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Exchange Rates and Inflation: France and Bulgaria in the Interwar Period and the Contribution of Albert Aftalion (1874–1956)

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SUMMARY. It is little known that the great French interwar economist Albert Aftalion (1874—1956) was born in Ruschuk (today Ruse) in Bulgaria. His "psychological theory of money and exchange rates" has a symbolic significance in today's Bulgaria which in 1997 chose stabilization based on a currency board. In many ways this is similar to stabilization devices adopted elsewhere after the War. At the time, Aftalion was exceptionally popular in Bulgaria, perhaps owing to the fact that numerous Bulgarian economists had studied or obtained postgraduate degrees in France. (Indeed, Aftalion himself may have lectured to many of them at the Sorbonne.)

Some of these economists attempted to copy their tutor's methodology and analyses directly, thus testing his ideas on Bulgarian economic reality. One of them was Josif Petkof (Petkof, 1926), who in 1927 even copied the title of Aftalion's book, merely transposing the order of words (Prices, Circulation, and Exchange Rate).

This study has three tasks. First, to compare French (central) and Bulgarian (peripheral) interwar financial stabilizations. Second, to apply modern econometric techniques (VAR models) to Aftalion's theory and check the extent to which it matches the genuine movements of monetary variables and the directions of their causality (Aftalion's proof rests on elementary statistical properties of the statistical series). Returning to the history of French and Bulgarian interwar stabilizations and viewing it through the prism of Aftalion's ideas would give us not only new elements in analyzing today's currency stabilization issues (especially the key role of the exchange rate and monetary rules), but would also link Bulgaria and France symbolically.

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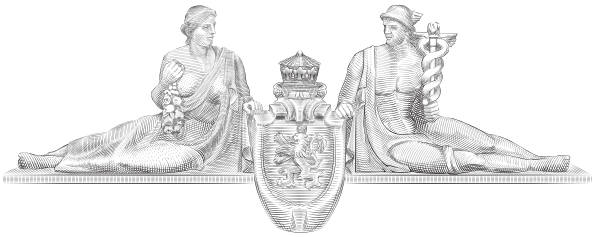

XIII REUNION
DES GOUVERNEURS DES BANQUES CENTRALES
DES PAYS FRANCOPHONES

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I. Introduction

As distinct from other small nations like Hungary, Bulgaria has not produced world famous economists. Hence even minor facts linking the country to an economist of such magnitude are worth noting. Such an economist is the Frenchman Albert Aftalion (1874—1956) who rose to prominence during the interwar period. Few people know that Aftalion was born in the Bulgarian city of Ruschuk (Ruse). Today, Aftalion's works figure mainly in the history of economic thought, and even specialists rarely learn of his link with Bulgaria. In his *History of Economic Analysis*, Schumpeter mentions two economists linked with Bulgaria: Aftalion and Oskar Anderson.[1] While we may assume Schumpeter was aware of the latter's Bulgarian link (they were co-members of the international Econometric Society) he would hardly have known that Aftalion was born in Bulgaria.[2]

Several things drove me to write this study. First, 2006 marks the 50th anniversary of Aftalion's death and just over 130 years from his birth. Second, putting his Jewish origin aside, Aftalion is a symbolic link between France and Bulgaria. Third, his psychological exchange rate theory has a definite resonance in today's Bulgaria, which in 1997 chose stabilization resting on a pegged exchange rate under a currency board: a move similar in many ways to post-Great War stabilizations. Today, Aftalion is better remembered for his work on the economic cycle and as father of the accelerator which shows how income affects investment. I feel his exchange rate theory is exceptionally original, anticipating in many ways a number of modern ideas on exchange rates.

Albert Aftalion became popular with his psychological theory of exchange rates which threw doubt on the postulates of the quantitative theory of money and the theory of purchasing power parity. He arrived at his theory by monitoring price, money, and exchange rate dynamics in a number of countries (particularly France) after the Great War. The Poincaré stabilization of 1926 to 1928 brought a practical proof of the significance of exchange rates in monetary and financial stabilizations.

At that time Aftalion was exceptionally popular in Bulgaria, most likely because many Bulgarians were reading economics in France (it may even be

[1]Oskar Anderson features in Schumpeter's book as the scientist who conducted one of the deepest and most careful empirical tests of Fisher's theory (Schumpeter, 1983 [1954], p. 458).

[2]Curiously, Ragnar Nurkse had a similar fate. Though born in Estonia, where he lived, he is considered Norwegian to this day even by informed economists such as Paul Krugman (Krugman, 2002). Kalev Kukk (2004) sets things to rights in an Eesti Pank publication which strengthened my wish to write about Aftalion. Intriguingly, another of Kukk's world famous Estonian economists, Nikolay Köstner, was also linked with Bulgaria, having been a League of Nations-nominated BNB technical adviser in 1932. He went on to lead a Central Bank of Egypt research unit.

supposed that Aftalion himself lectured to those of them at the Sorbonne). Some of them tried copying his methodology and analysis directly by testing them out on Bulgarian economic reality. One such was Joseph Petkof (Petkof, 1926) who even borrowed Aftalion's title, merely changing the order of variables from 'monnaie, prix et change' to Prices, Circulation, and Exchange Rate.[3]

I pursue three tasks with this study: first, to acquaint Bulgarian readers with Aftalion's life (in his biography of Aftalion, Bernard Delmas is almost certain he has been forgotten in Bulgaria: Delmas, 2003); second, to present his theory of exchange rates and their effect on prices through the prism of a comparative analysis of the French and Bulgarian interwar stabilizations. Third, to apply modern econometrics (VAR models) to Aftalion's theory and see the extent to which it is borne out by facts. In the French case, I use statistics the author himself cites in his book and employs (using basic statistics). The current study follows a similar logic.

[3]As does Koszul (Koszul, 1932).

II. Albert Aftalion: a French Economist Born in Bulgaria

There is no doubt that alongside Charles Rist, Bertrand Nogaro, and Jacques Rueff, Albert Aftalion was the most renowned French economist in the interwar period. As distinct from the former three who occupied a variety of senior posts in the financial and political administration, Aftalion was a pure academic.[4] Though badly upset during the Second World War, his career was successful.

Albert Aftalion, 1874–1956, Maison des sciences économiques, Paris, from Dormard, ed., 2003

[4]During his stay in Lille, Aftalion was publicly active within the Movement for Workers' Rights, but after moving to Paris he devoted himself entirely to academic work.

Albert Aftalion was born on 21 October 1874 in Ruse (Ruschuk) in a Sephardic Jewish family. The novelist Elias Canetti[5] was also born in Ruse. After Bulgarian Liberation, when he was aged just four, his family emigrated to France, setting up home in Nancy. Nancy hosted a large Bulgarian colony, with numerous students, many of them of dentistry. The city was also a temporary home to famous Bulgarian poet Peyo Yavorov.

Aftalion graduated from the Sorbonne, authoring two doctoral theses: in law (1898) and economics (1899), the latter on Sismondi. He settled in Lille, teaching there between 1900 and 1922. While there, his interests evolved from an analysis of northern French economics (mining and cloth) and German harbors (Aftalion used sociological surveys) to applying statistics to economic study (he set up a hall of statistics)[6] and political economy in which the stress fell on cyclic theory.

In 1922 and 1923 Aftalion left Lille and moved to Paris to lecture in statistics at the Sorbonne. He did so for 11 years until inheriting Charles Rist's post in 1934 and taking over lecturing in political economy.

Albert Aftalion, 1874—1956, Matieu Pieters, La Haye, from Dormard, ed., 2003

[5]As did Prof. Garabed Minassian.

[6]According to Blancheton (1998, p. 715), Aftalion jointly with François Simiand was the first French economist to apply statistical methods systematically. Aftalion also wrote one of the first French statistics textbooks, the *Cours de statistique,* 1928.

After the Vichy government adopted its Jewish Statute,[7] in late 1940 Aftalion was removed from lecturing and left in isolation in Toulouse, spending four years there. In late 1944, he was restored to the Sorbonne, teaching there until retirement in 1950.[8]

Aftalion's was a regular byline in mostly Francophone academic journals, both as an author and a member of editorial boards. These included, inter alia, the *Revue d'économie politique, the Revue économique, and Kyklos*.[9] Yet, his ideas were known outside France and a number of his works were published in English[10] and other languages.

Albert Aftalion died aged 82 on 6 December 1956 at Chambesy and was buried at Auteuil near Geneva.[11] His contemporaries remember him as an exceptionally modest and reserved person; as Lhomme put it, 'an eternal researcher and an eternal student' (Lhomme, 1957, p. 358).

Today Aftalion's name is mentioned mainly in three contexts: the accelerator theory, the economic cycle, and the role of the exchange rates in price movements. While the former two are largely known beyond France, his ideas on exchange rates and money are somewhat forgotten, some interest in them lingering on in France alone.

Aftalion has significant publications in each context. The accelerator idea is set out in his paper, 'La realité des surproductions générales: essai d'une t*héorie des crises générales et périodiques*,' published in the *Revue d'économie politique* in 1909. This formed the basis of his 1913 two-volume work on economic cycles, *Les crises periodiques de surproduction:* arguably his best known work. In brief, accelerator theory claims that investment is a function of demand and income as opposed to multiplier, where the causality is exactly the opposite: from investment to income. Ideas on the accelerator, as well as on its cumulative movement with the multiplier went on to form the basis of a number of theories on the economic cyclical behavior, such as Paul Samuelson's oscillator.

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[7]France's Vichy Law was the only indigenous piece of anti-Semitic legislation (compare with Bulgaria).

[8]Interestingly, the Statute was not applied against Jacques Rueff.

[9]Aftalion was among the founders of the *Revue économique* in 1950 and an active editorial board member until his death in 1956. *The Revue économique* was founded as an alternative to the *Revue d'économie politique*, aiming to open doors to new trends in economics and be a tribune of interdisciplinary studies which would make the discipline more realistic (François Simiand was a board member). Most board members were 'disciples' of Aftalion's. Later the journal strayed from its original aims (see Arena, 2000, Steiner, 2000). See list of Aftalion's works in Appendix 1.

[10]See for instance Aftalion's paper in *The Review of Economic Statistics*, where he sets out his basic ideas on the economic cycle at Pierson's invitation (Aftalion, 1927).

[11]See the obituaries in the Revue économique (Lhomme, 1957) and the *Revue d'économie politique* (Guitton, 1956).

Aftalion's interest in cycles was not isolated. At the time it was fashionable for economists to focus on cycles and crises. This was motivated both by actual conditions (the multitude of crises at the time and the cycles are more pronounced than before) and by theoretical ones (the then-fashionable analyses of the statistical features of dynamic orders comprising economic variables such as prices and money in circulation). The USA and later Europe, Austria[12] in particular, sprouted whole movements which studied economic conditions.

The theory of economic cycles and overproduction crises (Aftalion preferred the term cycle theory to crisis theory, considering the latter a special case within the former) was strongly influenced by Austrian methodology (Aftalion admired von Wieser, as mentioned below) on the pyramidal spatial and time structure of economic goods (Menger's goods of various orders), most of all investment and consumer goods. As distinct from Hayek and the Austrians, however, who considered cycles as fundamentally based on money, and credit dynamics in particular, Aftalion's theory relied overall on 'real' factors rather than monetary ones, seeing impulses as resulting from entrepreneurs' errors. Hence erroneous pricing (while Hayek has it the other way around: wrong pricing leading to wrong expectations) which is determined by the economy's intrinsic trend to overcapitalization (with Hayek, it is not a question of overcapitalization, but of bad capitalization and malinvestment).[13]

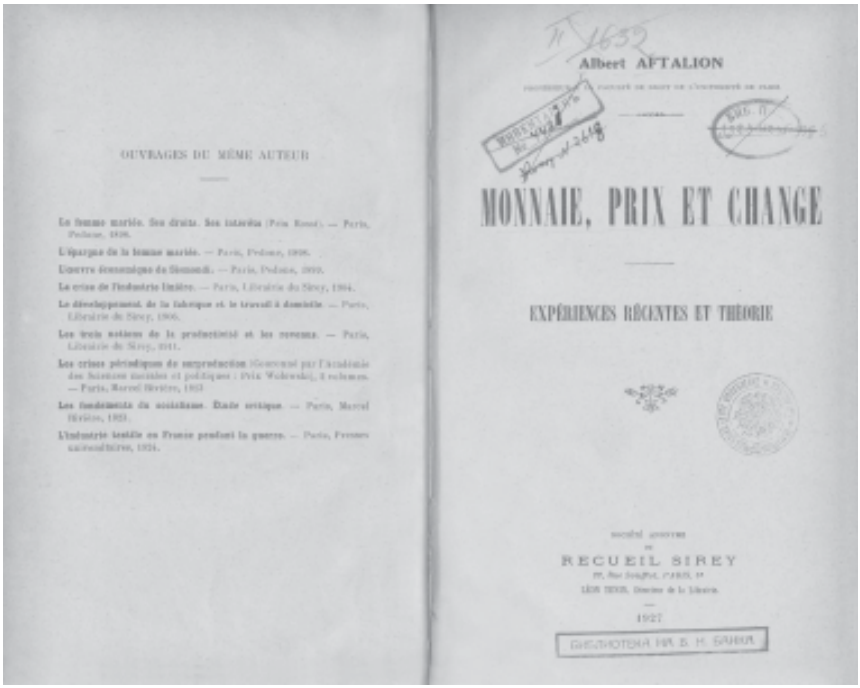
Aftalion felt that though credit was not the major cause of cycles and crises, it played an important auxiliary and attenuating role (Aftalion, 1927, p. 239). It also acted through increasing incomes which could also be due to other factors.[14] In both cases, we have endogenous cycle theories and theories for divergence between expectations and reality, determined by the time structure of the economic process (Bliek, 2003).

