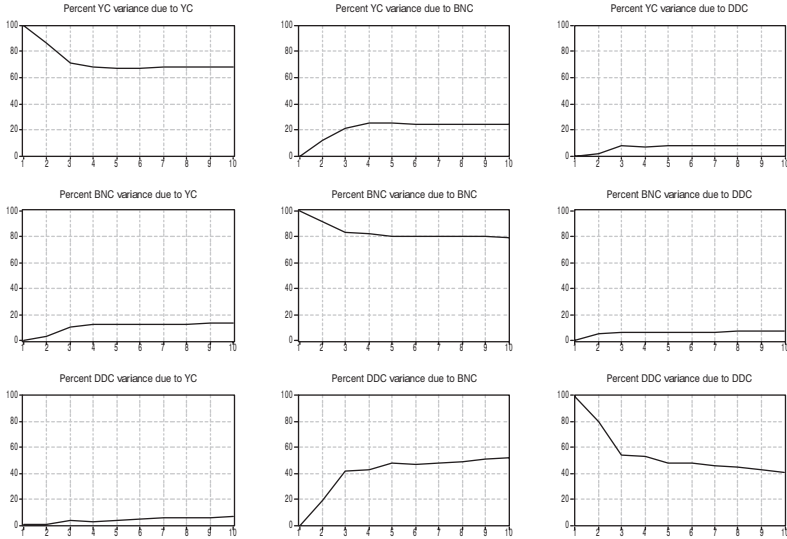
The analysis of variance decomposition in Model 1 shows the following results:

- The degree of real income variance (approximately 68%) is attributable to endogenous fluctuations, 24% to banknote fluctuations, and 8% to quasi-money fluctuations.
- The degree of banknote variance (approximately 80%) is endogenous, attributable to previous periods' variances.
- 50% of quasi-money variance is caused by banknote variance, 40% by the quasi-money's own fluctuations in previous periods, and 10% by real income shocks.

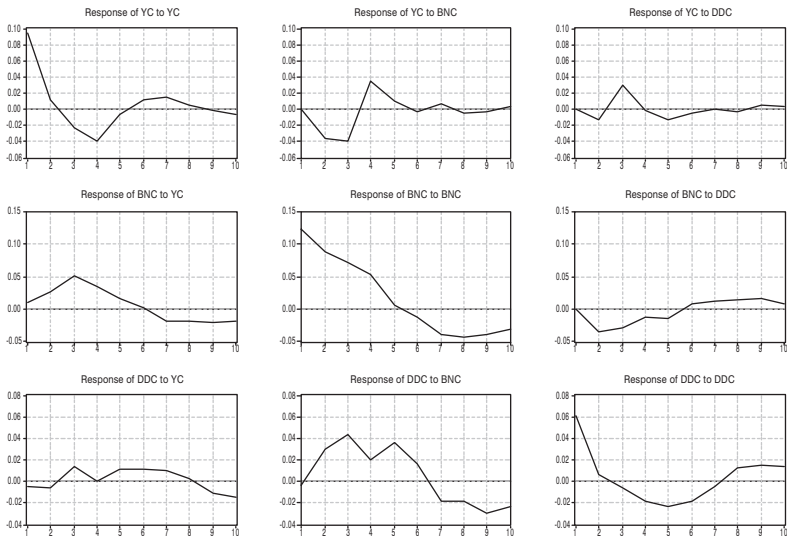
¹⁵ In the theory of real business cycle, differentiation of outside (controlled) and inside (uncontrolled) money is of particular significance. This theory assumes that inside money follows real economy movements, while outside money is the major source of shocks in the economy. For more details, see Plosser, C. (1989) and Ahmed, S. (1993).

