INTERNATIONAL CENTRE FOR ECONOMIC RESEARCH

ICER

WORKING PAPER SERIES

Kalina Dimitrova and Nikolay Nenovsky

EXCHANGE RATE AND INFLATION: FRANCE AND BULGARIA IN THE INTERWAR PERIOD

Working Paper No. 34/2006

Exchange Rate and Inflation:
France and Bulgaria in the interwar period

Nikolay Nenovsky*
Kalina Dimitrova**

November 2006

Resume:
The objective of this paper is twofold. First, to compare the model of financial stabilization in the interwar period in France (a country in the "core") with that in Bulgaria (a peripheral country). Second, applying modern econometric techniques (VAR models) we would like to "test "whether the theory designating a dominant role of the exchange rate on inflation (in comparison to that of money in circulation) holds and can be empirically proved by the actual movement of the monetary variables and the direction of their causality. Going back to the history of stabilization in France and Bulgaria in the interwar period and studying it through the theoretical ideas at the beginning of the XX century would provide us not only with new elements in the analysis of the present-day problems of monetary stabilizations but also add to the arguments of the crucial significance of the exchange rate and monetary rules for the efficiency and credibility of the monetary regime.

JEL classification: B3, C5, N1
Key words: economic history, modeling, France, Bulgaria.

---

* University of National and World Economy and ICER; e-mail: nenovsky.n@bnbank.org.
** "St. Kliment Ohridsky" Sofia University, Bulgarian National Bank; e-mail: dimitrova.ka@bnbank.org. This version of the paper was prepared during the stay of Nikolay Nenovsky at ICER, Torino. Earlier version was presented for the first annual conference of the South-East Europe Monetary History Network (SEEMHN) on "Monetary and Fiscal Policies in South East Europe: Historical and Comparative Perspectives" held on 13-14 of April 2006 in Sofia. The discussions and comments with researchers were very fruitful and helpful for completing the study. Among them we have to mention Enrico Colombatto, Bertrand Blancheton, Henri Bourguina, Dominique Torre, Alain Raybaut, Philippe Saucier, Cécile Hagnauer, Michel Lelart, Martin Ivanov, Roumen Avramov, Daniel Vachkov, Atanas Leonidov, Darina Koleva, Yuri Golland, Vladimir Mau and Sophia Lazaretou.

I. Introduction

The collapse of the communist regime at the end of the XX century in the Eastern European countries raised the question of financial stabilization in the region. Looking back in history, we find out similar attempts for financial stabilization throughout the whole of Europe after the consequences of the First World War (the Great War). In fact most European countries took radical measures in the 20's to restore the monetary and financial stability which characterized the European economies under the gold standard.

Studying the history of monetary regimes provides us with useful insights. First, in theoretical aspect it feeds the present-day debate about the "best" monetary regime not only with well-forgotten theoretical postulates but also with some empirical facts of the past. Second, the development of statistics and econometrics nowadays allows us to test various theoretical models *ex post*. And third, the analysis of economic history can provide us with valuable practical information which in one way or another could be integrated in the decision-making process of today and tomorrow.

In this paper, after a brief overview of the theoretical discussions of the 20's (section II) we make a comparative analysis of the financial stabilizations in France and Bulgaria after the Great War. In section II we test the theory of the dominant role of the exchange rate on inflation (Aftalions' theory) applying modern econometric techniques (VAR models and causality tests). After summarizing the results which proved to be in compliance with the analysis of that time, we propose some concluding remarks on the factors lying behind some similarities and differences of the two stabilization processes.

II. The exchange rate and inflation – a short journey in the theoretical debate of the 20's

The theoretical analysis and the empirical observations of the dynamics of prices, money in circulation and the exchange rate in several European countries at the beginning of the XX century made the distinguished French economist Albert Aftalion (1874-1956)[1] doubt the validity of the Quantitative Theory of Money (QTM) and Purchasing Power Parity (PPP). Aftalion is not the first to question the shortcomings and difficulties of QTM and PPP (Keynes, Hawtrey, Nogaro (1924) among others brought into question their validity and usefulness) but he is the first to propose a thorough and systematic theory as a prospective and constructive alternative. In spite of its eclectic features, Aftalion's theory is characterized by elements of integrity and logical structure.

In brief, the way of reasoning and exposition of the theory is the following: Aftalion starts with observations of the development of the main variables in the QTM and PPP in different countries and for different periods (usually quite short periods of time). Applying basic statistical techniques (putting aside whether they can be interpreted as causality tests), he finds out that both theoretical postulates could not be supported by facts and tried to give an explanation by (i) proposing as profound as possible arguments for the development of the monetary variables – income theory of money - and later on (ii) elaborated the fundamental income theory

[1] Albert Aftalion was born in the town of Rousse (Rustchuk). Bibliographical details and more information with respect to his theory on exchange rate and money see Nenovsky (2006).

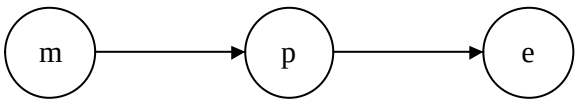
by adding the role of expectations to the behaviour of the monetary variables and primarily to the exchange rate (the "psychological theory of money and exchange rates").

Afltalion states that the causality (the cause-consequence chain) in the context of QTM and PPP is different for different spans of time and different countries (9 in his empirical studies) as the exchange rate has a dominant role in the price setting process rather than money in circulation or the money supply. Taking France for instance, he estimated that the magnitude of the link (i.e. the synchronized movement) between money in circulation and prices was getting weaker – it was still very strong in the period 1914-1919, weak in 1919-1920, and almost disappeared afterwards. At the same time this weak relation was replaced by another strong causality between prices and exchange rate - the devaluation of the franc leading to a direct increase in the price level. Moreover, Aftalion noticed that between 1927 and 1928 the growth of money supply was not accompanied by a rise in inflation[2]. The development of the same variables was similar in other countries under study, such as the eloquent examples Germany and Austria. Therefore, Aftalion argues in favour of the "hegemony of the exchange rate" on inflation for the period 1922-1924 (Aftalion, 1927, p.109).

In a similar way Aftalion criticizes PPP, which is a logical extension of the QTM in the context of international monetary relations. Here we would like to remind the reader that according to PPP theoretical postulate the nominal exchange rate is determined by the price differential between two countries which is in turn determined by the money supply (money in circulation) in each of them. Aftalion considers that neither PPP, nor the current account approaches are sufficient to explain the behaviour of the exchange rates. On the base of his empirical observations, Aftalion rejects the causality relations starting from money in circulation through prices to the exchange rate and argues in favour of exactly the opposite causality chain, i.e. from the exchange rate to prices.

The causality chains analyzed in the QTM framework and Aftalion's theoretical propositions can be illustrated by charts 1 and 2, where *m* is money in circulation, is the price level and is the exchange rate. In chart 1 the first causality link (arrow) of money to prices is defined by the QTM and the second one from prices to the exchange rate is the foundation of the PPP.

Chart 1. Causality chains in QTM and PPP

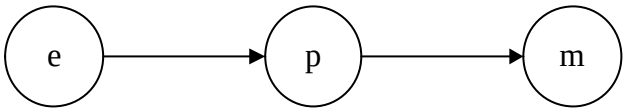


According the Aftalion's observations, the French experience can be illustrated by the first causality chain in chart 2 while the second one describes more precisely the development of indicators in Germany. However, in both countries he finds empirical proofs of the "hegemony of the exchange rate" on prices.

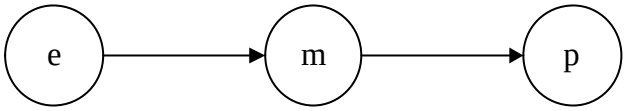
Chart 2. Causality chains in Aftalion's theory

[2] According to Aftalion, the expected stabilization of the exchange rate causes an increase in the money supply (Aftalion, 1927, p.98, 109).

The case of France

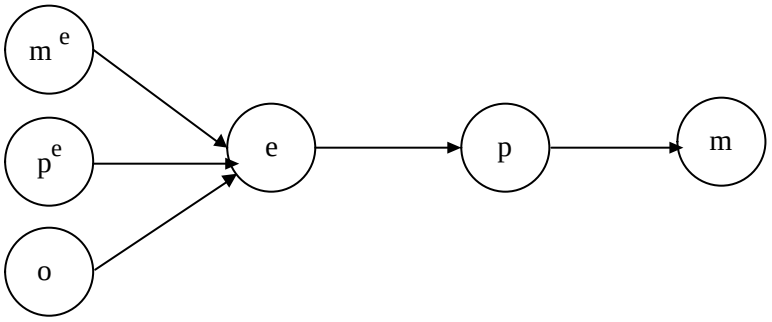


The case of Germany



In a more elaborate version of Aftalion's theory (Chart 3), he assumes that the inflationary expectations and the expected future development of money supply (denoted by *e* superscript) influence movements of the exchange rate. Moreover, he adds a large set of other macroeconomic and political factors (the situation of the public finances, the balance of payment, tax and customs policy, political, international and war news, etc) determining the behaviour of the "central" exchange rate variable.

Chart. 3 Causality chains in the elaborated Aftalion's theory



Whatever configuration we take, Aftalion summarizes that the exchange rate is the major and direct cause of inflation: "the *internal devaluation* of the currency is moving more or less together with the exchange rate; it is a satellite, not the driving force of the exchange rate" (Aftalion, 1927, p. 794). Therefore, he concludes that the exchange rate has a particular importance as an anchor for stabilizing money. Hence, he comes up with the practical proposition that monetary stabilization should start from stabilization of the *external purchasing power* (exchange rate) which automatically leads to stabilization of the *internal purchasing power*(price level). The exchange rate sets *directly* and *immediately* the expectations of the economic agents, that's why the fight against inflation should start with it and not with money supply. This argument has a direct policy implication in making the choice between stabilization targeting the exchange rate, or a monetary aggregate or price stability.