As regards the theory of money and exchange rates, Aftalion's major work was *Monnaie, prix et change. Expériences récentes et théorie*. It appeared in 1927 and arose from a series of articles published between 1924 and 1926 in the *Revue d'économie politique* and the *Revue économique internationale*.

[12]Indeed, the Austrian institute for the study of economic conditions was associated with Friedrich Hayek (who suggested it should be established after visiting the USA), Ludwig von Mises, and Oskar Morgenstern.

[13]Aftalion's cycle theory is presented by Bliek (2003) and Raybaut (2005).

[14]See for instance Hristoforov (1946), pp. 20–21.



OUVRAGES DU MÊME AUTEUR

Albert AFTALION

MONNAIE, PRIX ET CHANGE

EXPÉRIENCES RÉCENTES ET THÉORIE

RECUEIL SIREY

1927

A facsimile of Aftalion's *Monnaie, prix et change. Expériences récentes et théorie*, Paris, 1927. Other works by the same author are listed on the left

The book was subsequently reedited and reprinted in 1940 and 1948.[15] In it, the author proposes new analytical avenues to overcome the limitations of the quantitative theory which still dominated at the time, as well as its logical extension into the area of exchange rates and purchasing power. It is this set of ideas that forms the core of the present study.

Returning to Aftalion's presence in economics literature, we have to note that rather few studies of his works exist despite his name being well known to most French economists. Exceptions in recent years have been Blancheton's study (Blancheton, 1998) and a collection of articles published by Lille University after a colloquium devoted to Aftalion's life and works on 19 October 2001 (Dormard, ed., 2003).[16]

[15]Recollecting Aftalion's self-critical spirit, Guitton recalls him questioning whether his 1927 theory still held under the new conditions in 1948 (Guitton, p. 163).

[16]See also Dangel-Hagnauer and Raybaut (2004) which presents and compares major French economists (Aftalion, Rist, Gide, Nogaro, and Rueff) on monetary stabilization in the 1920s. The authors conclude that Aftalion's opinion was decisive in the formation of common theoretical and practical positions by leading French monetary theoreticians.

Aftalion barely features in modern Bulgarian economic thought. He is known to economists who, for one reason or another, have delved into economic cycles or the history of economic doctrine. This is in marked contrast with economic literature in the interwar period when no publication claiming any theoretical credibility could afford not to mention Aftalion's name and ideas under one form or another (Petkof, 1926, Ilieff, 1930, Monchev, 1939, Kemilev, 1936, Hristoforov, 1946, Demostenov, 1937, 1946, 1991 [1946]).

Aftalion's sole Bulgarian translation was *Gold and Its Worldwide Distribution*, published in 1932 under a preface by Bulgarian Agricultural Bank Chairman Dr. Nikola Sakarov. Interestingly, the book notes that Asen Kemilev's translation was 'approved by the Author.'[17] Kemilev was possibly Bulgaria's most categorical disciple of the psychological theory of money and exchange rates. All this may show that Aftalion was aware he was being translated into Bulgarian and had contacts with Bulgaria, a country barely mentioned in his writings.[18]

The Author feels that today Aftalion repays even more attention in Bulgaria than he does in France due to some fundamental differences between the two economies. France is part of Europe and does not face the issue of independent monetary stabilization, the euro being a supranational currency; Bulgaria is small and dependent on the outside world, and the debate on optimal monetary regime for European integration is still alive.

Recent Bulgarian history, especially after the changes of 1989, is both an exceptional illustration and a 'test tube' for the role of various inflationary factors and the comparative virtues of various monetary and financial stabilization approaches (some based on controlling money supply, and others on controlling exchange rates). Researchers into monetary and financial stabilizations would welcome a journey into the Interwar period when both Bulgaria and France stabilized their currencies for some period of time.[19]

What was Aftalion's money and exchange rate theory? What was new for that time, and what remains topical today?

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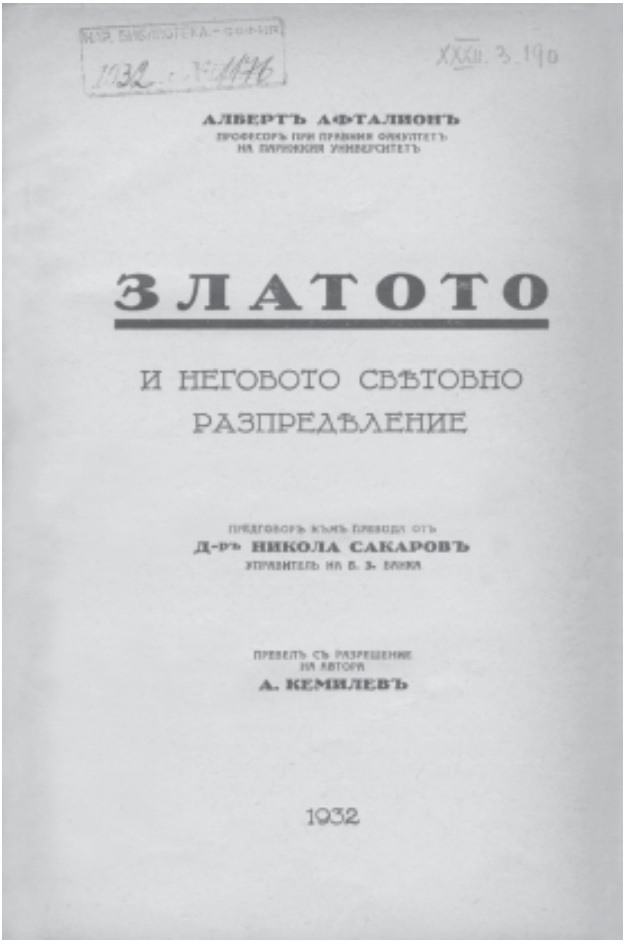
[17]Asen Kemilev sat on the BNB Plenary Council. Many of his publications were direct transpositions of Aftalion's theories into Bulgaria (Kemilev, 1936). For more detail on Bulgarian economic thought in the interwar period see Berov, 1997.

[18]Curiously, in *Monnaie, prix et change. Expériences récentes et théorie,* which reviews a number of European stabilizations including those in Poland and Czechoslovakia, Aftalion does not mention Bulgaria, though the quality and accessibility of Bulgarian statistics were not short of other European ones. It is also curious that the Bulgarian edition does not mention the author's having been born in Ruschuk.

[19]In some respects, the macroeconomic mechanics of the French crisis of 1924 to 1926, as presented by Blancheton and Sénégas (2000) is strongly reminiscent of the Bulgarian financial crisis of 1996 to 1997 (Berlemann and Nenovsky, 2004), since external debt monetization took two major routes and featured a set logical sequence and interchangeability: via direct central bank lending to the finance ministry, or via government bond sales to banks for subsequent discounting at the central bank.



The Bulgarian edition of Aftalion's *Gold and Its Worldwide Distribution,* published in Sofia in 1932

III. Aftalion on Exchange Rates and Inflation

Theoretical analysis and empirical observation on prices, monetary circulation and exchange rates in a number of countries made Aftalion put on test the Quantitative Theory of Money (QTM) and Purchasing Power Parity (PPP). His studies also had a certain positive direction (regardless of their author's general reluctance from dispensing practical advice) in a period when the methods and mechanisms of post-Great War stabilization were debated intensively.

Aftalion was not the first to note drawbacks and problems in QTM and PPP. Keynes, Hawtrey, Nogaro, and a number of other economists had expressed doubts as to these theories' validity and utility. Yet, Aftalion was among the first to offer a complete systematic theory as a possible alternative. Despite its eclecticism, his theory has a number of attributes of integrity, as well as logical elegance.

The theory's elaboration and presentation began with Aftalion's examination of the dynamics of the major QTM and PPP variables in various countries and periods (it must be said that the periods were rather short). Simple statistical techniques (regardless of whether they may be interpreted as causality tests) failed to 'prove' either theory, with Aftalion explaining this by 1. proposing the deepest possible explanation of the behavior of the monetary variables by approaching it through income theory, and 2. subsequently amplifying this fundamental income theory with the role of expectations in forming monetary variables, exchange rates in particular (this amplification often being called the Psychological Theory of Money and Exchange Rates).

Aftalion showed that within QTM and PPP, causality (and causality chains) differed in different periods and countries (nine were examined), with the role of exchange rate growing at the expense of that of circulation (i. e., money supply) in determining inflation. Thus, for France the link (i. e., synchronicity) between money circulation and prices gradually disappeared; still strong between 1914 and 1919, it grew weak in 1919 and 1920, ceasing to be felt thereafter. In its place emerged a strong correlation between prices and exchange rates (franc devaluation automatically led to price increases).[20] This is particularly obvius between 1920 and 1924 in France, with prices growing without any increases in money supply.

[20]Here, one may wonder at the non-chalance with which Aftalion judged economic causality by applying extremely rudimentary statistics to very short periods (even leaving aside different types of causality and the issue of whether economic causality may be estimated statistically or mathematically).

Between March 1924 and April 1925, Banque de France weekly balance sheets were falsified to show less money in circulation. In his research, Aftalion used the official, lowered, circulation figures, as did Nogaro and Rueff. (The possible consequences of this are coverageed in the last chapter.)

Using a similar technique, Aftalion noted, for instance, that between 1927 and 1928 money supply grew without influencing prices (we shall see below that this period of the Poincaré stabilization saw strong inward capital movements as French capital repatriated expecting the franc stabilization[21]).

Developments in other countries followed a similar logic, particularly marked in Germany and Austria. During the period of hyperinflation and the subsequent stabilization of the mark in 1924, money supply grew, yet prices remained stable.

As a whole, after 1922 and 1924, Aftalion definitely addressed 'the hegemony of exchange rates' on inflation (Aftalion, 1927, p. 109).[22] Other renowned economists such as Bertrand Nogaro also noted the significance of exchange rates for inflation (he analyzed major money variables by methods similar to those of Aftalion; Nogaro, 1924), and later by Ragnar Nurkse (Nurkse, 1944).[23]

Aftalion's critique of PPP was similar. PPP was a logical extension of QTM as regards the monetary relations between states. In it, the nominal exchange rate was determined by price dynamics in pairs of countries, these dynamics being functions of the money supply in each country. Aftalion did not consider PPP, nor the current account balance of payments sufficient to explain actual exchange rate movements. He again felt that causality did not lead from money supply and prices to exchange rates, but in the reverse order: from rates to prices and money supply; i. e., not from domestic purchasing power to external, but the other way around. As he pointed out, it is not parity which explains exchange rates, but exchange rates which explain parity (Aftalion, 1927, p. 190).

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[21]According to Aftalion, expectations of exchange rate stabilization lead to money supply increases (Aftalion, 1927, pp. 98, 109).

[22]Aftalion detailed the stabilization mechanism under a gold standard by claiming that gold price movements were another important input alongside gold reserve fluctuations. In a paper money regime, exchange rate fluctuations became key factors (Aftalion, 1940, p. 87) due to a number of psychological factors and expectations influencing prices and exchange rates. The analysis of paper money mechanisms rested in what Aftalion witnessed in France after Léon Blum's 1936 franc devaluation.

[23]Despite his theoretical and personal differences with Aftalion, Charles Rist stated before the Committee of Experts that Aftalion's exchange rate theory was entirely sufficient to explain the behavior of exchange rates, prices, and money supply (see Dangel-Hagnauer and Raybaut, 2004, p. 86).

To explain the problems of QTM and PPP, Aftalion constructed his psychological theory of money and exchange rates (as he put it, 'In order for a theory to be satisfactory, it must be in accord with the entire multiplicity of facts'; Aftalion, 1927, p. 141). Within it, and stemming from income theory as examined in depth by von Wieser (this theory has a long tradition dating back to Cantillon and Tooke, and was subsequently visited by Keynes, Hawtrey, and representatives of the Austrian School),[24] Aftalion strove to find a reason for money by taking into account all factors and avoiding problems with the definition of money.