RELATIONSHIP BETWEEN CYCLICAL COMPONENTS OF BANKNOTES (BNC), QUASI-MONEY (DDC) AND REAL INCOME (YC)

Variance Decomposition

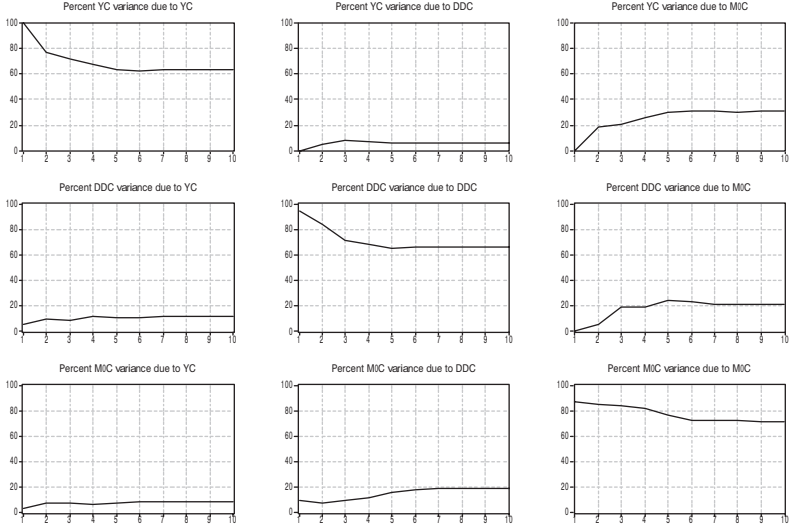


Response to One SD Innovations

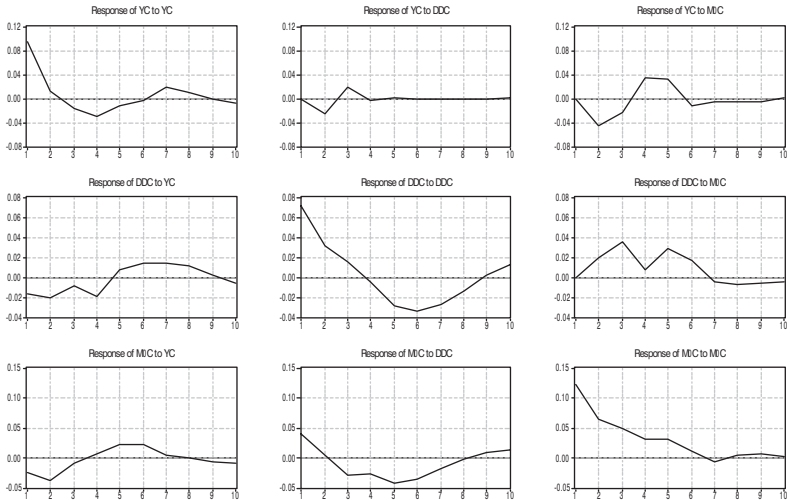


RELATIONSHIP BETWEEN CYCLICAL COMPONENTS OF RESERVE MONEY (M0C), QUASI-MONEY (DDC) AND REAL INCOME (YC)

Variance Decomposition



Response to One S.D. Innovations



The analysis of impulse response function reveals the following results:

- The impulse caused by the banknote cyclical component has a negative impact on real income until the third period, and then the direction of influence changes. This impulse occurs until the sixth period and its influence subsides.
- The impulse prompted by real income has a positive impact on quasi-money until the sixth period and subsides very slowly.

The analysis of variance decomposition in Model 2 reveals the following results:

- The variance of the real income cyclical component is caused by its variance in transition periods (64%), by reserve money (31%) and by quasi-money (6%).
- 68% of reserve money variance is attributable to its variance in preceding periods, 23% to quasi-money variance and just 9% to real income variance.
- 62% of quasi-money variance is attributable to quasi-money variance in preceding periods, 25% to reserve money variance and 13% to real income variance.

The impulse response function in Model 2 is as follows:

- Impulses caused by quasi-money and directed to real income have a positive effect, expressed in a three-period lag, which then subsides.
- Impulses directed from real income to quasi-money have a positive effect and subside very slowly.
- Impulses directed from reserve money to real income have ambiguous effect: initially it is negative, after the second period it is positive, and after the fifth period it subsides.

The result of both models

In the period under review, developments in monetary aggregates variance *is endogenous* for the greater part, caused by past shocks of the central bank. This proves the thesis of the destabilizing behavior of the issuing institution during this period. The hypothesis of the real business cycle theory on monetary policy nonsystematicity is not confirmed. Impulses are generated from the monetary to the real sector rather than *vice versa*. These results come closer to the classical approach of Friedman and Schwartz according to which money causes fluctuations in income.