III. Stabilization in France and Bulgaria – chronological presentation

The monetary and financial stabilization after the Great War enables us not only to see the complexity of the monetary and exchange rate phenomena (economy, politics, ideology, diplomacy, nationalism and other aspects) but also to make some parallels with today when monetary stabilization is on the agenda both in the centre and in the periphery of global economy [3]. In the period under study France was a country which could be referred to as being in the centre of the international financial system, a winner of the First World War, while Bulgaria was just the opposite – a peripheral country where the issue of stabilization is pressing[4]. After the Great War, Bulgaria was in the camp of the defeated countries and like Germany had to pay reparations [5].

Three steps were outlined by Sergent's Commmittee appointed in May 1926 to coordinate the establishment of the international monetary stabilization: 1) a preparatory period in which inflation should be curbed and the exchange rate could be fluctuating; 2) *de facto* stabilization in which the central bank takes the responsibility of maintaining the exchange rate at a certain level by buying and selling gold according to the golden points, and 3) the final step is when the exchange rate is *de jure* fixed (to the gold) (Hawtrey, 1932, p. 10). Therefore, in spite of the above mentioned differences between France and Bulgaria, the stabilization process in both countries went through similar phases[6]. As a result of the specific implementation of the prescribed stabilization phases and the different international financial positions, France and Bulgaria are among the countries which managed to maintain their currencies stable for a long period of time after the devaluation in Great Britain (1931) and in the USA (1933). France gave up the fixed exchange rate in 1936. By means of the specific exchange rate control Bulgaria officially withdrew from the convertibility rule in 1941.[7]

France – Poincare stabilization

The First World War had extremely negative consequences on the public finances and the real economies of the European developed countries, hence on the stability of money[8]. The lack of willingness to reach a compromise among the developed countries resulted in chaotic and inconsistent measures which undoubtedly

---

[3] See for example Kindleberger (1990, [1984], 1988, [1973, 1986]) and Eichengreen (1997, [1996]).

[4] The definitions of the core and periphery could be diverse; however, we accept the distinction made by Barry Eichengreen who states that in the gold standard period (1870–1914) the "core" comprises Great Britain, the USA, France and Germany which are creditors while the peripheral countries are characterized as debtors. For more on the exchange rate issues in global and historical aspect see. Bordo and Frandreau (2001).

[5] Bulgaria entered the War as an adversary of France. The two sides clashed in Macedonia in late 1915 after Anglo-French forces landed at the Salonika front.

[6] For more on the logical phases of the entire stabilization process see Aftalion (1938), Vallance (1998, [1996], 261) and Rist (1933 [1925]). Rist argues that the monetary stabilization goes hand in hand with the stabilization of the public finance as the latter one comprises two components – halting the excessive (uncovered) emission of banknotes and balancing the budget. Stabilization is more a question of credibility and usually it starts after accumulating enough foreign reserves. (Rist, 1933 [1925], p.8–10).

[7] See. Ivanov (2005).

[8] On the consequences of the Great War and particularly in France see Sauvy (1984) who estimates that for 15 months the country lost income or wealth accumulated for a period of 11 years.

postponed the attempts for stabilization[9]. After the restoration of the gold standard to the pre-war value in Great Britain in April 1925 [stabilization measures were also implemented in Austria (1923), Germany (1924), Poland (1924), Switzerland (1924), Hungary (1925), Belgium (1925), Canada (1926), Finland (1926), Czechoslovakia (1926) and even in Russia (1922) in the context of different ideology], France finally found the political will to solve the dilemma of how to conduct stabilization – revaluation (deflation) or devaluation[10].

Here we would like to remind the reader that the stable franc (*le franc Germinal*) dated back to Napoleon's day, with gold content remaining unchanged since 27 March 1803. As a result of the excessive emission of banknotes during the Great War (for a comparison, the volume of the banknotes in circulation in 1913 was 6 billion French francs while in 1919 it had reached 35 billion francs), the price level significantly rose and a great number of the new deals in the economy were contracted at the new prices. This fact made it very hard and even "immoral" to restore the old pre-war exchange rate achieved by deep deflation and money supply contraction. As a consequence of WWI, France had a lot of domestic and external debts and above all the burden of the short-term debt, the so called "flying debt" (*dette flottante*) which comprised short-term Treasury bills and particularly Defense Bonds (*bons de défense*). In spite of the then widely shared view that it was necessary to restore the pre-war exchange rate (one of its main supporters was Baron Rotshield), experts and representatives of the main groups of interests gradually converged to the opinion that this was impossible and that a new cheaper franc was needed. Although the debate on the level of the fixed exchange rate is important (we can recall Keynes's criticism of Churchill on the restoration of the pre-war exchange rate of the British Pound[11]), in this analysis we are interested only in the fact of fixing the exchange rate, the restoration of the currency convertibility and the golden backing of the money supply which was suspended on 15 August 1914.

After several currency crises caused by growing evidence that Germany would not pay the expected reparations, and after former president Raymond Poincaré (1860 – 1934) had become Prime Minister in January 1924, measures towards financial stabilization and balancing public finances were undertaken. Shortly afterwards, however, Poincaré fell from power, and though the new left – wing government of Herriot tried to follow Poincaré's financial policies in its early days, it lost confidence and took France to the brink of financial chaos, near defaults on domestic debt, and a currency crisis. In the period from 3 March 1924 to 2 April 1925 the weekly balance sheets of the Banc de France were falsified by means of accounting manipulations with the purpose of disguising the considerable increase of money in circulation. The

---

[9] Each country blamed its partners in egoism and harsh pursuit of it own interests. For instance France did not like to make any economic and political concessions to Germany and her allies because she heavily relied on the reparations from the defeated countries. On the role of the consequences of the reparations see two points of view exposed by Keynes (1920 [2002]) and Bainville (1920 [2002]).

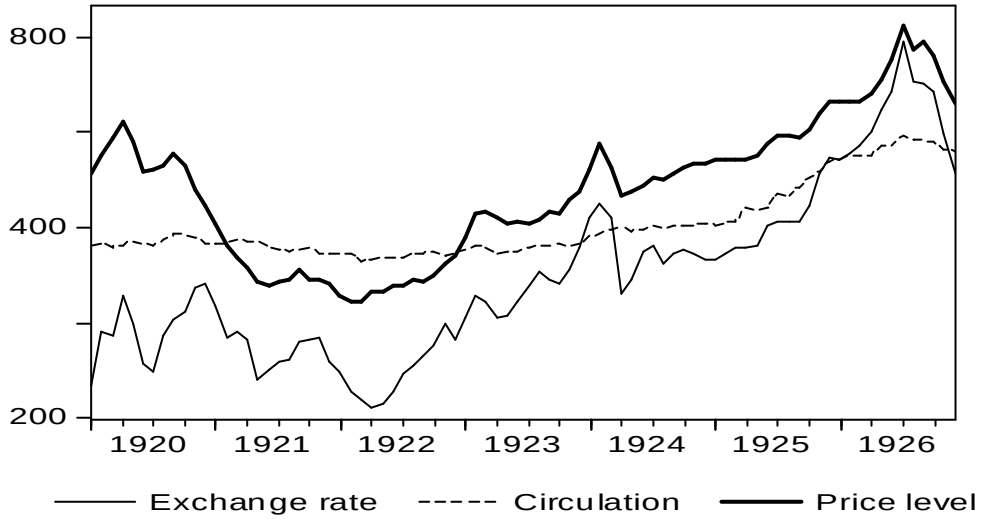
[10] Rueff endows this dilemma, personified within Poincaré's life, with 'the resonance of an antique drama where the heart (in favor of restoring the old rate) struggles with reason (in favor of devaluation due to the irreversible wartime rise in prices),' Vallance (1998, [1996], p. 250). At the time in most developed countries and particularly in France, there is "pathological adherence to the monetary stability and to the orthodox points of view" (Kemp (1971, 82). Keynes analyses in details the "deflation-devaluation" dilemma reducing it to the choice between price and exchange rate stabilization (Keynes, 1923).

[11] Keynes argued in favour of the level of the stabilized exchange rate of the franc which was the opposite to the British decision (see the collection of his articles and pamphlets on the franc by Keynes, 1928).

violation of the ceiling of 41 billion francs fixed by law became obvious on 2 October 1924. Under the pressure imposed by the consultants of the Banc de France, the truth was revealed on 9 April 1925, immediately demolishing the credibility in the franc, breaking expectations and increasing the probability of currency and financial crisis, and Herriot's government lost power[12].

Poincaré won the elections again in July 1926, forming a broad coalition (including Herriot himself) and immediately launched radical reforms with the aim of "paying the bill for the war" and of stabilizing the franc. An expert group, in which Jacques Rueff was in charge of a "special mission" (*chargé de mission)*[13] to find the "optimal exchange rate of the franc", was established to discuss the technical details of stabilization. As a result of the constructive reforms in the public finances (balancing the budget), mainly cutting the expenditures, increasing taxes and converting the short-term debt into a long-term debt, the expectations of stabilization grew stronger. This process was accompanied by capital inflows leading to the accumulation of foreign reserves at the Banc de France and to the restoration of the demand of national currency (in real terms).

Figure 1. France (1920–1926): Price level, money in circulation and exchange rate (Franc-US Dollar) (logarithmic scale)



In August 1926 a new ceiling on the money in circulation was re-introduced and in February 1927 the emission of Treasury bonds ceased. The franc started to be appreciated in nominal terms with respect to other currencies, which favoured the next step of *de facto* stabilization. Bank de France began to intervene on the exchange rate market in order to reduce the volatility of the exchange rate (as in some periods of time it protected the franc from sharp appreciation). Further steps implied abolition of the restriction on capital outflows (10 of January 1928) and enactment of the Law on the Devaluation of the franc setting the franc at around 80% of its pre-war value. At that phase of stabilization the central bank held a significant amount of gold

[12] For more details on the falsifications of the balance sheets of the Banc de France see Senegas (2000), Blancheton (2001), and also Jacob (1996).