He felt that one such direct reason lay in income changes, caused in their turn by changes in, *inter alia*, money supply and exchange rates. Aftalion went further by addressing not only income changes, but also anticipated changes in individual incomes which drove people to seek benefits and thus affect prices. Anticipated income changes were linked with expectations of changes in money supply and exchange rates, among others. Within this theory, the utility of money was close to the views of the Austrian School (and the aforementioned von Wieser), where monetary utility was seen as directly linked with income utility (measured in money: nominal income) and the pleasure individuals were expected to derive from such incomes (Aftalion, 1927, p. 227).[25] Aftalion felt that incomes theory 'transfers the explanation of prices

[24]Aftalion felt that income theory was a significantly more comprehensive alternative to QTM. He criticized its early versions, however, for failing to take account of expectations and psychological factors, and tried to enrich it by including income expectations into it (Aftalion, 1927, pp. 187, 207). Schumpeter put forward both approaches to monetary value: cash holdings and income, expressly naming Aftalion as a representative of the latter approach (Schumpeter, 1983 [1954], pp. 461–466). Curiously, while Aftalion mentions Keynes' 1923 *Tract on Monetary Reform* in his first edition (1927), subsequent reissues (1940, 1948) do not mention Keynes.

[25]Aftalion makes a point of reviewing the various factors influencing monetary utility, and hence demand for domestic and foreign money. He fascinatingly lists the desire to evade taxes ('cheating fisk') among the basic factors behind the demand for foreign exchange (Aftalion, 1927, pp. 293, 322–323).

The Author feels that three fundamental points in exchange rate theory are worth noting. They could place Aftalion in the position of forerunner to a number of contemporary exchange rate theories (see also Blancheton, 1998). The first of these is undoubtedly the role of expectations and their fickleness, and that of news in forming exchange rates (Aftalion, 1927, pp. 297–300). Second is Aftalion's claim that the best position of forecasting exchange rates is firmly grounded in their past value (Aftalion, 1927, p. 298): doubtless another way of defining the unstationary process approach also termed the Random Walk (see Rogoff and Meeses's 1983 article), or of first order autoregression (ARMA (1.0). Third, Aftalion noted that the complexity of factors influencing exchange rates was such that, in a paper money regime, it was difficult or impossible to speak of normal or equilibrium exchange rate levels (Aftalion, 1927, pp. 332–344): 'There is no normal exchange rate level; instead, there are levels resulting from everything that happened in the past'; 'Each quotation makes sense only as regards immediately preceding quotations, and is influenced by them'; 'exchange rate levels are determined historically' (Aftalion, 1925, pp. 448, 952, 985); 'There is no normal exchange rate level; any such thing is an abstraction of the mind' (Aftalion, 1925, p. 427). (See Blancheton, 1998, Huart and Rollet, 2003.) Rainelli's (1986) criticisms of PPP parallel those leveled by Viner and Aftalion, and mention the new elements included by the latter in the money demand function. Arena (2000, p. 976–977) feels that Aftalion as a whole (alongside Nogaro, Simiand, Perroux, Lescure, and

from objects (items) to people' (Aftalion, 1927, p. 163).[26] Alternatively, 'the value of a currency and the prices of goods are two inversely linked concepts' (Aftalion, 1940, p. 15). Aftalion enriched income theory with his psychological theory of money (and later of exchange rates), in which economic actors' expectations play the leading role.[27]

Causality in QTM and Aftalion's theory could be represented diagrammatically thus:

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later Perroux and André Marchal) may be ranked among realist economists, or within the sociological trend which exemplified 'French resistance against Anglophone macroeconomics.' According to Dangel-Hagnauer and Raybaut (2004, p. 14) Aftalion (similarly to Simiand) possesses clearly expressed positivist views. [See also Blancheton (1998, p. 714).] Blancheton (1998) points out that Aftalion's psychological exchange rate theory contains almost all modern methods of analyzing the role of expectation; for instance, self-fulfilling prophesies, panic and contagion, and others, which logically lead to overshooting models (Dornbusch) or to second generation currency crises (Obstfeld). The Author feels that models linking exchange rates and fluctuations (GARCH) also go back to Aftalion's book (as do analyses of 1920s hyperinflation by Cagan, 1956). Blancheton (1998) is right when he states that the richness of Aftalion's theory does not find contemporary resonance because it must be considered first and foremost as the point of departure for a number of analyses without possessing overall conceptualization. The Author has no doubt that multilayered ideas on the role of expectation in forming monetary value and exchange rates remain to be woven into an integral theory of expectations, this being the reason why Aftalion's theory is not entirely clear and hence not entirely viable. It is rather easier to speak of the source of a number of theories whose origins could all lay in Aftalion's work.

[26]'The social value of money is the result of all individual valuations of money,' Aftalion, 1927, p. 165. Dangel-Hagnauer (2003) analyses the theory of money and exchange rates and draws up a topology of causality in Aftalion.

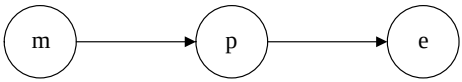
[27]Aftalion's theory was criticized by a number of economists, such as Michel Heilperin (Heilperin, 1939, pp. 112–114) who felt that QTM and PPP were seen as contradictory to the psychological theory due to a misunderstanding. He felt both theories displayed different levels of abstraction and causality, for 'nobody denies the influence of psychological factors; they simply lie outside the sphere of economics. Economic theory begins where monetary demand and supply begin, and where there are market deals.' Factors moving such deals were outside economics. 'Whatever the motives of human behavior, what matters to economic theory is their material and quantitative effect. There are, and always have been, two stages of phenomena: a first stage of individual valuations, assessments, preferences, fears, and expectations; and a second stage of the individual as seller and buyer of benefits, services, and funds. The second stage is the result of the first; yet, it is only at the second stage that we touch upon the problems linked with market transactions: processes which define the subject of economic science' (Heilperin, 1939, p. 113).

A number of Japanese economists also offered critiques (Aftalion was very popular in Japan and was much translated there). Shimazu (1969) sounds exceptionally modern (from the viewpoint of causality and the time factor). He felt that Aftalion denies QTM by reference to extremely short periods, putting us in danger of being led astray by 'transient disparities' between basic variables at set moments and countries. According to Shimazu, QTM and PPP are not disproved over a long term, as trends rather than laws. Shimazu (1969, p. 52) also felt there were a number of problems in the definition of variables used by Aftalion in testing QTM during hyperinflation (for instance, the role of barter, et alia, was not considered).

Another early Japanese critic of Aftalion's theory was K. Tanaka (Tanaka, 1929, 1930, as quoted by Shibata, 1931). He felt that 'money may not be assessed subjectively regardless of goods.' In turn, Tanaka was criticized by K. Shibata (Shibata, 1931) within the latter's overview of the subjective theory of value and money. Shibata felt there was clear continuity and no contradictions between Aftalion's psychological money theory and the Austrian theory of value and money (Menger, Wieser, Mises, and Schumpeter).

Chart 1

QUANTITATIVE THEORY OF MONEY



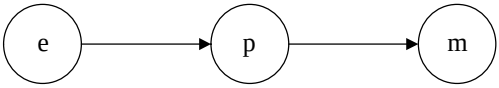
m is money in circulation, *p* is prices, *e* is exchange rate, and *y* is income.

The indices below show expected levels of these variables and the arrow shows causality sequence. Within this causality chain, the first link (money *m* to prices *p*) is described by QTM, and the second (prices *p* to exchange rate *e*) is described by PPP.

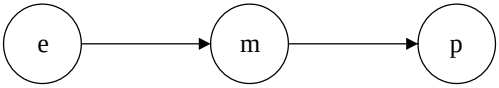
Chart 2

AFTALION'S THEORY

According to Aftalion, the French experience of the early 1920s may be described as shown in Chart 2a:

a. 

The German experience of the same period may be described as shown in Chart 2b:

b. 

As a whole, Aftalion sees two possible causality chains during the period, with expectations playing the decisive role in both (Charts 3 and 4). In the first one, exchange rate fluctuations result from expectations of change in money supply; circulation in this case (Aftalion stresses that money supply influences prices through expectation, rather than through its volume).[28]

Chart 3

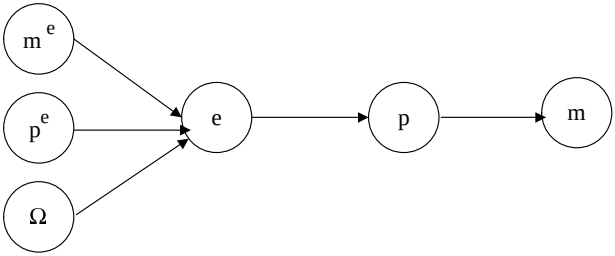
CAUSALITY CHAIN: FIRST VERSION

[28]Despite Aftalion's express mention of the role of expectations as regards money supply on exchange rates, and despite his manifold mentions of the significance of information emanating from Banque de France balance sheet publication ('money supply movements ultimately lead to a kind of mysticism which injects tension into the anticipation of the Issue Department's periodic statistics, and which may lead to rather abrupt rate movements,' Aftalion, 1926, p. 966), in his 1927 book he never mentions the consequences of the falsified Banque balances between March 1924 and April 1925 with a view to making money supply (circulation) appear lower.

Along with direct causes of exchange rate fluctuations, the second chain also features expectations on price levels, as well as on a number of macroeconomic and political factors Ω (the state of public finances; the balance of payments; fiscal and excise policy; news of political, international, and military developments, *etc.*).

Chart 4

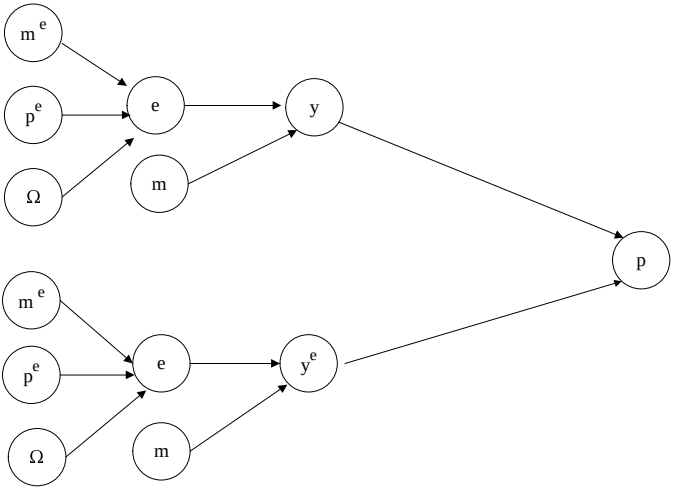
CAUSALITY CHAIN: SECOND VERSION



If we assume the broadest (or most distant) viewpoint to present Aftalion's theory, thus surveying both its income and psychological aspects, we get a causality chain that shows that QTM and PPP are special cases within the complex causality of monetary processes which Aftalion proposes.[29]

Chart 5

GENERALIZED COMPLEX CAUSALITY PATTERN ACCORDING TO AFTALION



[29]See also Dangel-Hagnauer and Raybaut (2004, p. 81).

In this latest pattern, the specifics of Aftalion's theory are lost to an extent (yet completeness and complexity are both amplified) because everything goes via income. In other words, Aftalion gives priority to the direct reasons for monetary movement: income and demand (it is no accident that Heilperin considers there is no contradiction between Aftalion's theory and other approaches; they simply occupy different analytical levels).

Regardless of the causality chain he adopts, however, Aftalion considers that exchange rates are a basic and direct inflationary factor: '... domestic devaluation of money moves more or less rapidly along with the exchange rate; it is a satellite of the rate, rather than its master' (Aftalion, 1926, p. 794). This is why the exchange rate has the special significance of anchoring monetary stabilization, or more precisely, of anchoring money's domestic purchasing power. The practical conclusion follows that monetary stabilization must commence with stabilization of foreign purchasing power, thus automatically leading to stabilization of domestic purchasing power. The exchange rate focuses public and business expectations directly and immediately, hence the fight against inflation must commence with its stabilization, rather than with money in circulation. This theoretical position finds practical expression in the choice of stabilization and monetary policy based on targeting either the exchange rate, or a set monetary aggregate, or prices.

Aftalion considered that the exchange rate must be the major economic policy anchor, especially after periods of inflation and financial crisis. It is clear that his ideas emerged from the realities of his day: the necessity for monetary stabilization after the Great War, and particularly French realities.

Aftalion's preferences for exchange rate stabilization and 'gold' money were set out in these words:[30]

'The great utility of gold money lies in its ability to act as a brake on fantasy and governmental weaknesses, to spare money the terrible manipulations of government which claims that it is ridding it of harmful value through paper money inflation. As long as gold money is maintained, or rather, as long as an effort is made for it to be maintained, we are compelled to subject ourselves to strict discipline, bring order into our house, and follow a policy which, though it may not aim at price stability, aims at the very least at a stable national economy and succeeds, as a rule, in leading to less instability than may be observed in periods of paper money' (Aftalion, 1940, p. 119–120).