Conclusion

The review of major monetary dependencies between 1913 and 1945 confirms the disastrous role of government intervention in the economy, and particularly in central banking. Inflation is a monetary

phenomenon: a result of money supply manipulation and money supply inconsistency with money demand developments, attributable to real economy development. Monetization of deficits by the government is the major source of instability. In the historical period under review, these deficits were primarily the result of extraordinary circumstances like the two World Wars, and to a lesser extent of failures in the real sector and the 30s crisis. The monetization of deficits resulted in a significant redistribution of the national wealth (assets and liabilities) in favor of particular social groups.

What was the role of the BNB? Was it able to counteract the economic processes, thus neutralizing the negative effects of shocks? Was it possible for the central bank to implement a neutral monetary policy, consistent with Milton Friedman's rule prescribing a pursuit of moderate real money supply growth? The answers to these questions are clear in advance to those who know Bulgaria's history well, and particularly its new history: they are negative. The reasons behind this are various: culture (Avramov, R., 1998), historical heritage, politics and institutional development.

Consequently, the results of stabilization programs in Bulgaria had temporary effects since they were not a product of consistent social and political resolve to fight inflation like that in Germany after the World War II which helped create an institution capable legally and *de facto* of providing national currency stability and economic growth.

Recently, influenced by *institutionalism*, economists dealing with monetary problems started to consider carefully the institutional structure of money supply, including the role of the central bank in the structure.

The introduction of a *currency board in Bulgaria* in the summer of 1997 partially answered the questions put by institutionalism as regards monetary system organization. However, no answer has yet been found to the reasonable question of Roumen Avramov: "Are there no alternatives enabling the economy to achieve the same, or even better results?"

This is an insidious question, and even more insidious questions are: is it possible to have decentralized *money demand*, a result of spontaneous activity of economic agents on the one hand, and *money supply* which is a quasi-monopoly of the government based on various instruments used to achieve goals? Is it possible to estimate the liquidity needs of the economy? Is it possible to supply any good knowing nothing about demand for this good? What will happen with the price of this good? What will happen with the interest rate? Should the central bank participate in the money market?

To find answers to these questions, we recommend that readers should open their *microeconomics* books.

Appendices

Table 1

RESULTS FROM STATIONARITY TESTS

Variable	Phillips – Perron Test (PP Test)		Integration and lags	
	levels	I difference	I	lag
M0/N	5.65		0	3
BN	2.98		0	3
DD/N*	4.57		0	3
M3/N	5.47		0	3
M	-0.59	-5.05	1	3
GD*	6.6		0	3
GD/N*	5.21		0	3
GDNR	0.17	-5.59	0	3
BNR	-1.16	-4.73	1	3
M0*	4.55		0	3
M0RN*	-1.19	-5.93	1	3
M3R	-1.26	-4.99	1	3
YN*	-6.81		0	3
YRN*	-0.87	-6.7	1	3
YC*	-4.97		0	3
P	3.17		0	3
S*	-0.56	-5.31	1	3
DDC**	-2.78		0	3
IC**	-2.76		0	3
M0C**	-2.51		0	3
M3C**	-2.35		0	3
BNC**	-2.46		0	3

* With trend and level.

** At 95% significance level.

*** McKinnon critical values for rejection of stationarity hypothesis at 95% significance level: with trend and constant: -4.27; without trend and constant: -2.63; with constant without trend: -3.65.

Table 2

GRANGER TEST FOR CAUSALITY BETWEEN CYCLICAL COMPONENTS OF REAL INCOME (YC) AND OF QUASI-MONEY (DDC)

Sample: 1913 – 1945

Lags: 2

Zero hypothesis:	Observations	F-statistics	Probability
YC does not cause Granger DDC	31	0.32982	0.72202
DDC does not cause Granger YC		1.61416	0.21837

Table 3**GRANGER TEST FOR CAUSALITY BETWEEN CYCLICAL COMPONENTS OF REAL INCOME (YC) AND OF RESERVE MONEY (M0C)**

Sample: 1913 – 1945

Lags: 2

Zero hypothesis:	Observations	F-statistics	Probability
M0C does not cause Granger YC	31	3.48018	0.04579
YC does not cause Granger M0C		0.30751	0.73792