[13] Rueff put his experience of franc stabilization to use in the 1958 franc stabilization which he led under the auspices of president de Gaulle. Jacques Rueff conducted League of Nations' financial missions in Bulgaria, Greece, and Portugal between 1927 and 1930.

reserves (from June 1928 to December 1932 the foreign reserves increased to 55 billion francs, i.e. from 8% to 27% of the world gold reserves – see Mouré, 1996, p. 137–138) which enabled *de facto* stabilization. A contribution to this was that accounting gains from gold revaluation were used for an ultimate strengthening of the central bank balance sheet (at the new rate, 1700 tonnes of gold led to a rise of Banque de France foreign reserves from 5.6 billion to 26 billion francs).

Subsequently, after the British and US devaluations of 1931 and 1933, France remained isolated in the so – called Gold Bloc. Ultimately, when even Gold Bloc members (Belgium, Switzerland) devalued their currencies one after the other, France was forced to cede the Poincaré franc on 26 September 1936 under the left – wing Léon Blum government. The gold franc thus survived some seven years, making France the nation at the centre of the financial system to have sustained monetary stabilization the longest. We may state that the Poincaré stabilization was a clear illustration of the role of the fixed exchange rate[14], while convertibility and the discipline of public finances were a classical example of how to build confidence in a national currency.

Bulgaria – the Stabilization of the Lev

The Bulgarian stabilization followed the logic of the stabilization in the developed countries with the peculiarities of the peripheral and less developed countries.[15] The economic and financial losses of the First World War for Bulgaria piled up over the losses born from the exhausting Balkan Wars of 1912–1913 (the three wars are commonly referred to as the "Big War"). According to Kiril Nedelchev (Nedelchev, 1940, p. 76–77) while daily expenditures for conducting the Balkan Wars were about 1 mill levs, during WWI they reached 2 mill levs. According to the same author, and not bearing in mind territorial losses, overall Bulgarian spending for the WWI may be rounded off at 3 bill gold leva. Public finance was entirely upset as for the period 1916–1918 the budget deficit was about 1.5 bill gold levs and the central bank (Bulgarian National bank – BNB) financed almost all war expenditures of the government (Ivanov 1929, p. 139). As a result, the banknotes in circulation increased drastically (around 14 times) and the coverage fell down to 3.2 % of the gold banknotes and to 5.9 % of the silver ones (Table 1). The public debt and particularly the "flying debt" reached perilous amounts (Figure 2).

Table 1. Coverage of the banknotes in circulation in Bulgaria (1912–1918)

Years	Banknotes covered by gold (mill levs)	Gold reserves (in mill levs)	Gold coverage (%)	Banknotes covered by silver (mill levs)	Silver reserves (in mill levs)	Silver coverage (%)
1912	139.6	51.1	36.6	24.7	16.8	58.0

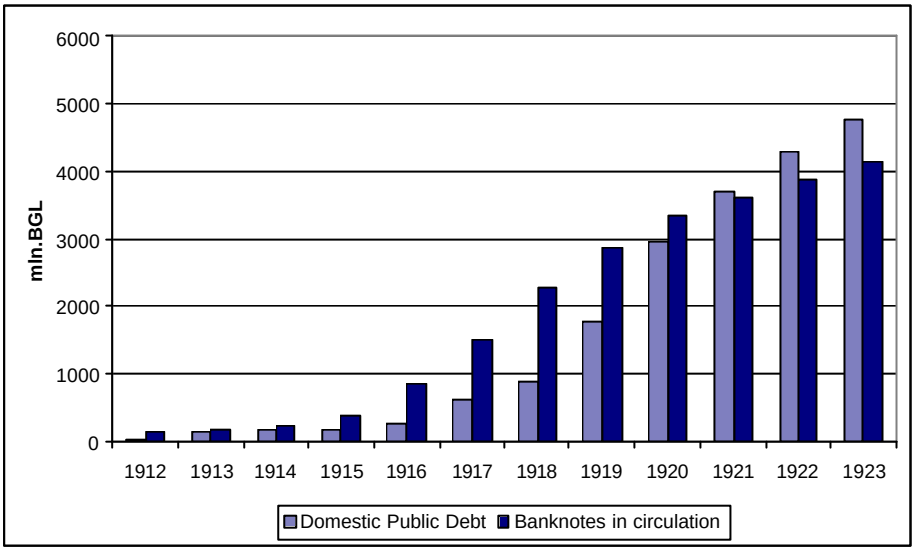
[14] Kenneth Moure (Moure, 1996) argues that in the context of the discussions on the technical details of Poincare's stabilization the reader can notice critical remarks with reference to the QTM and PPP, with reference to the equilibrium exchange rate as well (hence the terms "depreciation" and "appreciation" of the exchange rate are scantly mentioned), and the significance of Aftalion's psychological theory of the exchange rate and its popularity.

[15] On the functioning of the gold standard and its features in the core and periphery of the world economy in the pre-war times see Whale (1937) and in the inter-war period Simmons (1996).

1913	166.0	55.3	33.3	22.8	23.4	102.6
1914	198.9	55.1	27.7	27.7	28.5	102.9
1915	304.8	61.4	20.1	65.1	22.5	34.6
1916	577.1	68.2	11.8	256.8	17.2	6.7
1917	1 176.0	62.9	5.3	316.8	16.9	5.3
1918	1 969.4	64.0	3.2	329.2	19.4	5.9

Source and notes: Nedelchev, K. (1940) "Monetary Issues: Bulgaria, 1879-1940", p. 77. Studying the data we have found out that calculating gold and silver coverage of the banknotes in circulation, Nedelchev used the maximum volume of banknotes in circulation reached in the year and the gold and silver reserves at 31 December of the respective year.

Figure 2. Public debt and banknotes in circulation (1912–1923)



Source and note: Nedelchev, K. (1940) "Monetary Issues: Bulgaria 1879-1940", p. 81. "The stock of the outstanding domestic public debt in 1922 and 1993 includes also Treasury Bonds amounting respectively at 150 mill levs and 300 mill levs. "

Between the close of 1918 and the end of 1922, even before reparation payments began on 1 October 1923, foreign debt service reached 112 mill gold francs or 16.3 per cent of budget spending [16]. Reparations under the 27 November 1919 Treaty of Neuilly – sur – Seine were added to this debt, coming to 2250 mill gold francs at 5 per cent annual interest over 37 years plus occupation expenses representing a quarter of the national wealth of the economy. French claims on Bulgaria were about 26% of overall external Bulgarian debt (next in the creditors' list of Bulgaria was Italy (25%), followed by Greece (12.7%) and Romania (10.55%). The external debt was 96% of the public debt as the reparations represented 9/10 of the whole external debt (Koszul (1932, p. 40). In spite of its difficult situation, Bulgaria made immense efforts to keep a record of "good" debtor who not only bore

[16]For more on the development of the Bulgarian foreign debt as well as on the overall situation of the Bulgarian economy after the Great War see the fundamental and yet unpublished research work on the history of the Bulgarian external government debt by Vatchkov, Ivanov and Todorova as well as Koszul (1932) and Stoyanov (1933).

the debt burden on its own shoulders but also did not obtain any preferential debt relief (Ivanov, 2001, 2005).

The convertibility of the lev was *de facto* interrupted at the beginning of the wars (10 of October 1912) and the unconditional government financing during the wars was suspended by the law in January 1919 (BNB, A Collection of Documents, Vol. 3, Sofia, 2001, p. 55–56). It was assumed that the break of the convertibility rule would be temporary, like some typical short-term interruptions of the gold standard during wars or other extreme events ("rule with an escape clause", Bordo and Kydland, 1996). As a result the lev was devaluated 16.4 times for the period 1915 – 1918 (Toshev, 1928, p. 116, p. 172) and respectively 26.65 times over an extended period of years (1912-1923).

As prescribed by the international financial experts the phases of the Bulgarian stabilization were also three and had the following chronology.[17] The first preparatory phase started in 1922 with the introduction of the Law on limiting banknote emissions (at a ceiling of around 5.5 bill levs). A later amendment of the law required that the banknotes in circulation and the other permanent liabilities of BNB should not exceed double the value of available gold and other stable currencies on the assets side of bank balance sheet.

Measures to constrain the public finances were also taken by limiting the advance credits extended to the government by the BNB to the amount of 4700 mill levs (up to 5400 mill levs in special cases). However, under harder budget constraints and heavy debt burden (annual payments amounted to around 132.5 mill gold francs or more than 50% of the annual budget revenues (Koszul, 1932, p. 48–49)), financing the government by banknote emissions was a crucial issue. Therefore, the state of the public finances had a considerable impact on the development of the exchange rate and prices.

The expectations of each round of debt negotiations strongly influenced exchange rate dynamics. The lowest international purchasing power of the Bulgarian lev was reached in 1921 (184 levs per US dollar) and in June 1923 a sharp rise to 75 levs per US dollar was observed which recorded appreciation of 245 %. The following events of the French invasion in Ruhr and its economic and political consequences on Germany once again put the international exchange rate system on the devaluation path. As a result of the drastic devaluation of the Reichsmark Bulgaria (BNB) lost considerable amount of money denominated in Reichsmarks blocked in German banks.[18] These assets were accounted in the coverage of the Bulgarian levs and their devaluation brought a heavy blow to the purchasing power of the Bulgarian lev. This forced BNB once again to introduce monopoly of foreign exchange trade (the first exchange rate monopoly was established in December 1918 and abolished in May 1920). The foreign exchange market was closed (11 of December 1923) and BNB started to determine the buying and selling rates for foreign currencies. According to the law dating back to 2 May 1924 BNB commenced to manage the exchange rate (in the corridor of selling rate of 139 and buying rate of 137.2 levs per US Dollar), which is interpreted as the act of the actual stabilization (Ivanov, 1929, p. 141).