A careful reading of Aftalion convinces the reader that he places the significance of confidence in money and the exchange rate to the forefront:

[30]According to Blancheton (1998, p. 714) Aftalion did not express clear preferences as regards exchange rate regimens (floating or fixed), as dictated by his principle of 'not making direct normative claims on the basis of observed fact.'

ahead of discipline (limiting money supply). This distances him considerably from disciples of Ricardo's quantitative theory, they being more concerned to limit the amount of money, regardless whether it be paper or commodity-backed (gold), rather than with its convertibility. In many senses, this stance brings Aftalion close to Charles Rist. We shall see below that this theoretical argument between giving priority to credibility or to discipline also divided Bulgarian interwar economists.[31]

Turning now to interwar monetary stabilizations, let us look at France and Bulgaria. Based on stabilizing the exchange rate, these stabilizations resulted from the conviction of politicians in both countries in the significance of the exchange rate in determining price dynamics: an indirect illustration of Aftalion's psychological theory. In the last part of the study, we shall conduct an econometric test of Aftalion's claim that exchange rates have a significantly more marked and more rapid effect on inflation than money supply.

IV. Stabilizations in France and in Bulgaria

Post-Great War monetary and financial stabilization continues to attract research attention, mainly due to its exceptional complexity, and yet a certain straightforwardness and clarity (perhaps the last such combination in world economics) in the economic and political relationships between separate countries.[32] The period gives us the opportunity not only of observing the complexity of monetary and currency phenomena (such as economics, politics, ideology, diplomacy, and nationalism), but also of drawing certain parallels with today, when monetary stability is yet again on the agenda, be it in the centre or on the periphery of the world economy.

In that period France was a nation which occupied the centre of the international monetary system; one of the winners of the Great War. Bulgaria was a nation on the periphery, and one for whom exchange rate stabilization was even more important (Aftalion mentions that exchange rates are especially important to peripheral countries such as those of Central and Eastern Eu-

[31] An exceptionally interesting theoretical approach to the nexus between confidence and discipline, and on its application to modern stabilization options based on currency boards, is exemplified by Raybaut and Torre (2003).

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

rope; Aftalion, 1927, p. 218).[33] Bulgaria was in the losing camp and, like Germany, had to pay reparations.[34] Despite the differences between France and Bulgaria, stabilization in both countries went through similar stages which may overall be reduced to: 1) pre-stabilization, i. e., nominal rises in the national currency's value ('rising to its feet'); 2) *de facto* stabilization, including a healing of public finance; and 3) *de jure* stabilization when the gold standard (i. e., the fixed exchange rate of national money to gold) was reintroduced.[35]

In both countries, stabilization illustrated the roles of fixed exchange rates and convertibility in overall monetary stabilization. They placed confidence to the fore, logically following it with discipline, though at certain stages the two did not move together. Confidence was mostly to do with convertibility and hence with limiting money supply or money in circulation. Alongside France, Bulgaria was among the few countries which managed to maintain monetary stability after devaluations in Britain (1931) and the USA (1933). France abandoned the fixed rate in 1936, while Bulgaria (despite the specifics of exchange control) continued resisting until it removed gold coverage and stopped maintaining the standard as late as 1941.[36]

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[33]Aftalion gives scant mention to Bulgaria in his research. Definitions of centre and periphery may differ, but here we may conveniently adopt that of Eichengreen who considers that in the classical gold standard era (1870—1914), the centre comprised Britain, the USA, France, and Germany (mainly creditor nations), while the periphery comprised mainly debtor nations. If we adopt the asymmetricity of the gold standard balancing mechanism as a point of departure, debtors were forced to take on the greater part of such balancing ('automatic balancing') and it was this very dependency that defined them as peripheral to the international monetary and financial system. While in a disbalance peripheral nations are bound to take limiting measures, those at the centre are not obliged to get their economies moving (through internal demand and hence price rises) and usually accumulate reserves. Peripheral nations, mostly monocultural and dependent on trade conditions, usually compensate their trade deficits by borrowing from countries with a surplus. A number of studies of the classical gold standard era show the presence of sterilization in developed nations, i. e., their central banks' domestic and foreign assets do not move in the same directions (for details, see Desquilbet and Nenovsky, 2005). System asymmetricity has been the subject of a number of studies such as Nurske (1944), Ford (1960), Simmons (1996), De Cecco (1974), and Gallarotti (1995).

[34]Bulgaria entered the War as an adversary to France. The two sides clashed in Macedonia in late 1915 after Anglo-French forces landed at the Salonika front. (See for instance Ashcroft, 1924, Keegan 2003, 1998.)

[35]For more on the logical sequence of these phases, see Aftalion (1938), Vallance (1998 [1996], p. 261) and Rist (1993 [1925]). Rist feels that monetary stabilization goes hand in hand with financial stabilization, with the latter comprising two components: halting the issue of paper money and balancing the budget. Stabilization is a matter of confidence and usually starts where there is a sufficiency of exchange reserves (Rist, 1925, pp. 8—10). The three stages of stabilization were also defined by the Sargent's committee (Sargent led the experts' committee set up in May 1926) as comprising: 1. a preparatory period when inflation must stop while exchange rates may continue fluctuating; 2. de facto stabilization during which the central bank maintains certain exchange rate levels by buying and selling gold according to the number of gold points; and 3. an ultimate stage in which the rate of exchange to gold is fixed *de jure* (Hawtrey, 1932, p. 10).

[36]See Ivanov (Ivanov, 2005), and The Bulgarian National Bank: A Collection of Documents, Vol. 4, Sofia, 2004, p. 295) (Protocol No. 8 of the BNB Governing Council of 29 October 1936 — in Bulgarian).

France: the Poincaré Stabilization

The Great War hit developed nations' public finances and economies, impacting monetary stability.[37] The lack of coordination and compromise, as well as of any genuine collaboration between these nations led to some chaotic and conflicting measures which logically in their turn doomed stabilization attempts.[38] After Britain restored the gold standard to its pre-War value in April 1925, it was France's turn to face the dilemma of stabilization: whether to revalue or devalue.[39] (Stabilizations also took place in Austria in 1923, in Germany, Poland and Sweden in 1924, in Belgium and Hungary in 1925, in Canada, Czechoslovakia, and Finland in 1926, as well as — though under a different ideology — in Russia[40] in 1922.)

It should be pointed out that the stable franc (le franc Germinal) had dated back to Napoleon's day, with gold content remaining unchanged since 27 March 1803. As a consequence of the issue of large volumes of paper money during the War (while 6 billion francs' worth of notes circulated in 1913, by

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[37]See Sauvy (1984) on the consequences of the War for France in particular; he considers that in 15 months, that country lost income and assets that had taken 11 years to accumulate. For a full and comprehensive analysis of French monetary and financial history between 1914 and 1928 and of theoretical discussions regarding monetary policy issues, see Blancheton (2001).

[38]Each country accused the others of selfishness and the naked pursuit of self-interest. Thus, the USA refused to contemplate linkage between Central Powers' debts with debt between the Allies, while France refused to make economic and political concessions to Germany. For a long time, France relied on German reparations, invading the Ruhr in January 1923 when doubts arose on whether they were forthcoming, thus plunging German finance and the mark into further crisis. On the role and consequences of reparations, see Keynes (2002 [1920]) and Bainville (1920 [2002]). The latter accuses Keynes of encouraging German default by his behavior (for purely personal reasons) and of creating an atmosphere which logically led to the emergence and rise to power of the Nazis. Germany returned to mark convertibility before France, introducing the so-called rentenmark, coverageed by mortgages over German land. After a period of competition, the rentenmark displaced the highly devalued reichsmark.

[39]The Poincaré stabilization has been studied many times, both for itself and within broader studies of either Interwar stabilization or financial and monetary history as a whole, e. g. by Hawtrey (1932), Kalecki (1938), Kemp (1971), Sauvy (1984), Eichengreen and Sachs (1985), Kindleberger (1988 [1973, 1986]), Kindleberger (1990 [1984]), Borne and Dubief (1989, [1976]), Mouré (1998, [1991]), Mouré (1996), Mouré (2003), Vallance (1998, [1996]), Eichengreen (1997, [1996]), Hautcoeur (2000), Asselain and Plessis (2003), and Blancheton (2001, 2003). 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 the irreversible wartime rise in prices),' Vallance (1998, [1996], p. 250).

At the time, developed countries, and France in particular, were 'pathologically accustomed to monetary stability and orthodoxy' (Kemp, (1971, p. 82). In his collection of articles (Rist, 1933) Rist proffers particularly interesting evidence on the Poincaré stabilization. He had been an active participant in it, having sat on the experts' committee, been a deputy governor of the Banque de France, and a major participant in monetary diplomacy of the period. In his detailed analysis of the dilemma between deflation and devaluation, Keynes boils the choice down to stabilizing prices or the exchange rate (Keynes, 1923).

[40]Russian stabilization (the launch of the gold-convertible chervonets), and the theoretical debate on roads to monetary and financial stabilization are the subject of an in-depth analysis by Golland (1998).

1919 their value had escalated to 35 billion francs' worth), prices rose significantly and the greater part of commercial contracts was written in new prices. This rendered any return to the pre-War rate exceptionally painful and even immoral from the standpoint of deals contracted under the new franc purchasing power; a return might have been accomplished through marked deflation and constricting money in circulation. During the War, France had assumed heavy foreign and domestic debt, with the so-called dette flottante or short-term debt the most onerous; this comprised short term government bonds and bons de défense. Despite the then-current view that a return to the pre-War rate was necessary (with the Baron de Rothschild among its most ardent supporters), experts and representatives of major interest groups gradually came round to the view that a return would be impossible, and that a new lower franc was needed. Yet, though the rate mattered (let us recall Keynes' criticism of Churchill on the return of the pound Sterling to its pre-War level[41]), the more important issues concerned the legal peg, the return of franc convertibility, and the restoration of gold coverage for money in circulation, suspended on 5 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 premier, January 1924 saw measures towards financial stabilization and balancing public finances. 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. This (between 13 March 1924 and 2 April 1925) was when the Banque de France's Thursday morning balance sheet reports were falsified, with a series of accounting manipulations hiding the true number of banknotes to mask the significant rise in money in circulation. The 41 billion franc legal ceiling was exceeded on 2 October 1924 with-

[41]Keynes was generally skeptical about the work of French economists and about their ability to adopt correct practical decisions in the monetary sphere. He was, however, positive about the level at which the franc was stabilized, in contrast with his attitude to the British solution (see his collected articles and pamphlets on the franc, Keynes, 1928). As a whole, Keynes was extremely negative towards all attempts to restore the pre-War gold content of money not only as regards Churchill's decision, but also as regards Mussolini's plans to follow the British example (ultimately, a new devalued rate was set). As early as the beginning of the 1920s, Keynes (Keynes, 1923) considered that returning to the gold standard was harmful due to the fact that credit money and the movement of capital invariably lead to the need for 'managed money' through central bank policy (he considered gold standard automatism long dead if it ever existed). This was the basis of his criticism of the Cunliffe Committee's 1918 recommendations, including a return to the gold standard, which failed to take account of the irreversible changes in the structure of the post-War monetary system. See also Irving Fisher, who expressly points to the role of contracts written in new (post-War) money in stabilization decisions, and to the need for 'scientific' management of money (Fisher, 1927).

out the public being aware. When, under pressure from Banque de France regents, on 9 April 1925 the lie was revealed and the ceiling was shown to have been exceeded, confidence in the franc collapsed, expectations dived, fears of a currency and financial crisis became reality, and the Herriot government fell from power.[42] Poincaré won the July 1926 elections, forming a broad coalition (including Herriot himself) and immediately launched radical reforms. In his program declaration, he stated:

'The cabinet which presents itself to you was formed in the spirit of national unity in order to overcome the dangers which threaten at once the value of our money, the freedom of trésorerie, and the balance of our finances' (Becker and Berstein, 1990, p. 280).

In other words, the idea was to 'pay the bill for the war' and stabilize the franc. An experts' party was convened to discuss the technical details of stabilization (and particularly the level at which the rate ought to be pegged), with Charles Rist a member of it. Jacques Rueff was actively involved and tasked with the chargé de mission[43] of calculating an 'optimum level' for the franc. Each expert made his own calculations and recommendations for stabilization. As a result of decisive reform of public finance (budget balancing), in particular cutting spending, raising taxes, and converting short-term public borrowing into long term debt, stabilization expectations grew and an inflow of capital began, boosting Banque de France foreign exchange reserves. In other words, demand for national currency (in real terms) had been restored.

A new legal limit to money in circulation was set in August 1926, and government bond issues halted in February 1927. The franc's nominal value began rising against other currencies, and *de facto* stabilization was a fact. The Banque de France began intervening on the currency market (it had been empowered to buy and sell gold) so as to cut exchange rate fluctuation; certain interventions aimed to keep the franc from becoming overvalued. Limits to capital exporting were lifted on 10 January 1928 and the Franc Devaluation Law was adopted on 24 June for the new franc, valued at some 80 per cent of the pre-War one. At that moment, the central bank had significant gold reserves (between June 1928 and December 1932 foreign exchange reserves had grown by 55 billion francs or 8 to 27 per cent of world gold reserves; see Mouré, 1996, pp. 137—138) and franc stabilization had become a fact. A contribution to this was that accounting gains from gold revaluation were used for

[42]For detail on Banque de France balance sheet falsification, see Blancheton and Sénégas (2000), Blancheton (2001), and Jacob (1996).