Table 4**GRANGER TEST FOR CAUSALITY BETWEEN CYCLICAL COMPONENTS OF REAL INCOME (YC) AND OF BROAD MONEY (M3C)**

Sample: 1913 – 1945

Lags: 2

Zero hypothesis:	Observations	F-statistics	Probability
M3C does not cause Granger YC	31	3.36151	0.05030
YC does not cause Granger M3C		0.13116	0.87765

Table 5**GRANGER TEST FOR CAUSALITY BETWEEN CYCLICAL COMPONENTS OF REAL INCOME (YC) AND OF BANKNOTES (BNC)**

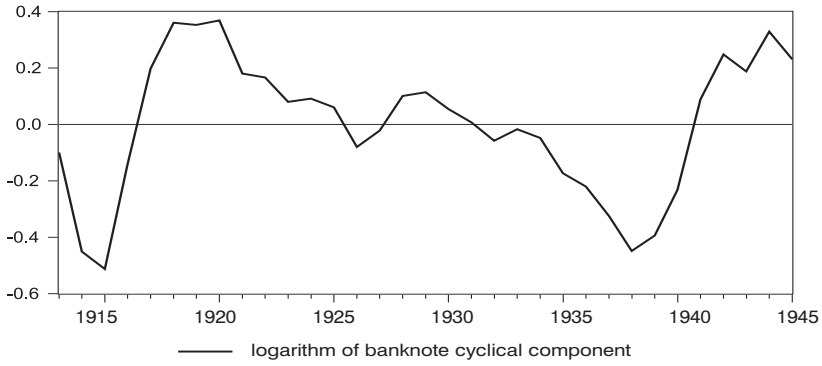
Sample: 1913 – 1945

Lags: 2

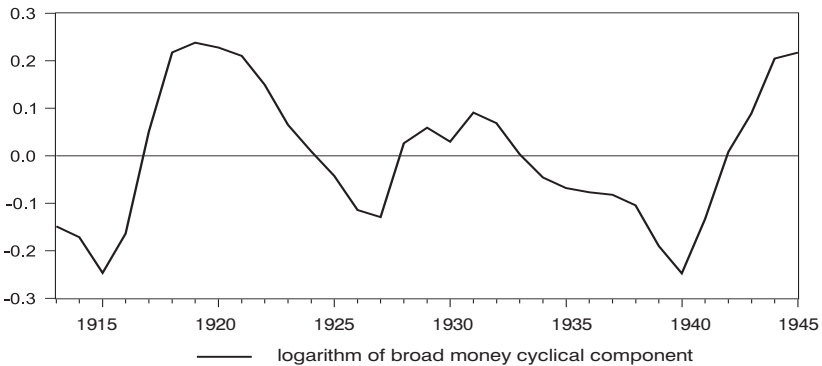
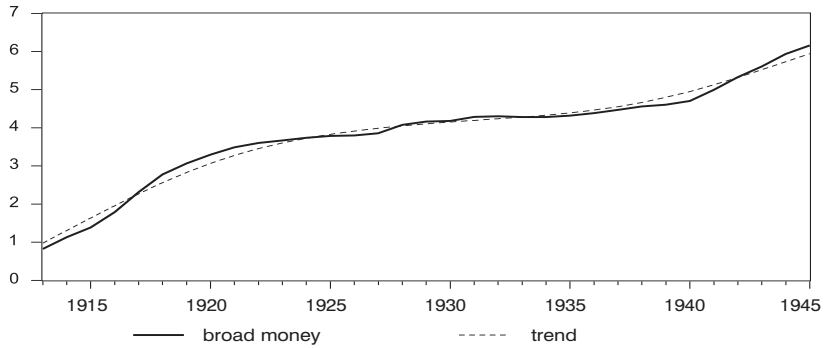
Zero hypothesis:	Observations	F-statistics	Probability
BNC does not cause Granger YC	31	3.58641	0.04212
YC does not cause Granger BNC		0.04017	0.96069