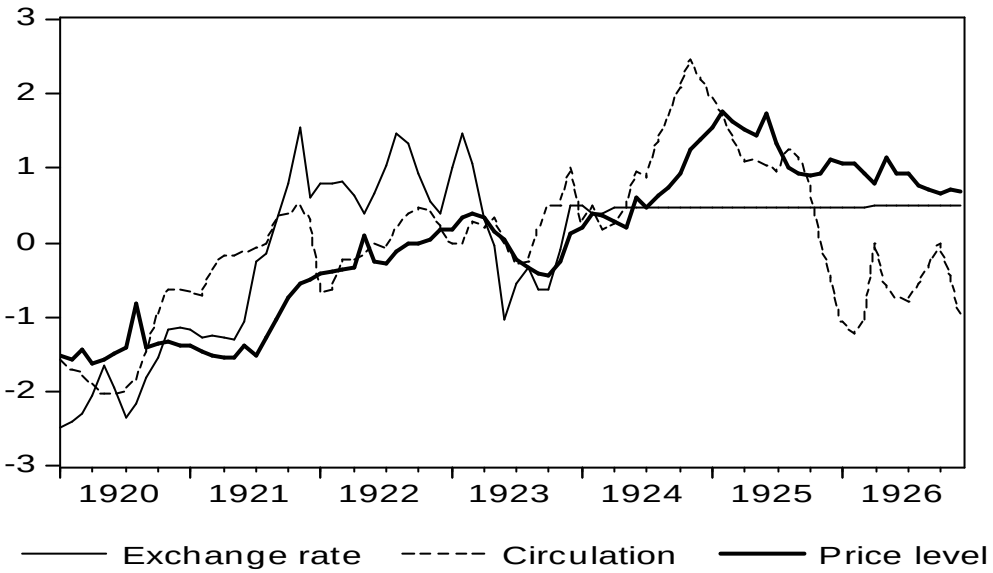
The Law on BNB dating back to 20 November 1926 is regarded as the next step in the stabilization process of the lev which constituted the convertibility of the

[17] For more details see Burilkov (1928), Toshev (1928), Ivanov (1929), Nedelchev (1940), Berov (1997).

[18] Bulgaria entered WWI on the condition of getting a loan and financial support from Germany and Austria- Hungary of around 200 mill golden Francs.

lev, thus enhancing the accomplished transition to the gold-exchange standard. According to Article 8 of the Law the coverage ratio of the banknotes was designated to 33 1/3 % as it was proposed to target 40%. Although this law defined the coverage of the banknotes in circulation, it did not fix the exchange rate to gold, i.e. the gold content of the lev was not yet determined.

Figure 3. Bulgaria (1920–1926). Price level, money in circulation and exchange rate (Lev-US Dollar) (normalized scale)



With the Stabilization Law (from 3 of December 1928) the lev was finally and legally pegged to gold as the exchange rate of "92 Levs per 1 gram of pure gold" was laid in Article 1. In further details, accounting also for the BNB commissions the exchange rate of 139 levs per US dollar equaled 139 levs per 1 ½ grams of gold (which is the gold content of the Dollar). The key role of the stabilization of the lev as a ground of the overall financial and economic stabilization is declared by the Bulgarian statesmen from its very beginning. On behalf of the central bank, its Deputy Governor Burilkov associated the stabilization of the lev with the restoration of morality in business relations (Burilkov, 1928, p. 3).

Loosing foreign currency assets, the stabilization of the lev was accompanied by deflationary monetary policy.[19] The money supply contraction was a subject of debate and criticism coming mainly from the academic economists – Toshev (1928), Yurii (1923), Nikolov (1927), Totev (1932), Boshnyakov (1936), Chapkunov (1936), Sarailiev (1937) and Monchev (1939) among others, who accused it of being at the root of the economic crisis in the country.

Although the Great Depression exacerbated the economic crisis in the country[20], Bulgaria continued to maintain the fixed exchange rate and its convertibility, and after the devaluation of the US dollar in 1933 the lev was fixed to

[19] In the period after the exchange rate crisis between 1924 and 1927, the money supply drastically contracted thanks to the restrictive monetary policy of the BNB - for example Toshev estimates that it contracted by around 1/3 (Toshev, 1928, p. 176–177) while prices did not decrease by the same degree. According to other authors, in order to reach an equilibrium prices should have decreased more (by around 40%) than the degree of money supply contraction (Yurii, 1923, p. 28).

[20] For more details about the influence of the Great Depression on the Bulgarian economy as well as on the theoretical discussions of that time see Ivanov (2001, 2005).

the French franc (BNB, A Collection of Documents, Vol. 4, Sofia, 2004, p. 419). After the devaluation of the franc in 1936, the Governing Council of the BNB continued to maintain the fixed exchange rate until the end of 1939, arguing that „we are not directly hurt by these devaluations and at the moment there is no need of certain adjustment measures and our export will follow its own way" (BNB, A Collection of Documents, Vol. 4, Sofia, 2004a, p. 557-562)[21].

The chronology of the stabilizations in France and Bulgaria shows an obvious parallelism of events. The co-movement of the monetary stabilizations is predetermined by the decisions taken at the two international conferences in Brussels (1920) and particularly in Genoa (1922). Moreover, France (which was our major creditor) was in some sense an example (an institutional benchmark) of good monetary policy conduct for the Bulgarian politicians and economists and they carefully tried to "imitate" it. As a result France and Bulgaria started almost simultaneously the preparations for stabilizing their national currencies in 1924. However, due to the fact that the French stabilization (the first Poincare stabilization) was interrupted for two years for political reasons and resumed in 1926 when Poincare was back in power, the *de facto* stabilization of the Bulgarian lev was carried on before the stabilization of the franc. Later on, the stabilizations in both countries reach their "legislative anchoring" together in 1928.

Two different ideological schemes

First of all, it is necessary to point out that most Bulgarian authors studying the pre-stabilization period observed empirical discrepancies in the traditional postulates of the QTM and PPP (for example Petkof (1926), Kemilev (1936), Yurii (1923)). Going back to the war years 1915–1918, Berov summarized these discrepancies with the following empirics: an increase of the money in circulation by 6.2 times, 5.5 times increase in prices and only 1.5 times devaluation of the exchange rate to the Swiss franc explaining this observation by the strong state intervention in the economy in those years (Berov, 1997, p. 71). According to Toshev "the barometer informing us when inflation starts to accelerate is the exchange rate" (Toshev, 1928, p. 114–116). And many other authors (Koszul, 1932) as well as Bulgarian economists, acquainted with the French literature (Ilief, 1930, Petkof, 1926) and analyzing the pre-stabilization period, shared the opinion that Aftalion's theoretical framework was the most logical one in explaining the failures of the QTM and PPP in the interwar period.

If we use the classic interpretation of stabilization as a *credibility effect* (or confidence effect) and *discipline effect*[22], we can argue that in contrast to the dominating ideology of the stabilization of the franc in France, the role of the credibility effect is relatively underestimated in the stabilization of the lev. In other words, the Bulgarian economists and politicians underlined that the main motive behind the stabilization of the lev is the management of money supply rather than the convertibility of money and the credible fixed exchange rate. The few exceptions are

[21] According to Monchev (1939, p. 55), there were two tendencies: creditors (among which France) wanted to devaluate their own currencies with the purpose to improve their balances of payments while debtors (primarily agricultural countries among which Bulgaria) decided on keeping the purchasing power of their currency in order to reduce their debts (they often introduced protective tariffs). A historical analysis of the reasons why Bulgaria did not devaluate the lev is offered by Ivanov (2005)

[22] Raybaut and Torre (2005) provide an interesting analysis on the credibility and discipline effects.

represented only by economists of the BNB[23] who gave an advantage to the credibility effect achieved by the stabilization of the lev while at the same time not rejecting the importance of the discipline effect.

Some Bulgarian authors, however, totally neglected the role of the credibility effect stemming from the stabilization. For example, Toshev (1928) criticized Adolf Wagner's theory of credibility pointing out that there were objective economic laws, otherwise "scientific arbitrariness" would reign (1928, p.99). He states that the volume of money is more important than the convertibility rule, "convertibility is an empty word" (p. 178) and "the estimation of the gold content of lev is an arbitrary act" (p. 199). Like Toshev, Nikolov argues many times that the main question is not about the coverage or whether money should be fiat or gold backed but rather about its quantity. He states that there is a "harmful psychological preference for gold money and not [for] fiat money" (Nikolov, 1927, p. 31–33). In his opinion, "the coverage is not equally suited for all times and for all countries" (p. 34). Toshev (1932, p. 52) also agrees that the main question is "How much money is necessary for market exchange?" and although he mentions the role of credible money (as a second factor which influences the value of money together with its volume), he insists that "in the process of stabilizing the monetary system, the quantity of money is more important than its coverage" (p.105–109).

Therefore, two different "ideological" schemes of monetary stabilization are formed in France (dominating credibility effect) and Bulgaria (prevailing discipline effect) which predetermine to some extent (of course, together with other factors) the different approaches in the implementation of the stabilization process in the two countries[24]. While the stabilization in France is more "market-oriented" and based on building credibility, the stabilization in Bulgaria is more administrative and regulated by the state (foreign currency exchange trade monopoly imposed by the BNB, control over the capital flows, etc.),the aim of which is to establish financial discipline.

In spite of the variety of interpretations, Bulgarian economists concurred in underlining the role of the psychological factors and expectations in determining exchange rate and price movements. Similar to the influence of the expectations about the reparations' receipts from Germany on the French franc, the value of the lev was strongly influenced by the expectations about the outcome of the debt negotiations. The franc exchange rate was further influenced by the expected introduction of new taxes announced by the left government in July 1926, while the lev exchange rate reflected the expected increase of customs tariffs in 1921.

---

[23] BNB economists stressed the role of confidence in the monetary stabilization on many occasions. For example in the Annual Report of the BNB from 1929 the analysis of the Bulgarian economic situation at the beginning of the Great Depression points out that: "The situation of the exchange rate as well as the measures undertaken by the management of the Bank have not given any reason of concern with respect to the stability of the Lev. Unfortunately, such disturbing rumours have found rich ground in our society, constantly worried about some phantasmagorical threat; those rumours went abroad and caused a great damage to our financing. The management of the Bank did its best to disperse all concerns and doubts and to ensure the public that in spite of the unfavourable economic development BNB together with the contribution of other factors is capable to maintain the stability of the Lev" (BNB, A Collection of Documents, Vol. 3, Sofia, 2001, p. 55-56).