[43]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 (http://www.archivesnationales.culture.gouv.fr/chan/chan/fonds/xml.inv/EtatsdesfondsAP/579AP.htm).

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).[44]

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[45] government. The gold franc thus survived some seven years, making France the nation from 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,[46] while convertibility and the discipline of public finances were a classical example of how to build confidence in a national currency.

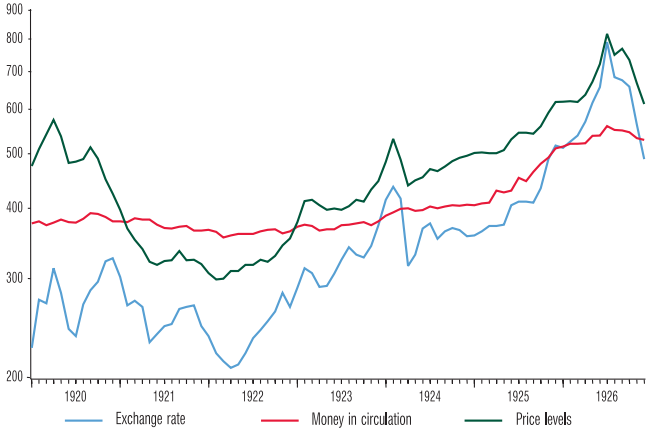
[44]Poincaré won the April 1928 elections and continued his reforms. After signing the Young Plan on German reparations in April 1929, he retired from public life in July that year. Problems with the French economy surfaced at that instant; as one author put it, 'a great man knows when to time his exit.'

[45]Blum's predecessor Laval made a last attempt to avoid devaluation by following a restrictive policy which encountered exceptional public hostility. Interestingly, the left (Maurice Thorez' Communist Party) and the trades unions were fierce supporters of the Poincaré franc. Along with the central bank and financiers, they were the major force defending the level set by Poincaré. Workers wrote threatening letters to Paul Reynaud once he began his media campaign in support of devaluation (Kemp, 1971, p. 88). A similar unity between blue collar and finance existed prior to the Poincaré stabilization (Vallance (1998 [1996], p. 262). Léon Blum (the Popular Front) changed the Banque de France statute, making it a public body, introduced working hour restrictions (the 40-hour week) and a number of other measures. In 1935 Paul Reynaud said: 'An overvalued currency is pursued by speculators like big game is pursued by wolves' (Vallance (1998 [1996], p. 269). For the economic and social consequences and results of the Blum government and the lessons of significant pay rises under a pegged exchange rate, also see Kalecki (1938).

[46]Kenneth Mouré (Mouré, 1996) notes that the discussion on the technical parameters of the Poincaré stabilization contained notes critical of QTM and PPP, and to balanced exchange rate levels (hence, there was scant mention of franc overvaluation or undervaluation), and that Aftalion's psychological exchange rate theory was rather popular.

Chart 6

FRANCE, 1920 to 1926
PRICE LEVELS, MONEY IN CIRCULATION, AND THE FRANC DOLLAR RATE
(LOGARITHMIC SCALE)



Bulgaria: the Lev Stabilization

Bulgarian stabilization followed the logic of stabilization in developed nations, yet contained all specifics of stabilizations in peripheral and overall less developed nations.[47] For Bulgaria, the economic and financial losses of the Great War were an extension of those incurred during the exhausting Balkan Wars of 1912 to 1913; the three wars are often treated as 'the Big War.' According to Kiril Nedelchev (Nedelchev, K. 1940, pp. 76–77), while daily expenditure on the Balkan Wars came to about 1 million gold levs, in the Great War it reached 2 million levs. (By comparison, Britain spent some 150 million levs a day.) According to the same author, and not bearing in mind territorial losses, overall Bulgarian spending on the war may be rounded off at 3 billion gold levs. Public finance was entirely upset. Between 1916 and 1918 the state budget deficit came to some 1.5 billion gold levs, with the BNB almost exclusively financing state military expenditure (Ivanov, A., 1929, p. 139). As a result, banknotes in circulation rose meteorically by a factor of about 14, while coverage dropped to 3.2 per cent for 'gold' notes and 5.9 per cent for 'silver' ones (see Table 1). Government debt (especially its floating component) rose to threatening proportions (Table 2).

[47] As distinct from France, Bulgarian stabilization generally failed to draw the attention of contemporary researchers, except some Bulgarian authors (Lyuben Berov, Roumen Avramov, Martin Ivanov, and Daniel Vachkov). On gold standard functioning and specifics from the centre to the periphery of the world economy, see Whale (1937), and also Simmons (1996) on the Interwar period.

Table 1

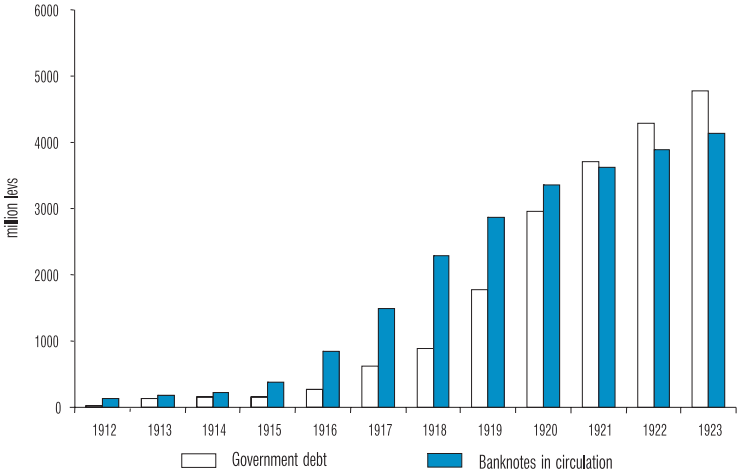
COVERAGE OF BANKNOTES IN CIRCULATION WITHIN BULGARIA, 1912 to 1918

Year	Gold Notes	Gold Reserves	Coverage per cent	Silver Notes	Silver Reserves	Coverage per cent
	million levs (1)	million levs (2)	(2/1)	million levs (3)	lmillion levs (4)	(4/3)
1912	139.6	51.1	36.6	24.7	16.8	58.0
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 note: Nedelchev, K., Monetary Issues: Bulgaria, 1879–1940, p. 77 (in Bulgarian). Studying these data, one notes that Nedelchev calculates banknote coverage as the proportion of banknote volumes and gold or silver holdings on 31 December each year. Using his data, the coverage of silver notes in circulation in 1912 came not to 58 per cent as shown in his work and the table above, but to 68 per cent. For more comment on these indicators, see Appendix 3.

Chart 7

GOVERNMENT DEBT AND BANKNOTES IN CIRCULATION, 1912 to 1923



Source and note: Nedelchev, K., Monetary Issues: Bulgaria, 1879–1940, p. 81 (in Bulgarian). 'State debt for 1922 and 1923 includes 150 and 300 million levs respectively of treasury bonds.'

Between the close of 1918 and that of 1922, even before reparation payments began on 1 October 1923, external debt service reached 112 million gold francs or 16.3 per cent of budget spending.[48] Reparations under the 27 November 1919 Treaty of Neuilly-sur-Seine were added to this debt, coming to 2250 million gold francs at 5 per cent annual interest over 37 years, plus occupation expenses. At the time, this represented a quarter of national wealth, while the annual payments of 134 million gold francs equaled the entirety of state income (Vachkov et al., p. 124). French claims on overall Bulgarian debt came to 26 per cent, with German ones coming to 52 per cent (the next country in line, to whom Bulgaria owed almost as much again, was Italy (25 per cent), followed by Greece (12.7 per cent) and Roumania (10.55 per cent).[49] Overall, Bulgaria strove to gain the reputation of a good payer who bore the brunt of his obligations and received practically no preferential debt relief, and did indeed attain such a reputation (Ivanov, 2001, 2005). In his speech marking the BNB's 50th anniversary, premier Andrey Lyapchev said:

'One would be hard put to find quite such a young nation in quite such exacerbated circumstances as ours these past fifty years, yet one which can boast that it has ever occupied the position of an exemplary payer to its foreign creditors' (Lyapchev, 1929, p. 135).

The state of public finance undoubtedly reflected on price movements and the lev exchange rate. In reality, lev convertibility to gold ended at the very outset of war. Unlimited lending to the state for the duration of the war was allowed on 10 October 1912, to be suspended by law in January 1919. (*The Bulgarian National Bank: A Collection of Documents*, Vol. 3, Sofia, 2001, Document No. 2, pp. 55–56, Document No.22, p. 139), and also Ivanov, À. (1929).[50] The lack of convertibility was assumed to be temporary, as was characteristic with the gold standard in wartime or other emergencies ('rule with escape clause,' Bordo and Kydland, 1996).

Later the BNB and Bulgaria as a whole lost significant sums through having its reichsmark assets blocked in German banks and subject to sharp value falls. Since these marks represented part of the coverage for Bulgarian money, this brought another blow to the lev (it is worth recalling that Bulgaria's entry

[48]On the development of Bulgaria's foreign debt, and the overall state of Bulgaria's economy after the Wars, see the fundamental and yet unpublished The History of Bulgaria's External Government Debt, Vachkov, D., M. Ivanov, Tsv. Todorova,1878–2005, an unpublished manuscript (in Bulgarian)., as well as Koszul (1932, p. 7).

[49]External debt represented 96 per cent of government debt, with reparations in their turn forming nine tenths of foreign debt (Koszul, 1932, p. 40). Annual payments came to some 132.5 million gold francs or over half the state's annual income (op. cit., pp. 48–49). This put Bulgaria's *per capita* foreign debt among the highest among defeated powers. For a detailed analysis of Bulgarian foreign debt, see Stoyanov (1933) and Ivanov (2001).

[50]Also see Berov (1997, p. 67).

into the Great War was linked with a German and Austro-Hungarian loan and financial support worth 200 million gold francs).

Post-War problems were succinctly represented by G. Toshev thus:

'Since the War, Bulgarian economy is dominated by phenomena previously unknown to Bulgarian society. Our currency, the lev, was devalued; alongside this, its value and purchasing power experienced great changes which found expression on the one hand in constant fluctuations in the price of goods, and on the other, in large and catastrophic fluctuations in exchange rates' (Toshev, 1928, p. 1).

Again according to Toshev (Toshev, 1928, p. 116, p. 172), over the period from late 1915 to late 1918, the lev lost value 16.4-fold (with an overall 26.65-fold loss of value between the close of 1912 and the end of 1923). In Bulgaria, the period between the War and April 1924, when lev stabilization commenced, was entirely in line with that fixed in French and European monetary history, and that in which Aftalion built his theory on exchange rates.

The parallel between events in Bulgarian and French stabilization processes was apparent. This joint movement to monetary stabilization was also dictated by the decisions of the two international conferences (Brussels, 1920, and particularly Genoa, 1922), and by the fact that France (which happened to be Bulgaria's largest lender) was, in a certain sense, an example or institutional benchmark of good monetary policy which Bulgarian politicians and economists carefully imitated.

France and Bulgaria commenced preparing to stabilize their money almost simultaneously in 1924. As pointed out above, however, the French process (the first Poincaré stabilization) was interrupted by politics for two years and activated anew after 1926, when Poincaré returned to power. Hence, in a certain sense, *de facto* lev stabilization overtook that of the franc. Later stabilization in both countries reached the *de jure* stage simultaneously in 1928. Other than that, the three stabilization stages in Bulgaria followed the same chronology (for details, see Burilkov, 1928, Toshev, 1928, Ivanov, 1929, Nedelchev, 1940, Berov, 1997).

The key role of lev stabilization as the basis for overall financial and economic stabilization was rapidly acknowledged by Bulgarian men of affairs. The speech by BNB governor Asen Ivanov marking the Bank's 50th anniversary contained this passage:

'Stabilizing currency was the first and most important task. Yet, since money devaluation stemmed from abuse of the privilege of issuing banknotes for the purposes of excessive and unjustified lending to the state after the end of the War, initial restorative measures had to stop further loans to the state by the issuing authority and to limit strictly the right to issue banknotes' (Ivanov, 1929, pp. 140–141).

The first — preparatory — phase began in 1922 with the Banknote Circulation Limitation Law (which limited banknotes in corculation to some 5.5 billion levs, subsequently replaced by a requirement that banknotes and other permanent BNB liabilities should not exceed double the reserves of gold and stable currencies), and limiting the amounts the BNB could lend the state to 4.7 billion levs (5.4 billion *in extremis*).

Measures also addressed the health of public finances. Until the reparations treaty, exchange rate movements were strongly influenced by expectations as to the outcome of negotiations (similar to earlier ones as to the outcome of the War itself). The rate reached a low in 1921, rising strongly and unexpectedly in June 1923 from 184 levs to 75 levs to the dollar: a 245 per cent appreciation!