DECOMPOSITION OF SERIES INTO TREND AND CYCLICAL COMPONENT

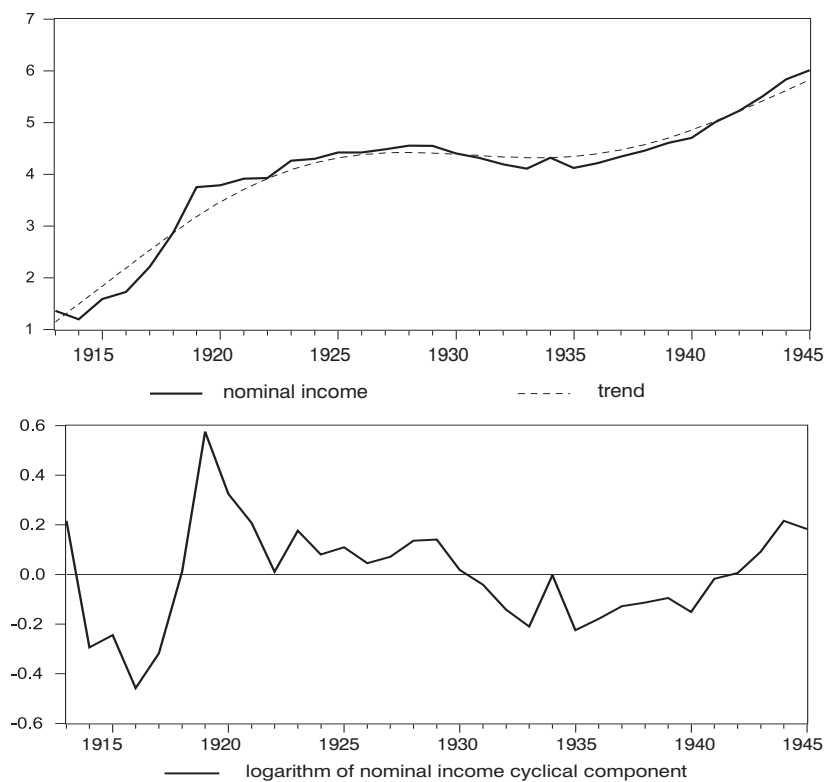
Banknotes



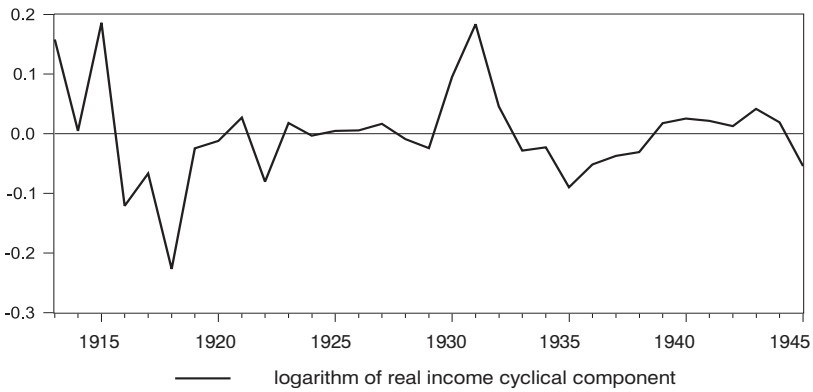
Broad Money



Nominal Income



Real Income



CURRENCY IN CIRCULATION/DEPOSITS

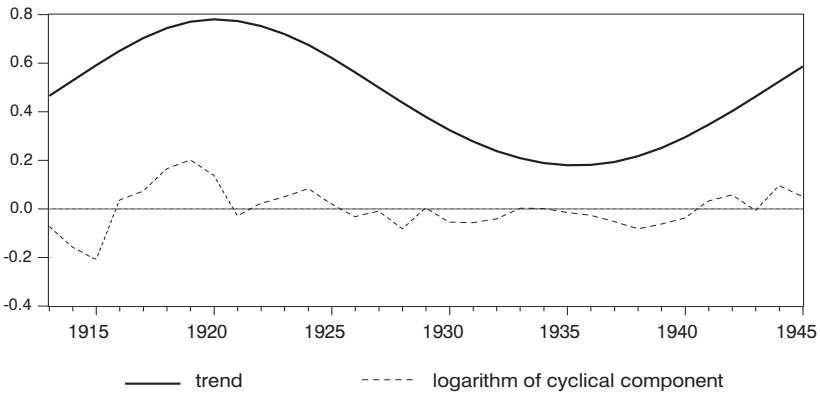


Table 6

STATISTICAL DATA

Year	Money multiplier (broad money/ reserve money) (levs)	National income per capita (levs)	Real national income per capita (levs)	Amount of currency in circulation at year-end (thousand lev)	Reserve money at year-end (thousand lev)	Amount of bank deposits at year-end (thousand lev, BNB incl. until 1928)	Population at year-end	Price index (1913 = 100)	Government debt at year-end (thousand lev)	Average annual BNB discount interest rate
1913	2.06	478.22	8692.50	188742	323159	478408	4828300	100.00	148604	6.50
1914	2.07	399.57	6411.91	226615	363493	525158	4875300	102.50	173065	6.50
1915	1.93	583.50	7578.44	369829	556924	703618	4978600	126.00	166159	6.50
1916	1.60	662.24	5779.90	833910	1040549	828490	5026900	214.00	280236	6.50
1917	1.56	1067.22	4912.72	1492768	1901206	1477646	5075800	344.00	643077	6.50
1918	1.50	2049.87	3346.99	2298619	2921793	2072755	5125200	1317.00	1318498	6.50
1919	1.49	5267.39	6680.41	2858489	3644151	2582213	4803900	1803.00	2017885	7.00
1920	1.56	5390.17	6332.61	3354139	4438071	3557628	4846971	1990.00	3031014	6.50
1921	1.75	6021.95	5702.76	3615440	4594412	4432853	4946900	2104.00	3591359	6.50
1922	1.70	5963.56	6099.43	3885990	5146647	4886429	5049000	3656.00	3939241	6.50
1923	1.52	8176.67	5870.92	4138985	6044567	5029337	5153200	3351.00	4739606	7.00
1924	1.54	8304.59	5305.83	4530296	6509069	5503994	5259500	3824.41	5242041	9.00
1925	1.69	9220.38	5384.69	3655302	6002141	6496251	5368000	4098.91	5080668	9.00