[24] The different features of the stabilizations comparing Bulgaria to other countries of the "Gold bloc" are subject to analysis by Sarailiev (1937, p. 27) who focuses on the trade-off between "Lev's devaluation and customs' duties acceleration" and argues in favour of the latter with view to improve the external balance of Bulgaria. According to him the first approach is like a "leap in the dark". In Sarailiev's book the reader can find some of the later arguments of the presence of "*original sign*" in the peripheral countries (p. 32).

Moreover, we can draw an obvious parallel between the influence of the capital flows on the exchange rate and price development. In France there was a huge capital outflow by mid 1926 and after the second Poincare government the capital returned back to the country. Similarly there was a capital outflow from Bulgaria in the period from June 1923 till April 1924, when high taxation on capital profits was expected and quite a reverse tendency after the strong and explicit motivation of the authorities for stabilization. If we use Aftalion's scheme, the set of factors having impact on the exchange rate comprises: 1) the prospective optimistic outcome of the negotiations about the reparations, 2) the tendency towards budget balancing, 3) the development of the positive trade balance, as well as 4) many other psychological factors (mentioned by Chapkunov, 1936, p. 39).

IV. Econometric tests almost a century later

In spite of being regarded as simple from present-day point of view, Aftalion applied progressive methods of correlations and standard errors over time series of indices of the main variables and pedantically compared their dynamics. Wrongly or at least in an oversimplified approach (given modern theories), he interpreted the change of variable coming before the change of variable as a causality relation. Today we know that problems with causality are considerably more complex and that even causality in Granger-Sims terms[25].

Before proceeding with the econometric tests of the psychological theory of Aftalion, it is necessary to comment some methodological features. First, the tests will be applied from the period starting with the end of the WWI up to stabilization, as the stabilization is treated as a reaction to the dominating role of the exchange rate in explaining price development as well as in stabilizing inflation expectations. We stop at the *de facto* stabilizations, thus in the case of Bulgaria the last observation is for May 1924 and of France it's for July 1926. This automatically shortens the time series under study by almost two years.

Second, it is important to take into consideration the market "purity" characteristics in the period under study, i.e. to what extent the movement of the variables is driven by market forces and principles and to what extent the state regulates the prices or determines the development of other indicators (regulating the deficit by a coupon system or exchange rate controls). The "clearer" the market is, the more obvious is the effect of the psychological theory. Undoubtedly, during the war years the intrusion of the state in both countries was very strong. As we have already mentioned, the Bulgarian stabilization was considerably less market-based than the French one, and respectively the period in which we can detect Aftalion's interrelations between the variables is shorter (this could be one of the reasons why he has not included Bulgaria in the sample of countries which he studied).

Third, it is necessary to keep in mind the quality of statistics in both countries, for example to what extent the announced price indices reflect the actual movement of prices or to what extent the announced money in circulation is close to the true one. We would just like to note that as in France (May 1924 – April 1925), there are observations of accounting manipulations with the balance sheets of the central bank

[25] The variable *?* causes *?* at a given information set if the current value of *?* could be better forecasted by adding past values of *?* rather than without them.

in Bulgaria[26] with the purpose of disguising the true acceleration of money in circulation and the violation of the legislation. For this purpose we provide a detailed data description of indicators' dynamics reflecting data quality characteristics and policy influence which will be taken into account in the econometric analysis.

The econometric estimation of the psychological theory of Aftalion for the pre-stabilization periods in both countries (France and Bulgaria) shall be reduced to several tests of the dynamics of the exchange rate, money in circulation and prices. The fist step involves an analysis of the development of the indicators and their basic characteristics with a focus on building consistent time-series, variance and correlation statistics[27]. In order to identify causality chains, in the second step we shall apply Granger causality test to each couple of variables. And finally the econometric analysis of indicators' relations and inter-dependency shall be extended to shock response tests and variance decomposition analysis based on built VAR models.[28]

Econometric test for France (1920–1926)

The pre-stabilization period under study is the same as the one that Aftalion studied (1920-1926) and more precisely it ends with July 1926 when it became clear that Poincare would undertake the "second" stabilization reform. Therefore we use the same data which Aftalion used (Aftalion, 1927, p. 58-64). Here we would like to draw the attention of the reader to a very curious methodological case.

As we have already mentioned the weekly balance sheets of the Bank de France were falsified between May 1924 and April 1925 with the purpose of hiding the excessive emission of banknotes (this case is studied in details in Blancheton, 2001). Weekly analysis of the balance sheets reveals that by falsifying its balance sheets, the central bank managed to meet the legislative ceiling of 41 bill Francs in the fourth week every month till August 1924. The violation of the rule could no longer be disguised in the last week of September 1924 and became obvious on the 2nd of October. Although the period and volume of falsified data were not significantly large (still a symbol of the violation of the rule), we come across a methodological case stemming from the fact that Aftalion built his theory on the official values of the observed indicators.

Hence, it would be logical to ask ourselves several questions. First, is it appropriate to use the true data when in fact the expectations of agents and their decisions were taken on the basis of the falsified data? Second, is it not nevertheless right to use the true data which could better explain the fundamental relations in the QTM and PPP? Third, would it be proper to reject Aftalion's theoretical relations on the basis of data he did not use? Finally, why did he not (as well as other economists such as Rueff for instance (Rueff, 1927, p. 343)) apply the true data when the falsification was revealed in April 1925, turning out to be the direct occasion for the exchange rate crisis in 1926? The answers to these questions could be a subject of

[26] This happens outside the period under study, in the mid 30's under the governor of the BNB - Dobri Bozhilov. Later on the accusations of falsification are addressed to Kiril Gunev - a deputy governor in the same period (BNB, A Collection of Documents, Vol. 4, Sofia, 2004b, p. 945-952).
[27] Similar to what Aftalion (1927) and Petkof (1926) did for Bulgaria by means of "hand" calculations.
[28] The analytical steps are similar to the ones undertaken by Spanos et al. (1997).

another discussion[29]. In this study we shall use the same data upon which Aftalion built his psychological theory of money and exchange rate.

The statistical characteristics and above all the variance of variables (either in levels and in first difference of logs) show at first sight that the dynamics of the exchange rate is the most volatile (0.07), followed by the development of prices (0.04) and then by the money in circulation (0.01). Moreover, the correlation matrix (tables 2) proves that there is a stronger co-movement between the exchange and the prices as well as between the exchange rate and the money in circulation rather than between money in circulation and prices. Let's recall that Aftalion divided the period in small samples (up to a year) and he calculated the correlation in each of these sub-samples. However, we consider that this approach is not very useful and informative, last and not least because of the problem of interpreting correlations as causality. Therefore, we opt for testing Aftalion's theory for the whole period.

Table 2. France: Correlation matrixes of variables

In levels	Exchange rate	Money in circulation	Price level
Exchange rate	1.000000	0.925512	0.874854
Money in circulation	0.925512	1.000000	0.855251
Price level	0.874854	0.855251	1.000000

First difference of logs	Exchange rate	Money in circulation	Price level
Exchange rate	1.000000	0.286006	0.713637
Money in circulation	0.286006	1.000000	0.332630
Price level	0.713637	0.332630	1.000000

In the second step in identifying causality relations, we study Ganger causality tests in pairs by taking threshold probability of 0.05 as a criterion to reject the null hypotheses (Table 3). Thus we can summarize the results and give them the following economic interpretation: (1) exchange rate dynamics are more likely to be the determinant of money in circulation development than the other way around, (2) exchange rate dominates the dynamics of prices and (3) the causality chain between prices and money in circulation is not clear-cut. Therefore, the direction of causality observed and theoretically postulated by Aftalion and namely that the impulse starts from the exchange rate, and later on passes through to prices and to money in circulation, is in general confirmed by Granger causality tests.

Table 3. France: Granger causality tests

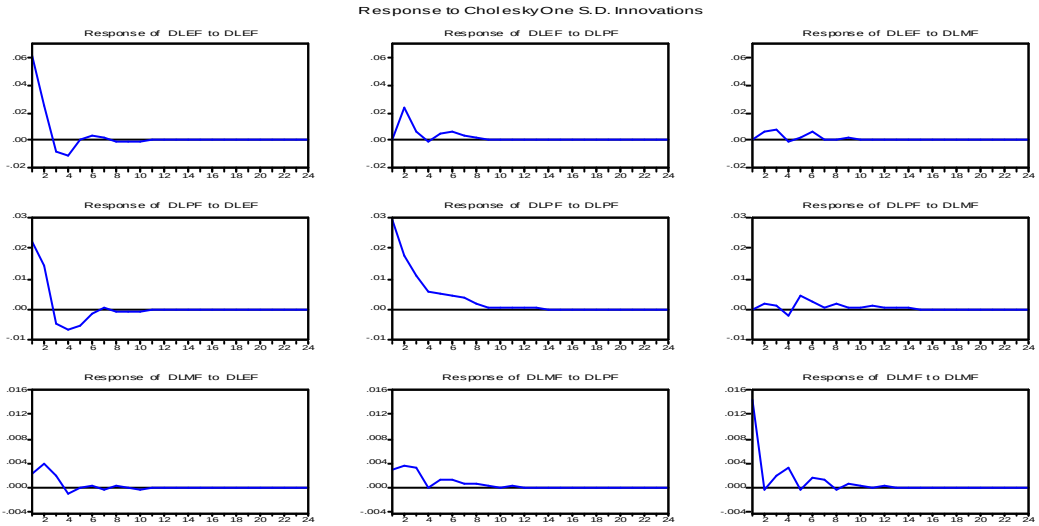
Pairwise Granger Causality Tests			
Sample: 1920 – V. 1926			
Lags: 4			
Null Hypothesis:	Obs	F-Statistic	Probability
MF does not Granger Cause EF	75	2.08188	0.09308
EF does not Granger Cause MF		2.66357	0.04003
PF does not Granger Cause EF	75	2.58119	0.04513

[29] It is possible to estimate the correlation between the true and the falsified data with the purpose of analyzing whether they move together or not. Another suggestion is to put a dummy variable in the models.