These events forced the BNB to reintroduce a currency monopoly (the first such monopoly had been declared in December 1918 and ended in May 1920). The Bank began to determine offer and bid rates for foreign exchange, closing the foreign exchange market on 11 December 1923. According to the Law of 2 May 1924, the BNB pegged the lev dollar rate, with the offer rate set at 139 and bid at 137.2 levs to the dollar. This event marked the start of *de facto* stabilization (Ivanov, 1929, p. 141).

The BNB Law of 20 November 1926, and the Annexe to the 1928 Stabilization Loan which provided for banknote convertibility and a transition to the gold specie standard, were further steps to lev stabilization. The proportion of banknote coverage was determined under Article 8 of the Law at $33\frac{1}{3}$ per cent, with a proposal that it should aim at 40 per cent. The Law did not define the gold value of the lev (while coverage was defined, the fixed rate was not).

The Stabilization Law of 3 December 1928 pegged the lev *de jure*, with the exchange rate set under Article 1 at '92 levs per one gramme of pure gold.' Taking into account the BNB's commission, this equaled 139 levs per dollar, or 139 levs per 1.5 grammes of gold (the gold content of the dollar).

Lev stabilization was accompanied by deflationary policy by the BNB (aiming at curbing money supply[51]) which became the object of debate and

[51]It must be borne in mind that in the period under review, due to the practical monopoly of QTM in explaining price levels (movements in money supply alone were supposed to explain price movements), 'inflation' and 'deflation' denoted respective money supply moves. In order to focus on the concept of price movements, phrases such as 'price rises' and 'price falls' were used. This is a digression, however. After the 1924—1927 currency crisis, money supply contracted sharply through BNB restrictive policy. Thus, Toshev claims that a third of money in circulation was withdrawn (Toshev, 1928, pp. 176—177). Despite this, he claims that prices failed to fall by a parallel amount. Other authors' calculations purport to show that, for equilibrium to be restored, prices needed to fall even more: by some 40 per cent (Yurii, 1923, p. 28).

critiques (mostly by academic economists: see Toshev, 1928, Yurii, 1923, Nikolov, 1927, Totev, 1932, Boshnyakov, 1936, Chapkunov, 1936, Sarailiev, 1937, Monchev, 1939 *etc.*). The critics saw this policy as underlying the Bulgarian economic crisis.

As the Great Depression augmented the Bulgarian economic crisis[52] in time, the country continued maintaining the pegged rate and lev convertibility, adopting the franc as the basis after dollar devaluation in 1933 (The Bulgarian *National Bank: A Collection of Documents*, Vol. 4, Sofia, 2004, p. 419[53]). Criticism for deflationary policy and the rate peg grew. Thus, D. Boshnyakov supported devaluation ('dear money hurts!') and supported aforementioned devaluer Paul Reynaud. The same author names the deflationary policies of French premier Laval 'a bad example' (Boshnyakov , 1936, pp. 12, 25—28). According to Nikolov, BNB economists were 'orthodox fanatics who overestimate the role of stable money and underestimate that of the national economy'; he also opined that 'there should be no stability at any price; it sometimes contradicts economic stability'; 'the nation is choking' (Nikolov, 1927, pp. 4, 18, 26, 31).

According to Nikolov, the stable lev was of interest solely to Bulgaria's lenders (p. 28). Paraphrasing Goethe, he even waxed: 'theory is grey, while the tree of life is eternally green' (p. 22), as if it were clear where the tree ended and life began (Author's remark). In his turn, BNB deputy governor Burilkov organically linked lev stabilization with the restoration of morality in economic relations: 'There is the closest of relations between unstable currency and moral decay. Unstable currency insinuates injustice into all social and economic relations. Profit is no longer the result of ability and achievement; loss occurs for no error or blame whatever' (Burilkov, 1928, p. 3).

It is interesting to note that the intriguing coincidence of views between orthodox and left-wing economists (even Communists) which was observed in France and expressed itself in the defense of stable money, also appeared in Bulgaria. Evidence of this is contained not only in publications by left-wing economists like BNB comptroller Cholakov (who resigned his post; see Zarin, 1947), but also in the 1945 indictments of the People's Court against BNB managing board members (see *The Bulgarian National Bank: A Collection of*

[52]For details on the effect of the Great Depression in Bulgaria, and on theoretical discussions during the period, see Ivanov, 2001, 2005.

[53]After the 1936 franc devaluation, the BNB managing board continued defending the old rate, claiming that '[Bulgaria] is not affected directly by these devaluations and no especial measures are called for at the moment to enable [Bulgaria] to adapt, and [Bulgarian] exports shall follow their path' (*The Bulgarian National Bank: A Collection of Documents*, Vol. 4, Sofia, 2004, p. 558). For the reasons why Bulgaria did not devalue the lev, see Ivanov, 2005. According to Monchev (Monchev , 1939, p. 55), two trends existed: lenders (France included) strove to devaluation to improve their balances of payments, while debtors (mainly agricultural nations including Bulgaria) preferred to retain their currencies' value to cut the debt burden (they often introduced defensive premia).

Documents, Vol. 4, Sofia, 2004, Document No. 566, pp. 945–952) which claimed that the BNB offended against the gold coverage by reducing and removing it in stages, and that the Bank falsified its balance sheets to mask these offences.

Having reviewed the chronology and discussion of Bulgaria's monetary regimen, we can now try to focus on some facts from the Bulgarian stabilization which, inasmuch as they coincide with ones from the French stabilization, offer us the opportunity of parallel analysis through Aftalion's theory.

At the outset, it is necessary to point out that almost all Bulgarian authors who monitor the pre-stabilization period note the deviations from the traditional postulates of QTM and PPP: see for instance Petkof (1926), Kemilev (1936), and Yurii (1923). Putting aside the wartime period, when it is assumed that market relations were entirely dismantled,[54] in many regards the links Yurii sees are close to Aftalion's reasoning (though within the framework of an entirely different understanding of economics: that of Marxism).

Yurii is categorical; based on his quantitative (and Marxian!) approach, he declares: 'This, however, is a sleight. Lev depreciation cannot cause price rises' (Yurii, 1923, p. 11). The Author submits that 'stressing psychological factors in explaining the behavior of the rate and of prices is unscientific and represents a liberty which contradicts the objective laws of economics (those of Marx and of quantitative theory)' (Yurii, 1923, pp. 36–43). According to Toshev, 'the barometer which measures when inflation sets in is the exchange rate' (Toshev, 1928, pp. 114–116). Yet, according to other authors (Koszul, 1932) and Bulgarian economists aware of French literature (Ilieff, 1930, Petkof, 1926), Aftalion offers the most logical explanation for deviations from QTM and PPP.

Thus, some Bulgarian economists attempt to make light of deviations in monetary variables, explaining them through QTM and PPP, while others criticize QTM and PPP and adopts new theories such as Aftalion's psychological one, Keynes', Fisher's and the late Cassel's theory of 'elastic and manageable money,' or Marx' theory of labour value.[55]

Despite this interpretative variety, Bulgarian economists were united in stressing the role of psychological factors and expectations in determining the movement of exchange rates and prices. Just as the French franc was influ-

[54]The book published under Lyuben Berov's editorship, (Berov, 1997, p. 71) points out these discrepancies during the 1915–1918 War, when supply rose 6.2-fold, prices rose 5.5-fold, while lev depreciation against the Swiss franc was a mere 1.5-fold. The discrepancy is explained by strong state interventions in the economy during the period.

[55]Bulgarian economists did not find it conceptually difficult to leap from QTM to the theory of labour value. In reality, Marx's views on money do not contradict the quantitative equation, as he himself pointed out on many occasions.

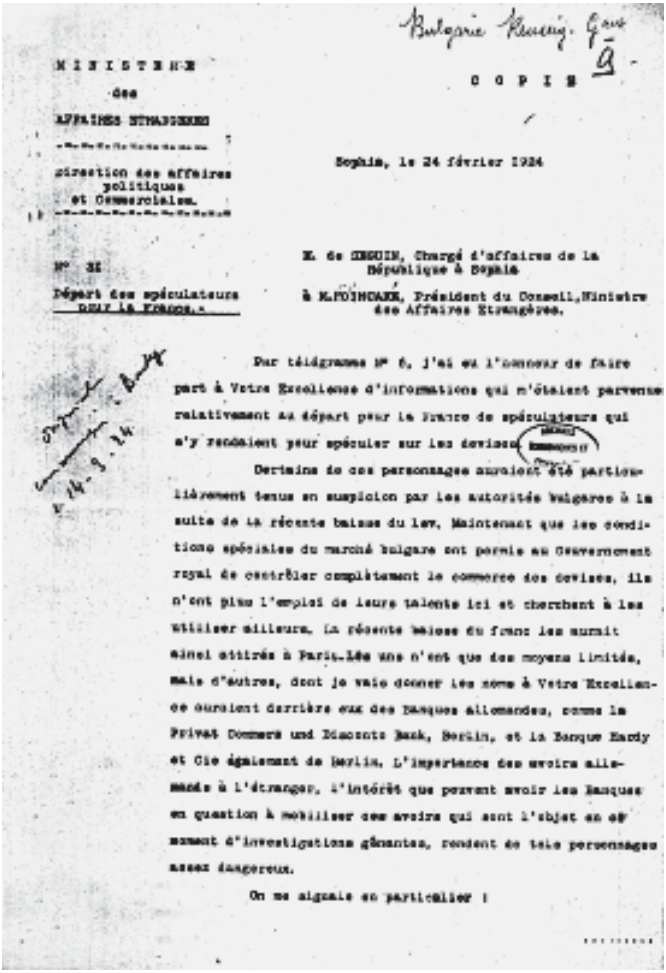
enced by expected German reparations, expectations of successful negotiations on the Bulgarian debt influenced the lev. French expectations on exchange rate levels were influenced by anticipated tax increases by a left-wing cabinet in July 1926; Bulgarian ones, by anticipations of higher customs duties in 1921. Capital movements exhibited some parallels to exchange rate and price movements. Thus, the capital flight from France until mid-1926 and the subsequent switch in the direction of capital movements into France during the second Poincaré cabinet were clearly matched by capital flight from Bulgaria between June 1923 and April 1924 under the threat of capital gains tax, as well as in the reversal of this trend once the will to stabilize had become evident.

The significance of psychology was most clearly shown in interpretations of the lev crisis of April 1923, when a number of authors mention 'rumor, deliberate speculation, attacks upon the exchange rate, *etc.*,' attempting to integrate these new categories into their theoretical explanations. If we make use of Aftalion's pattern at this stage, within the framework of factors , we can show the effects on expectation of: 1. potential favorable developments in reparation negotiations; 2. budget balancing; 3. an active trade balance, plus a number of psychological factors (many listed *inter alia* in Chapkunov, 1936, p. 39).

The parallel between speculations with the franc at the close of 1923 by German, Austrian, and Dutch agents[56] and franc crises of 1924 to 1926 as well as the lev crisis of 1923 is particularly clear. The nexus between franc and lev crises was, however unlikely it may seem, symbolically highlighted in the 24 February 1924 letter by the French chargé d'affaires in Sofia de Seguin to Poincaré, in which he warns of Bulgarian speculators who have departed for Paris and 'have behind them German banks' (*The Bulgarian National Bank: A Collection of Documents*, Vol. 3, Sofia, 2001, pp. 296, 723). He writes:

'Given that the special conditions of the Bulgarian market have afforded the royal government complete control over trading in exchange, they [the speculators, N. N.] can no longer employ their talents here and seek to utilize them elsewhere. The recent fall in the franc has likely drawn them to Paris' (The Bulgarian National Bank: A Collection of Documents, Vol. 3, Sofia, 2001, pp. 296, 723).

[56]See Blancheton (2001, p. 256), Blancheton and Sénégas (2000, p. 119).



Bulgarie Renseig. Gen
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MINISTERE
des
AFFAIRES ETRANGERES

Direction des affaires politiques et Commerciales.

N° 31

Départ des spéculateurs pour la France.

COPIE

Sophia, le 24 février 1924

M. de SEGUIN, Chargé d'affaires de la République à Sophia

à M.POINCARE, Président du Conseil, Ministre des Affaires Etrangères.

Par télégramme N° 6, j'ai eu l'honneur de faire part à Votre Excellence d'informations qui m'étaient parvenues relativement au départ pour la France de spéculateurs qui s'y rendaient pour spéculer sur les devises.

Certains de ces personnages auraient été particulièrement tenus en suspicion par les autorités bulgares à la suite de la récente baisse du lev. Maintenant que les conditions spéciales du marché bulgare ont permis au Gouvernement royal de contrôler complètement le commerce des devises, ils n'ont plus l'emploi de leurs talents ici et cherchent à les utiliser ailleurs. La récente baisse du franc les aurait ainsi attirés à Paris. Ce ne sont que des moyens limités, mais d'autres, dont je vais donner les noms à Votre Excellence suivent derrière eux des Banques allemandes, comme la Privat Commerz und Discconto Bank, Berlin, et la Banque Mendy et Cie également de Berlin. L'importance des avoirs allemands à l'étranger, l'intérêt que peuvent avoir les Banques en question à mobiliser ces avoirs qui sont l'objet en ce moment d'investigations gênantes, rendent de tels personnages assez dangereux.