1926	1.61	9020.14	6827.85	3480616	6417513	6833746	5478741	3925.19	4987275	10.00
1927	1.85	9452.10	7346.63	3726972	6138798	7635229	5550300	3792.47	11727965	10.00
1928	2.06	10053.53	7140.93	4173017	7562721	11422329	5622800	4406.85	15760576	10.00
1929	2.39	9867.46	6913.38	3608643	5784104	10188719	5696200	4520.62	13364193	9.50
1930	3.33	8429.11	7517.94	3295514	4842557	12828482	5770600	2298.23	11964585	10.00
1931	3.96	7622.61	8509.38	2918593	4315973	14153906	5845900	1566.29	13926928	9.48
1932	3.96	6631.38	8453.98	2634530	4232114	14126927	5922300	2256.52	13478839	8.60
1933	3.63	5939.23	8485.90	2983903	4500251	13334075	5999600	2863.31	13120303	8.00
1934	4.01	5686.80	7665.76	2448955	4182957	14326614	6077939	3553.54	13768759	7.00
1935	3.98	5969.47	7256.45	2496585	4412297	15081013	6126000	4076.90	14582020	6.61
1936	3.95	6500.49	8754.83	2570749	4835768	16517588	6182300	3796.26	15905622	6.00
1937	3.31	7471.56	9175.42	2569336	6307779	18300746	6232300	4084.49	17720697	6.00
1938	3.55	8177.24	9353.57	2800450	6427359	19998170	6272900	4471.32	19487228	6.00
1939	3.02	9421.97	9421.97	4245223	7608609	18729800	6307600	4095.86	21014052	6.00
1940	3.03	9796.90	8661.89	6518354	9065829	20925900	6676600	4308.24	22568073	5.80
1941	1.85	13209.39	8759.43	13467000	21553000	26432000	6734454	5904.87	32709100	5.00
1942	2.09	16172.89	8260.19	18922000	25875000	35143900	6797300	7573.55	46339500	5.00
1943	2.22	21319.42	8446.80	23860000	31869000	46887100	6856800	8612.69	63360700	5.00
1944	1.76	29430.12	7746.79	45834000	57839000	56227300	6913700	13512.56	68195500	5.00
1945	1.64	34722.45	5985.58	43726000	69612000	70430200	6977100	25902.54	96744600	5.00

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