EF does not Granger Cause PF		4.40683	0.00322
PF does not Granger Cause MF	75	4.20828	0.00428
MF does not Granger Cause PF		4.22419	0.00418

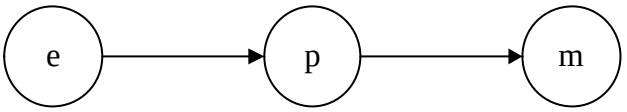
The results of the data analysis provide us with the necessary information to construct a VAR model which includes up to the 4th optimal lag of variables set according to the Akaike and Schwartz information criteria (see in the Appendix). Based on the relatively acceptable statistical characteristics of this model we generate impulse response simulations and variance decomposition as a next step of the econometric analysis. The simulation of impulse responses (Figure 4) "validates" Aftalion's theory of hegemonic exchange rate as prices respond much more to exchange rate shock rather than to a shock driven by money in circulation (column 2). Moreover, it is apparent that money in circulation has a comparatively weak influence on the development of prices and the exchange rate (column 3).

Figure 4. France: Impulse Response (IR) Analysis



Besides, the results of variance decomposition analysis show the role of inertia and expectations in the process of price and exchange rate setting. For example, the decomposition of price variance suggests that around 62% is explained by its own past values, 36% by the exchange rate and only about 1–2 % by money in circulation. In a similar way, around 85% of the volatility of the exchange rate is automatically induced, 12 % is associated with price development and only up to 3 % is a result of the changes in money in circulation. The variance decomposition analysis on money in circulation provides us with econometric evidence that 80% of it is determined by its own past values, around 11–12 % by price dynamics and about 8–9% by the behaviour of the exchange rate.

This final step of the econometric analysis allows us to "confirm" Aftalion's observations and theoretical arguments of the causality chains between these three variables and mainly that the dynamics of the exchange rate are the major source of shocks to the economy in the interwar period which passes through to prices and dies away with the adjustment of the volume of money in circulation. Thus, we can illustrate these relations in the following chart:



Econometric Test for Bulgaria (1920–1924)

For the period under study (1920–1924) we used monthly price data from the Statistical Annual Reports of the Kingdom of Bulgaria available from the beginning of 1922. In addition we analyzed data collected from the literature and namely the time series of price changes of food, heating and electricity for the period 1922–1931 (Koszul, 1932, base indices 1914=100) and monthly data of "price index" for the period 1920-1927 (Nedelchev, 1940, base indices 1913=100), without any indication of its content and source of information. Adjusting them to one and the same basis (1913=100) and comparing them with the official statistical data starting in 1922, the three time-series overlap except for 1924 when Nedelchev's data is slightly different. Thus, the price indicator for Bulgaria is the "index of the price change of food, electricity and heating for the 12 major cities in the Kingdom of Bulgaria", as we shall use Nedelchev's data for the period 1920-1923 and official data for 1924.
It is even more difficult to find reliable data on the Lev US Dollar exchange rate over the period considered. Koszul (1932) uses average monthly data published in the Federal Reserve Bulletin starting in 1922. Following the same source of information we manage to extend the series no earlier than July 1921 as before this data there are only minimum and maximum values. In BNB's quarterly bulletin ("Izvestia na BNB") there are monthly "average" exchange rate data for an earlier period – up to 1919 as we observe some differences among the two time-series. As we already mentioned when we discussed Bulgarian price data, putting aside the deliberate data manipulation (typical for the period before and during stabilization), the differences could be due to rounding numbers or lack of qualified statistical staff at the BNB or print errors[30]. Our aim to cover a period as long as possible imposes limits on using BNB data, provided that economic agents in the country take decisions based on the official source of information. Interestingly, BNB tends to underestimate nominal appreciation and overestimate devaluation of the national currency.

And finally with respect to the third variable (money in circulation) the differences between available data series are minor, regardless of the numerous approaches to define this indicator. Given the data availability constraints, we study only banknotes in circulation as we have not found monthly statistics of the component on the liability side of the BNB balance sheet (demand deposits and correspondence accounts) before 1922. Moreover, the official data published by the BNB[31] and the data of money in circulation in Koszul (1923) are identical, so we have no problems in constructing this historical time series for the period under study.

We may now turn to testing the statistics following the steps taken in analyzing the French pre – stabilization period. The statistical characteristics of volatility bring exchange rate movements to the fore, though not as clearly as in the French case. The exchange rate records the highest degree of deviation from its mean

[30] For instance, the monthly average buying exchange rate for May 1924 is 147.2 and its maximum and minimum rates are 137.2 The latter is obviously a printing mistake which is most probably the explanation of the resulting buying rate higher than the monthly average selling rate.

[31] Monthly data for banknotes in circulation for the period prior to 1928 were collected and generously provided by Martin Ivanov.

value (0.11), followed by price (0.04) and money in circulation which ranks last (0.02),taking the variables as first difference of logs.

Interestingly, correlation matrixes and particularly when variables are transformed in first difference of logs, suggest a stronger correlation between exchange rate and money in circulation (Table 4). It is worth noticing that for different sub-samples the correlations vary a lot, which reflects the high dynamics and different characteristics of market-setting mechanisms, degree of state intervention, etc. For instance shortening the period by eliminating the observations before July 1921, produces a closer correlation between exchange rate and priced dynamics both in levels and in first difference of logs.

Table 4. Bulgaria: Correlation matrixes of variables

In levels	Exchange rate	Money in circulation	Price level
Exchange rate	1.000000	0.793905	0.780339
Money in circulation	0.793905	1.000000	0.691938
Price level	0.780339	0.691938	1.000000

First difference of logs	Exchange rate	Money in circulation	Price level
Exchange rate	1.000000	0.141123	0.000123
Money in circulation	0.141123	1.000000	0.019133
Price level	0.000123	0.019133	1.000000

Granger causality tests also show some differences from the dynamics of French monetary variables. Being more liberal (applying the acceptability/rejection criterion at probability of 0.10), we can say that: 1) the exchange rate is obviously the cause of price movements, 2) the exchange rate reflects money in circulation dynamics as well, and 3) that there is some probability that money in circulation influences price changes. What cannot be ruled out, however, is the alternative that exchange rate dynamics have a direct impact on prices.

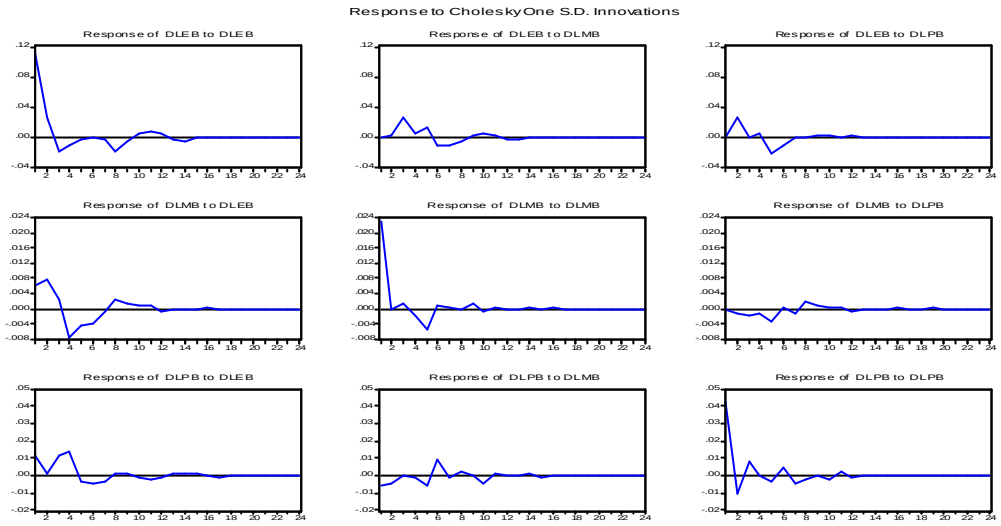
Table 5. Bulgaria: Granger Causality test

Pairwise Granger Causality Tests			
Sample: 1920–V.1924			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Probability
PB does not Granger Cause EB	51	0.43735	0.64840
EB does not Granger Cause PB		4.95947	0.01121
MB does not Granger Cause EB	51	2.69840	0.07797
EB does not Granger Cause MB		2.29515	0.11217
MB does not Granger Cause PB	51	2.07661	0.13695
PB does not Granger Cause MB		0.07956	0.92365

Despite the comparatively short sample of 53 monthly observations (we have 79 observations for France), the VAR models provide us with interesting results (see Appendix). In the first place, the impulse response analysis gives indications of weak influence of money in circulation on the price and exchange rate setting mechanisms (column 2 in figure 5). All three variables are primarily determined by themselves, implying either high degree of independence (strong inertia) or broken relations due to some kind of interference or administrative setting mechanism. What is important

in the case of Bulgaria is the relatively stronger response of money in circulation (column 1, raw 2) and of prices (column1, raw 1) to an exchange rate shock which justifies the hegemony of the exchange rate. However, the IR analysis suggests that the volume of money in circulation lies somewhere between the exchange rate and prices in the causality framework.