On me signale en particulier :

A facsimile of the 24 February 1924 letter by French chargé d'affaires in Sofia M. de Seguin to prime minister and minister of foreign affairs Poincaré

Source: Service des Archives Economiques et Financières, Direction du Trésor, Paris, 31578 courtesy Roumen Avramov.

While the philosophy on franc stabilization predominated in France, the role of confidence was underestimated in Bulgaria. To put this another way, if we use the classical interpretation of stabilization as having a confidence effect and a discipline effect, then France saw more of the former, while Bulgaria felt more of the latter. In other words, Bulgarian economists and politicians stressed the regulation of money on circulation and underestimated convertibility and the exchange rate. This marks them out as being closer to Ricardo, who had been much criticized by ideologues of French stabilization (Charles Rist foremost among them). With small exceptions, only BNB economists[57] mentioned the confidence that may be achieved by stabilizing the lev (while in no way underestimating discipline).

Elsewhere, the denial of confidence was total. Thus, Toshev (1928), while criticizing Adolf Wagner's theory of confidence, stresses the presence of objective economics laws, otherwise there would reign a 'scientific brouhaha' (1928, p. 199). According to him, the volume of banknotes mattered rather than convertibility, while 'coverage is an empty phrase' (p. 178), and 'determining the lev's gold content is a random matter' (p. 199). Or even:

'Banknote coverage (metal reserves), when it is not managed and remains wrongly idle in bank vaults, has absolutely no significance in either protecting banknotes from depreciation once they have been issued in excess amounts and in volumes greater than the needs of the economy, or in stabilizing the value of paper money once they have lost that value' (Toshev, 1928, p. 202).

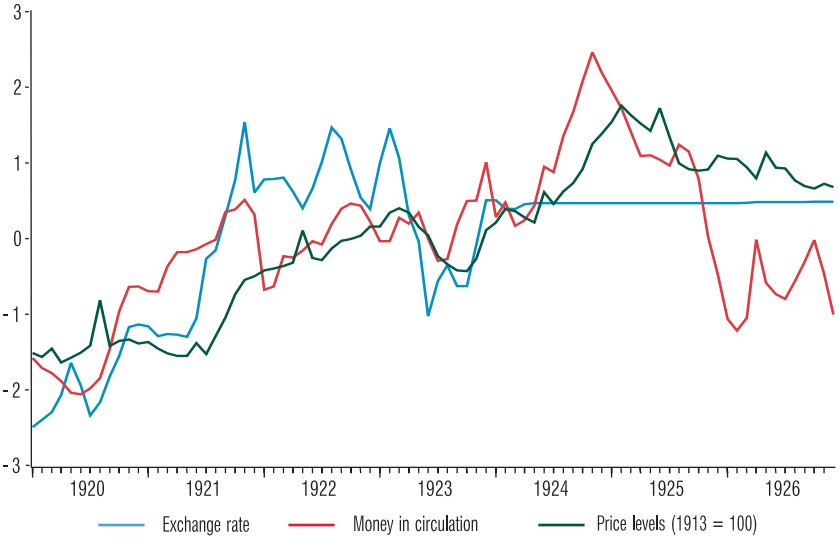
As Toshev did, G. Nikolov also claimed on many occasions that the basic issue was not that of coverage and of whether money was paper or gold, but of its quantity. He considered that a 'harmful psychology in favor of gold coverage and against paper money' was emerging (Nikolov, 1927, pp. 31—33). According to him, 'coverage is not equally suitable for all times and all nations' (p. 34). Totev (1932, p. 52) also considers the basic question to be 'how much money is necessary for exchange in the markets' and, though he mentions the role of confidence in money as a second factor which, along with circulation, affects value, he nevertheless holds that 'given a strengthening of the monetary system, coverage is not foremost, but the amount of money' (pp. 105—109).

[57] BNB economists stressed the role of confidence in monetary stability on many occasions. Thus, in the BNB *Annual Report* for 1929, the analysis of the economy after the onset of the Great Depression states: 'This monetary state, and the Bank's measures, did not and do not give grounds for concern as regards the stability of the lev. Unfortunately, such troubled rumours have found a ready ear among the public which has been mercilessly assaulted with phantasmagorical dangers; such rumour has permeated abroad and caused the greatest of damage to Bulgarian credit. The Bank's management has done all in its powers to deny any ground to such concerns and to convince the public that, despite unfavorable economic developments, the BNB, alongside other factors, is able to secure the stability of the lev' (The Bulgarian National Bank: A Collection of Documents, Vol. 3, Sofia, 2001, pp. 60, 262).

These two differing ideologies of stabilization — the French insistence on confidence and credibility and the Bulgarian insistence on discipline — may also explain in a certain sense (naturally alongside other factors) the different stabilization approaches in the two countries.[58] While French stabilization was more a market one and rested on confidence building, the Bulgarian one was more administrative and depended on state regulation through the Foreign Exchange Office, BNB monopoly over the currency, and limits to capital movements; *i. e.*, it emphasized the attainment of financial discipline.

Chart 8

BULGARIA, 1920 to 1924
PRICE LEVELS, MONEY IN CIRCULATION, AND THE LEV DOLLAR RATE
(NORMALIZED SCALE)



[58]Differences between Bulgarian and gold bloc stabilizations formed the subject of a study by Sarailiev (1937, p. 27) who stressed the tradeoff between 'lev devaluation and duty increases,' pronouncing himself in favor of the latter for improving Bulgaria's foreign equilibrium. He felt the former method was 'a leap into the unknown.' Sarailiev's book also contained some of the future arguments for the existence of 'original sin' in peripheral nations (p. 32).

V. Aftalion's Theory: an Econometric Test 80 Years Hence

What immediately strikes today's economist, even if he has elementary awareness of statistics and econometrics, is what one may style an exceptionally naive and rudimentary approach by Aftalion in his empirical testing of the theoretical hypotheses underlying his psychological theory of exchange rates. This is not surprising in the least, for the state of economic statistics at the time was exactly as presented by Aftalion. It was an emerging methodology which was used by the most technically forward of technically minded economists. (One must not forget that economics was still taught within faculties of law in France, and that Aftalion was not only a lector of many years' experience but also the author of some of the first French textbooks on statistics in 1928.)

Despite his advanced views, Aftalion used the methods of correlation and standard deviation and constructed a number of indices of basic variables, subsequently pedantically comparing their dynamics. With hindsight, he often erred, or at the least oversimplified his interpretation of anticipatory moves by a given variable *x* against another variable y as indicating causality $x \rightarrow y$. We now know that causality issues are rather more complex, and that even Granger (Granger — Sims) causality fails to tell us enough about economic causes between variables. As a reminder, statistical causality as seen by Granger comprises the following: if we wish to know whether variable x explains variable *y* by causality, we have to see what part of *y's* current behavior may be explained by past *y* values; then, including also past *x* values, we may see to what extent *y* forecasts may be improved. If we do so, we may denote it, stating '*x* causes according to Granger *y*,'[59] or:

$$\sigma^2(y_{t+1} \mid y_t, x_t) < \sigma^2(y_{t+1} \mid y_t) \qquad (1).$$

As a whole, the development of econometrics today (despite methodological limitations and debates) offers us the ability to make significantly more precise assessments of causality and directions of influence between economic variables. Such assessments, for instance, are VAR models (Vector Autoregressions Models) which offer the opportunity of seeing the mutual influence of variables (all variables are viewed as endogenous) through the mutual reaction of shocks (Impulse Response Analysis, IR) and decomposing those variations in each variable which are caused by other variables (Vari-

[59]See Haudeville and Rietsch (2004). Putting this another way, variable *x* causes *y* given a certain volume of information if *y's* current value can be forecast better by using past values of *x* than without them.

ance Decomposition Analysis, VD). VAR models are an alternative to structural models, where causality is supposed a priori.

We shall use a VAR (q) model:

$$X_t = K + \Phi_1 X_{t-1} + \Phi_2 X_{t-2} + ... + \Phi_q X_{t-q} + \varepsilon_t \qquad (2).$$

The vector of endogenous variables is $X = \begin{bmatrix} \Delta m \\ \Delta p \\ \Delta e \end{bmatrix}$ i. e., it comprises of circulation *m*, price level *p* and exchange rate e. In equation 2, vector *X* is regressed to its past values where optimum lag is *q*. The vector of constants is denoted *K*, Φ is the vector of estimated coefficient, and ε is the vector of residuals (the order of variables in the vector is of importance and calls for preliminary tests, as well as is determining the optimum lag).

Before we subject Aftalion's psychological theory to econometric tests, we must make some general methodological clarifications.

First, test scope. Tests are applied over the period between the end of the Great War and the stabilization, as the stabilization is regarded precisely as a reaction to the dominant role of exchange rates in explaining inflation and stabilizing inflationary expectations. We stop with *de facto* stabilization. In Bulgaria, this was March and April 1924, while for France it was July 1926. This immediately shortens the Bulgarian studies by some two years.

Second, it is important to bear in mind the market 'purity' of the period under review: i. e., whether the movement of monetary variables is determined by market forces and whether the state intervenes through regulating either prices (such as deficit management through coupons, inter alia) or exchange rates. The 'purer' the period, the stronger the effect of the psychological theory. There is no doubt that in wartime state intervention was most marked in both countries. As we recall from above, the Bulgarian stabilization was significantly less market-oriented than the French one, and hence the period during which Aftalion's dependencies could be seen in their pure form was shorter (it may be supposed that this is the reason he did not include Bulgaria in his sample of monitored countries). In the Bulgarian case, we may shorten the period under analysis further to the close of 1923 when exchange controls and the BNB monopoly were reintroduced.

Third, it is necessary to bear in mind the quality of statistics in both countries, as well as the extent to which price indices reflect genuine price movements and the extent to which declared circulation is close to actual circulation. The Author will limit himself to mentioning that both France (between

May 1924 and April 1925) and Bulgaria[60] witnessed a number of accounting sleights concerning central bank balances, aiming to coverage actual money supply rises and transgressions of legally prescribed banknote coverage.

The econometric test of Aftalion's psychological theory for the stabilization period in France and Bulgaria includes the following tests on the dynamics of the exchange rate, circulation, and prices: 1. analyses of the dynamics of variables and their basic statistical features (mean values, maximum, minimum, variance, distribution normality, correlation between variables, et c.), i. e., what Aftalion himself did (Petkof (1928) does the same with regard to BG), but employing 'steam' reckoning; 2. applying the Granger test on causality between variables in pairs according to equation 1; and 3. applying a VAR model to equation 2 to examine the mutual reaction of shocks (IR) and decomposing variable variances (VD).[61]

An Econometric Test on France, 1920 to 1926

The pre-stabilization period we are examining, and which coincided with the period Aftalion monitored, comprises the years between 1920 and 1926 (more precisely, to July 1926, when it became clear to economic agents that the second Poincaré reform would go ahead). The same period was monitored by Aftalion, and in our model we use his data (Aftalion, 1927, pp. 58—64).

A curious interesting methodological case comes up in this context. It is known that between May 1924 and April 1925, weekly Banque de France balance sheets were falsified to cover greater issue volumes (this is covered in detail in Blancheton, 2001). Week-by-week analyses of monthly balances show that until August 1924 the bank, having falsified weekly balances, managed to restore equilibrium by the fourth week in every month; from September 1924, however, balances remained false at the close of months, with the legal limit of 41 billion francs being surpassed on 2 October 1924. Despite the short duration and small magnitude of misrepresentation (the deception was more significant for the breach it represented), the methodological case is born of the fact that Aftalion constructed his theory on the basis of officially reported monetary variables.

Therefore, it would be logical to ask ourselves the following questions: First, whether it is proper to use true data when it was falsified data which provided economic agents with signals in forming their expectations and making

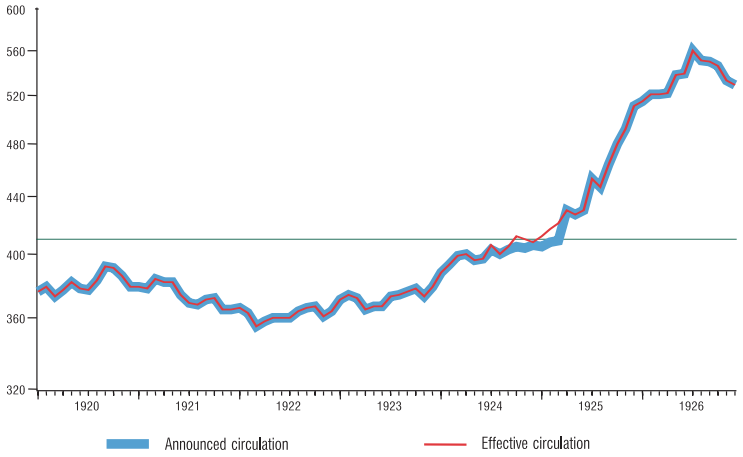
[60]This happened outside the period under review, in the mid-1930s, under BNB governor Dobri Bozhilov. Subsequently Kiril Gunev, deputy governor under Bozhilov, was accused of these falsifications.