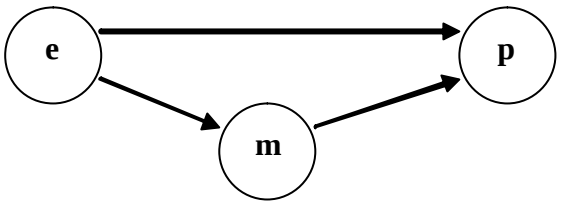
Figure 5. Bulgaria: Impulse Response (IR) Analysis



The variance decomposition analysis provides us with a quantitative estimate of the causality relations between the variables. The results show that 74-75% of the price variance is predetermined by its own past values, around 19% by the volatility of the exchange rate and around 7% by the movements of money in circulation respectively. The variance decomposition of the exchange rate (raw 1), apart from the considerably high degree of self-induced variance (84–85%), is equally influenced (by around 8%) by the (expected) performance of the price level and money in circulation. The econometric evidence of the variance decomposition of money in circulation suggests that the direct impact from the exchange rate is about 25%, which in comparison with the 3% inflation impact is more significant. Hence, money in circulation is obviously a function of the exchange rate and not the other way around. Summarizing, the results suggest that the exchange rate is the second most important variable in explaining price and money in circulation movements after their strong dependence on their own "past behaviour". Of course these estimates, apart from being conditional on the short sample, could find a reasonable economic explanation like the considerable "non-market" setting of the exchange rate prior to the stabilization in Bulgaria (the monopolistic interventions on behalf of the BNB in the foreign exchange trade) in comparison to the French pre-stabilization period. We produce similar results of the causality test and with the VAR models by shortening the period up to the end of 1923 when the exchange rate control is *de facto* introduced and the development of the exchange rate starts to reflect to a great extent the interference of the central bank.

Although the exchange rate is the cause of price movements, yet the latter are also influenced by the development of money in circulation. This gives certain grounds for claiming that exchange rates affect prices in two ways: 1) directly and 2) indirectly, through money in circulation as in both cases, this is carried out by means

of expectations. Therefore, the causality chains in Bulgaria in the pre-stabilization period can be illustrated by the following chart:



Since Aftalion's theory and his statistical tests have been "applied" to the Bulgarian monetary history by his contemporaries, it is interesting to compare their results with the ones generated by the VAR techniques. As a whole, the estimates by Koszul (1932) and Petkof (1926) are very similar to ours. According to the former author,the curves and correlation analysis of the money in circulation, prices and the exchange rate produce a clear-cut outcome: that in the period 1920 – 1924 the causality chains start from the exchange rate (pp. 120-121, pp. 187-191) as with time the significance of money in circulation increases. The statistical estimates of Petkof are even closer to ours. The author finds that in the whole sample of 1920 (1921) – 1924 the exchange rate dictates the development of prices and money in circulation, as in times of economic upsurge he observes the following causality chain "exchange rate - money in circulation – prices" while in times of economic drop there are two chains "exchange rate-prices" and "money in circulation-prices" (p.112). In conclusion Petkof summarizes that the determinants of prices are two: exchange rate and money in circulation (money supply) (pp. 141-148, pp. 361-377).

It is interesting to notice that according to our tests the causality chains described in Bulgaria are similar to the ones which Aftalion identifies in Germany. This similarity is not surprising as both countries are defeated in the IWW and it is very likely that debt burden and debt related expectations influence the dynamics of the variables and give this specific causality relation. In this configuration the exchange rate affects prices through two channels: directly and indirectly by means of money in circulation.

V. Concluding remarks

The interwar stabilizations have a number of common features with the modern concepts dominating the discussions on the effectiveness of monetary regimes and particularly in favour of those based on exchange rate stabilization, convertibility and on rules in general rather than on discretion. Such monetary regimes have the unambiguous advantage of enhancing credibility in the monetary authorities and thus to impose discipline. In this paper we do a comparative analysis of stabilization in France and Bulgaria. The two approaches to stabilization are the logical responses to the specific pre-stabilization dynamics of macroeconomic variables which are difficult to explain by the conventional QTM and PPP theories.

Albert Aftalion is one of the first economists to emphasize the role of the psychological factors, expectations and confidence in the analysis of the development of inflation, exchange rate and money in circulation. In many aspects his psychological theory of money and exchange rate precedes the modern understanding of the process of prices and exchange rate setting (the role of expectations,

overshooting effects, Random Walk, multiple equilibrium dynamics, self-fulfilling prophecy, etc.). Aftalion builds his theory on observations in the pre-stabilization experience in several European countries (Bulgaria is not included in his sample of empirical illustrations) and application of basic statistical methods (sometimes leading to imprecise interpretations of correlations like causality). The present –day econometric techniques allow us to run new tests on the validity of Aftalion's theory at that time. Despite the structural differences between France and Bulgaria in the pre-stabilization period, as in Bulgaria there was a great degree of administrative interference of the government in the monetary activities, Aftalion's theory proves to accommodate the facts as a whole.

The role of expectation is very significant as the money in circulation is no longer the leading indicator for prices and exchange rate development but rather and very often it is the final element in the causality chain of monetary relations. In both cases (of France and Bulgaria) the exchange rate is in the focus of expectations of economic agents. Its *de facto* and later on *de jure* stability as well as the convertibility of the national currency turns out to be the starting point of the whole process of stabilization. The specific characteristics of the stabilization process in both countries reflect the different ideological paradigms under which stabilizations were carried out. They illustrate the importance of the discipline effect (the control of money in circulation) in the debate concerning the stabilization in Bulgaria, and the dominant role of the credibility effect which was well shared by all economists and politicians involved in the French stabilization. In spite of the differences, stabilization measures are taken in response to similar problems and monetary dependences, all of them finding expression in the decisive role of exchange rates and expectation.

References

Aftalion, A. (1925). Existe-t-il un niveau normal du change, Revue Economique internationale, vol. 4, pp. 423-450.

Aftalion, A. (1927). Monnaie, prix et change. Expériences récentes et théorie, Recueil Sirey, Paris

Aftalion, A. (1938) L'or et la monnaie. Leur valeur. Les mouvements de l'or, Les éditions Domat-Montchrestien, Paris.

Berov, L. (1997) The Bulgarian National Bank at 120, an unpublished manuscript (in Bulgarian).

Bainville, J. (1920 [2002]) Les conséquences politiques de la paix, Gallimard, Paris.

Blancheton, B. (2001). Le Pape et l'Empereur. La Banque de France, la direction du Trésor et la politique monétaire de la France (1914-1928), Albin Michel, Paris

BNB (1930) Annual Report for 1929 (in Bulgarian).

BNB (2001) Motives to the draft law on the exchange rate and the coverage of the BNB banknotes, with the draft text included, the Central Public Record Office, The Bulgarian National Bank: A Collection of Documents, Volume 3, 1915-1929, documents No. 2, p. 55-56 (in Bulgarian).

BNB (2004) A protocol of the BNB Governing Council with a resolution stating that the foreign currency exchange rates shall temporarily be based on the French franc instead of the US dollar owing to the considerable depreciation of the US dollar on international markets, the Central Public Record Office, The Bulgarian National Bank: A Collection of Documents, Volume 4, 1930-1947, documents No. 183, p. 419 (in Bulgarian).

BNB (2004a) A protocol of the BNB Governing Council with a statement of the governor D. Bozhilov on the foreign exchange rate policy and the clearing agreements with some countries and a resolution on the amendments to the general regulation on imports and exports, the Central Public Record Office, The Bulgarian National Bank: A Collection of Documents, Volume 4, 1930-1947, documents No. 295, p. 557-562 (in Bulgarian).

BNB (2004b) An indictment against Kiril Gunev, Dr. P. Kyosev, G. Proichev, Sv. Toshev, Dr. N. Hristov and St. Stoichev with a decision to bring a suit against them under the Regulation Law on People's Court Trial against the Perpetrators Responsible for Bulgaria's Dragging into the World War against Allied Peoples, the Central Public Record Office, The Bulgarian National Bank: A Collection of Documents, Volume 4, 1930-1947, documents No. 566, p. 945-952 (in Bulgarian).

Bordo, M., F. Kydland (1996) The Gold Standard as a Commitment Mechanism, in Bayoumi, T., B. Eichengreen, M. Taylor, ed., Modern Perspectives on the Gold Standard, Cambridge University Press.

Bordo, M., M. Frandreau (2001), Core, Periphery, Exchange Rate Regimes, and Globalization, in Michael D. Bordo, Alan M. Taylor and Jeffrey G. Williamson, Editors, Globalization in Historical Perspective, NBER Conference held May 4-5, 2001, Forthcoming from The University of Chicago Press.

Boshnyakov, D. (1936) Prices and the Monetary Problem, Razvitie Printing House, Sofia (in Bulgarian).

Burilkov, Zh.T. (1928) The Monetary Reform, S.M. Staikov Printing House, Sofia (in Bulgarian).

Chapkunov, A. (1936) Crises and Foreign Currency, Hudozhnik Printing House, Sofia (in Bulgarian).

Dangel-Hagnauer, C., A. Raybaut (2004). Monetary reform in France: the French economists and the stabilization of the franc in the 1920s, in Barens, I., V. Gaspari (eds)., Political Events and Economic ideas, Edward Elgar

Eichengreen, B., M. Flandreau, Eds., (1997), The gold standard in theory and history, Routledge, London and New York.

Eichengreen, B. (1997 [1996]. L'expansion du capital. Une histoire du système monétaire international, L' Harmattan.

Hawtrey, R. (1932). The Art of Central Banking, Longmans, Green and Co., London.

Ilief, P. (1930). La banque nationale de Bulgarie et l'histoire de sa politique monetaire, Lyon

Ivanov, A. (1929) Report of the BNB Governor Asen Ivanov at the Reception to celebrate the fifth anniversary of the BNB Foundation, the Central Public Record Office, The Bulgarian National Bank: a Collection of Documents, vol. 3, 1915-1929, document No.22, p. 136-144 (in Bulgarian).

Ivanov, M (2001) Political Games with the external Debt. Bulgarian Scenarios of Economic Crises and Upsurge, 1929-1934, Zlatyo Boyadzhiev Publishing House, Sofia (in Bulgarian).

Ivanov, M (2005) Could We Devaluate? What is There behind the Orthodox Bulgarian Answer to the Great Depression?, Historical Review, No.3, 4 (in Bulgarian).

Jacob, D. (1996). La Banque centrale et le secret, Thèse pour le doctorat ès sciences économiques, Université Montesquieu-Bordeaux IV

Kemilev, A. (1936) Money Circulation in Bulgaria, Journal of Higher School of Commerce Graduates, Varna, Volume I, Issues 4, p. 287-3000 (in Bulgarian).

Kemp, T. (1971). The French Economy under the Franc Poincare, The Economic History Review, New Series, vol. 24, N 1, pp. 82-99.

Keynes, J.M. (1923). A Tract of Monetary reform, MacMillan, London

Keynes, J.M.(1928). Reflexions sur le franc et sur quelques autres sujets, Les documentaires, Paris

Kindleberger (1990) [1984]. Histoire financière de l'Europe occidentale, Economica, Paris

Kindleberger (1988) [1973, 1986]. La crise mondiale 1929-1939, Economica, Paris

Koszul, J. (1932). Les efforts de restauration financière de la Bulgarie (1922-1931), Félix Alcan, Paris

Monchev, B. (1939) The Monetary Problem after the World War, Sofia (in Bulgarian).

Mouré, K. (1996). Undervaluing the Franc Poincare, The Economic History Review, New Series, vol. 49, N 1, pp.137-153.

Nedelchev, K (1940) Monetary Issues: Bulgaria 1879-1940, Knipegraph Printing House, Sofia (in Bulgarian).

Nikolov, G. (1927) Stabilization: Monetary and Economic (Thoughts on the Monetary and Economic Crisis), Elisei Petkov Printing House, Sofia (in Bulgarian).

Nogaro, B. (1924), La monnaie et les phénomènes monétaires contemporains, Marcel Giard, Editeur, Paris.

Nenovsky, N. (2006). Exchange rate Inflation. The contribution of Albert Aftalion (1874-1956), Editions of Bulgarian National Bank

Petkof, J. (1926). Prix, circulation et change en Bulgarie de 1890 a 1924, Jouve & Cie Editeurs, Paris

Raybaut, A., D. Torre (2005). Discipline, confiance et stabilité des régimes de caisse d'émission en transition vers l'Euro, Paper presented at Marrakech, Maroc, 16-17 mars, 2005

Rist, Ch. (1933, [1925]). Pour la stabilisation du franc, in Rist, Ch., Essais sur quelques problèmes économiques et monétaires, Recueil Sirey, Paris

Rueff, J. (1927), Théorie des phénomènes monétaires, Payot, Paris.

Sarailiev, G. (1937) Monetary Devaluations and Their Effect at Home and Abroad, Sofia (in Bulgarian).

Sauvy, A. (1984). Histoire économique de la France entre les deux guerres, Economica, Paris

Simmons, B. (1996). Rulers of the game: central bank independence during the interwar years, International Organization, vol. 50, n 3, summer, pp. 407-443.

Spanos, A., E. Andreou, G. Syrichas (1997). A VAR model for the monetary sector of the Cyprus economy, University of Cyprus and Central Bank of Cyprus

Stoyanov, N. (1933) Reparations and Inter-Allied Debts. Bulgarian Government Debts, Sofia (in Bulgarian).

Toshev, G. (1928) Foreign Currency and Foreign Exchange Policy. A Scientific Inquiry into the Reasons of the Economic Crisis, Franklin Cooperative Printing House, Sofia (in Bulgarian).

Totev, T. (1932) The Money. Coins – Banknotes - Paper Money, Zadruzhen Trud Printing House, Sofia 9in Bulgarian).

Vallance (1998 [1996]). Histoire du franc, Champs, Flammarion, Paris

Whale, P. (1937), The working of the prewar gold standard, in Eichengreen, B., and M. Flandreau Eds., (1997), The gold standard in theory and history, Routledge, London and New York.

Yurii, (1923) Monetary Crisis Liquidation (the Appreciation of our Lev), Pridvorna Printing House, Sofia (in Bulgarian).

Appendix

VAR Model for France

Vector Autoregression Estimates
Date: 08/08/06 Time: 14:06
Sample(adjusted): 1920:06 1926:07
Included observations: 74 after adjusting endpoints
Standard errors in ( ) & t -statistics in [ ]

	DLEF	DLPF	DLMF
DLEF(-1)	0.134482	0.011680	0.018543
	(0.15956)	(0.09593)	(0.03860)
	[0.84283]	[0.12175]	[0.48037]
DLEF(-2)	-0.266052	-0.222034	-0.010792
	(0.15529)	(0.09336)	(0.03757)
	[-.71324]	[-2.37816]	[-0.28727]
DLEF(-3)	0.043869	-0.024333	0.012586
	(0.15030)	(0.09036)	(0.03636)
	[0.29187]	[-0.26928]	[0.34614]
DLEF(-4)	-0.047258	-0.092423	0.008085
	(0.14425)	(0.08673)	(0.03490)
	[-.32761]	[-1.06569]	[0.23167]
DLPF(-1)	0.742948	0.589630	0.127069
	(0.26025)	(0.15646)	(0.06296)
	[2.85480]	[3.76848]	[2.01830]
DLPF(-2)	-0.418530	-0.017684	0.007236
	(0.28566)	(0.17175)	(0.06911)
	[-.46511]	[-0.10296]	[0.10471]
DLPF(-3)	0.045958	0.158871	-0.077449
	(0.29074)	(0.17480)	(0.07033)
	[0.15807]	[0.90889]	[-1.10115]
DLPF(-4)	0.134019	0.012063	0.013832
	(0.27123)	(0.16307)	(0.06562)
	[0.49412]	[0.07398]	[0.21080]
DLMF(-1)	0.458827	0.106168	-0.009510
	(0.54824)	(0.32961)	(0.13263)
	[0.83692]	[0.32210]	[-0.07170]
DLMF(-2)	0.366661	0.021685	0.124091
	(0.53723)	(0.32299)	(0.12997)
	[0.68251]	[0.06714]	[0.95480]
DLMF(-3)	-0.092247	-0.126553	0.213472
	(0.52357)	(0.31478)	(0.12666)
	[-.17619]	[-0.40204]	[1.68537]
DLMF(-4)	0.247051	0.502510	-0.000416
	(0.52339)	(0.31467)	(0.12662)
	[0.47202]	[1.59694]	[-0.00328]
C	0.009187	0.004769	0.003164
	(0.00835)	(0.00502)	(0.00202)
	[1.09986]	[0.94964]	[1.56608]
R-squared	0.323921	0.398689	0.234344
Adj. R-squared	0.190921	0.280399	0.083723
Sum sq. resids	0.232151	0.083914	0.013587
S.E. equation	0.061691	0.037090	0.014924
F-statistic	2.435508	3.370420	1.555849
Log likelihood	108.2825	145.9337	213.2996
Akaike AIC	-2.575202	-3.592802	-5.413503
Schwarz SC	-2.170434	-3.188034	-5.008735
Mean dependent	0.013873	0.005674	0.005169
S.D. dependent	0.068584	0.043723	0.015591

Determinant Residual Covariance	6.94E-10
Log Likelihood (d.f. adjusted)	465.2493
Akaike Information Criteria	-11.52025
Schwarz Criteria	-10.30595

VAR Model for Bulgaria

Vector Autoregression Estimates
Date: 08/08/06 Time: 14:11
Sample(adjusted): 1920:06 1924:05
Included observations: 48 after adjusting endpoints
Standard errors in ( ) & t -statistics in [ ]

	DLEB	DLPB	DLMB
DLEB(-1)	0.152272	0.045539	0.076154
	(0.15511)	(0.06360)	(0.03339)
	[0.98172]	[0.71605]	[2.28052]
DLEB(-2)	-0.313069	0.109705	0.015853
	(0.15772)	(0.06467)	(0.03396)
	[-1.98493]	[1.69640]	[0.46685]
DLEB(-3)	-0.191620	0.151034	-0.036271
	(0.16091)	(0.06598)	(0.03464)
	[-1.19086]	[2.28923]	[-1.04701]
DLEB(-4)	-0.147989	0.012393	0.029794
	(0.17155)	(0.07034)	(0.03693)
	[-0.86265]	[0.17619]	[0.80669]
DLMB(-1)	0.320343	-0.252603	-0.021176
	(0.73011)	(0.29936)	(0.15719)
	[0.43876]	[-0.84381]	[-0.13472]
DLMB(-2)	1.263009	-0.053182	0.015976
	(0.69362)	(0.28440)	(0.14933)
	[1.82088]	[-0.18700]	[0.10698]
DLMB(-3)	0.160999	-0.081902	-0.210192
	(0.71850)	(0.29460)	(0.15469)
	[0.22408]	[-0.27801]	[-1.35881]
DLMB(-4)	0.963770	-0.470828	-0.292166
	(0.70101)	(0.28743)	(0.15092)
	[1.37484]	[-1.63808]	[-1.93588]
DLPB(-1)	0.622371	-0.234208	-0.034306
	(0.39255)	(0.16095)	(0.08451)
	[1.58547]	[-1.45515]	[-0.40593]
DLPB(-2)	0.053459	0.089589	-0.092002
	(0.37463)	(0.15361)	(0.08066)
	[0.14270]	[0.58323]	[-1.14068]
DLPB(-3)	0.272731	-0.000270	-0.058845
	(0.35342)	(0.14491)	(0.07609)
	[0.77168]	[-0.00187]	[-0.77336]
DLPB(-4)	-0.259082	-0.207514	-0.068658
	(0.35277)	(0.14464)	(0.07595)
	[-0.73442]	[-1.43467]	[-0.90401]
C	0.008887	0.008602	0.007394
	(0.01820)	(0.00746)	(0.00392)
	[0.48832]	[1.15278]	[1.88726]
R-squared	0.290444	0.314350	0.309344
Adj. R-squared	0.047168	0.079269	0.072548
Sum sq. resids	0.425355	0.071509	0.019715
S.E. equation	0.110241	0.045201	0.023734
F-statistic	1.193887	1.337202	1.306374
Log likelihood	45.31574	88.11014	119.0323
Akaike AIC	-1.346489	-3.129589	-4.418010
Schwarz SC	-0.839706	-2.622806	-3.911227
Mean dependent	0.014162	0.008986	0.004814
S.D. dependent	0.112936	0.047106	0.024645

Determinant Residual Covariance	1.20E-08
Log Likelihood (d.f. adjusted)	233.4311
Akaike Information Criteria	-8.101296
Schwarz Criteria	-6.580945