[61]Analytical steps used here are similar to those used by Spanos et al. (1997) who use this approach in applying the VAR model to the Cypriot economy.

their decisions? Second, is it not nevertheless right to use true data which best describe the fundamental dependencies of QTM and PPP? Third, would it be proper to reject Aftalion's theoretical dependencies using data which he was denied? And finally, why he (and almost all other economists such as Rueff for instance [Rueff, 1927, p. 343]) failed to apply the true data once the deception was revealed in April 1925, prompting the deep currency crisis of 1926?

Chart 9

FRANCE, 1920 to 1926
ANNOUNCED AND EFFECTIVE GROWTH IN CIRCULATION IN FRANCE
(LOGARITHMIC SCALE)



Though they may contain interesting methodological asides, replies to the above questions are suitable for another lengthy discussion. For this reason, the models we use employ amplifications to Aftalion's data, correcting them for the true state of circulation (data was kindly supplied to the Author by Bertrand Blancheton).[62]

The statistical characteristics and correlation matrix of variables (Table 3) show, both as levels and as first order logarithms: 1. that exchange rate variations were greatest, followed by price fluctuations, and lastly money supply fluctuations; 2. the correlation matrix which shows connection strength also

[62]It is possible to test correlation between true and falsified data in order to check to what extent they move together, or to include a dummy variable in the models.

shows a stronger relationship between exchange rates and prices than between supply and prices, than between money supply and prices, or between money supply and exchange rates, than between money supply and prices.

Table 2

FRANCE: STATISTICAL CHARACTERISTICS OF VARIABLES AND CORRELATION MATRIX

January 1920 to July 1926 (in levels)

	Exchange Rate	Money in Circulation	Price Level
Mean	338.6835	401.7848	461.9367
Median	313.0000	379.0000	461.0000
Maximum	790.0000	560.0000	837.0000
Minimum	208.0000	355.0000	306.0000
Std. Dev.	108.9872	50.69711	112.3743
Skewness	1.646211	1.699986	0.658832
Kurtosis	6.329693	4.776909	3.387260
Jarque–Bera	72.17605	48.44418	6.208761
Probability	0.000000	0.000000	0.044852
Sum	26756.00	31741.00	36493.00
Sum Sq. Dev.	926501.1	200475.3	984982.7
Observations	79	79	79

January 1920 to July 1926 (first difference of logs)

	Exchange Rate DLEF	Money in Circulation DLMF	Price Level DLPF
Mean	0.016045	0.005107	0.006943
Median	0.019961	0.002732	0.006986
Maximum	0.196236	0.052107	0.124526
Minimum	-0.274943	-0.022285	-0.109409
Std. Dev.	0.072719	0.015413	0.044801
Skewness	-0.765592	0.811807	-0.326610
Kurtosis	5.710316	3.986225	3.445391
Jarque–Bera	31.49359	11.72849	2.031475
Probability	0.000000	0.002839	0.362135
Sum	1.251498	0.398348	0.541560
Sum Sq. Dev.	0.407176	0.018293	0.154548
Observations	78	78	78

Correlation Matrix (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

Correlation Matrix (first difference of logs)

	Exchange Rate DLEF	Money in Circulation DLMF	Price Level DLPF
Exchange Rate, DLEF	1	0.286006	0.713637
Money in Circulation, DLMF	0.286006	1	0.332630
Price Level, DLPF	0.713637	0.332630	1

The causality direction Aftalion proposes in his book, *viz.* that the direction of impulses starts from the exchange rate, traverses prices, and ultimately stops at circulation, is confirmed overall by the causality tests (Table 3).

Table 3

CAUSALITY GRANGER TESTS

Pairwise Granger Causality Tests
Sample: January 1920 to July 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
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

Chart 10

FRANCE: MUTUAL SHOCK REACTION (IR)

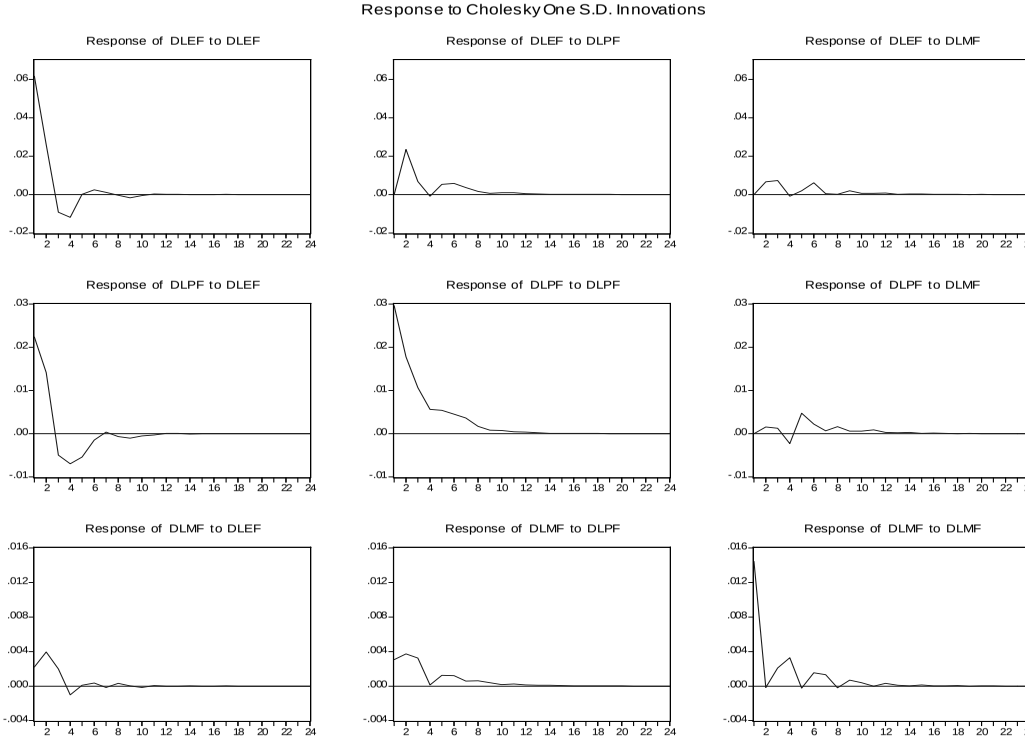
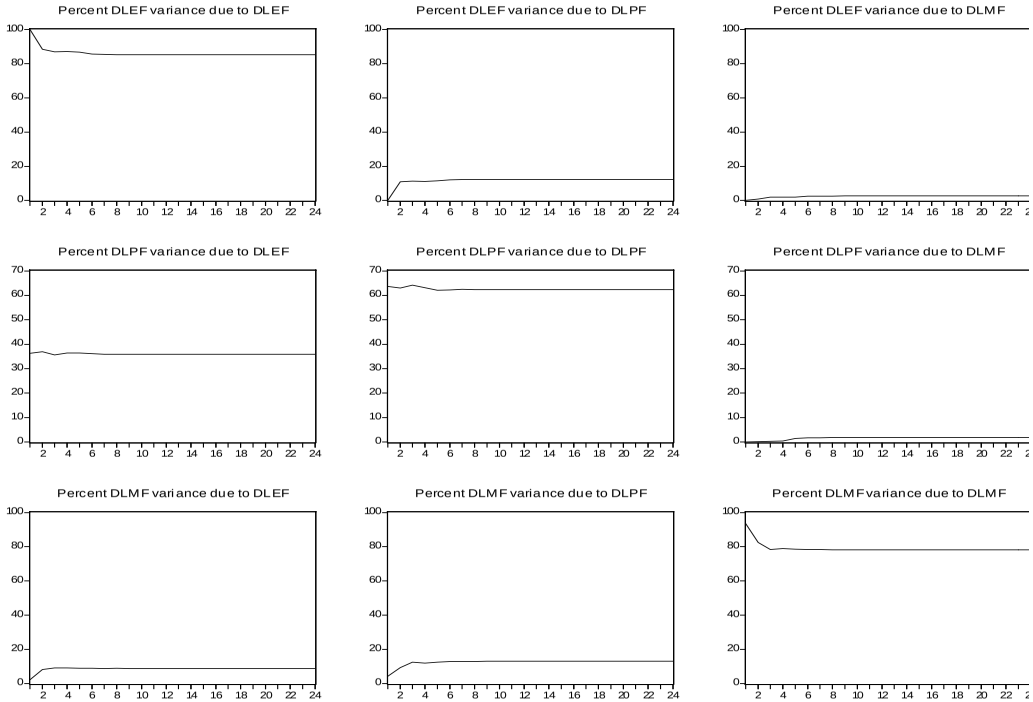


Chart 11

FRANCE: VARIANCE DECOMPOSITION (VD)



The VAR model we apply in Appendix 4 (the four lags are selected to Akaike and Schwartz criteria) has relatively acceptable statistical characteristics and allows simulations of shocks and variance decomposition.

Both shock simulation and variance decomposition show that, as a whole, Aftalion's psychological theory of money and exchange rates is 'confirmed' (bearing in mind the entire conditionality of any empirical proof, N. N.). It is evident that circulation has a weak effect on price movements and exchange rates (the third column in Charts 10 and 11). Naturally, in his book Aftalion fragments the period under review into short sub-periods (often as short as individual years), attempting to calculate correlation and even show causality within these narrow confines. The Author feels this does not convey significant information (quite apart from the mix between causality and correlation Aftalion offers) and serves to make the presentation torturous. Hence, Aftalion's theory was tested for the entire period.

Apart from anything else, the results also show the roles of inertia and expectation in forming prices and exchange rates. Thus Chart 11 shows that some 62 per cent of price variations are explained by past price levels, with 36 per cent due to the exchange rate and only 1 or 2 per cent, to circulation. In a similar way, when looking at the exchange rate, respective values are some 85 per cent auto-induced, 12 per cent are price-induced, and only about 3 per cent are down to circulation. When looking at circulation movements, some 80 per cent are auto-induced, with 11—12 per cent resulting from price movements and some 8—9 per cent, from exchange rates.

Let us now see how Bulgaria's pre-stabilization period compares.

An Econometric Test on Bulgaria, 1920 to 1924

As all who handle historical data know, it is very difficult to find solid series of high-frequency (say, monthly) data. In Bulgaria's case, the problem is yet more complex, for as far as is known, to date nobody has tried to construct such series, statistical methodologies changed frequently, and no such data were gathered in wartime.[63]

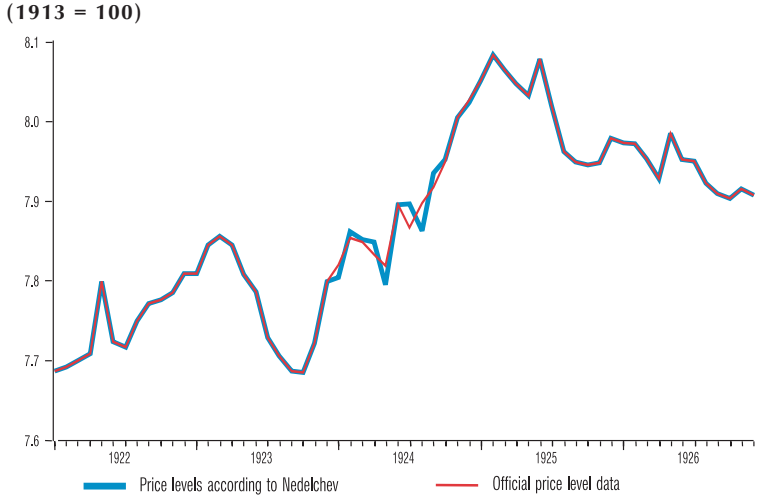
For the period under review (1920 to 1926), the Author used monthly price data from *Statistical Yearbooks of the Kingdom of Bulgaria*, published since early 1922. From scientific literature, data showing changes in the prices of food, heating, and lighting between 1922 and 1931 were used, with a base of 1914 (Koszul, 1932), plus a monthly prices index based on 1913 and coverageing the 1920 to 1927 period (Nedelchev, 1940; data sources are not mentioned, and precise data composition is unclear). Bringing these to a com-

[63]Yearbooks were not published during the 1915 to 1918 War, annual data on the 1913 to 1922 being published only in 1923.

mon base of 1913 and comparing them with post-1922 *Yearbooks*, we find complete concord: all three indices represent a notional 'Index on Price Rises in Food, Heating, and Lighting in 12 County Towns in the Kingdom of Bulgaria.' The sole difference between official data and those used by Kiril Nedelchev concerns the 12 months of 1924 (see Appendix 3). For this reason, we use data from Nedelchev for 1920 to 1923, and *Yearbook* data for 1924.

Chart 12

PRICE LEVELS IN BULGARIA
(LOGARITHMIC SCALE)

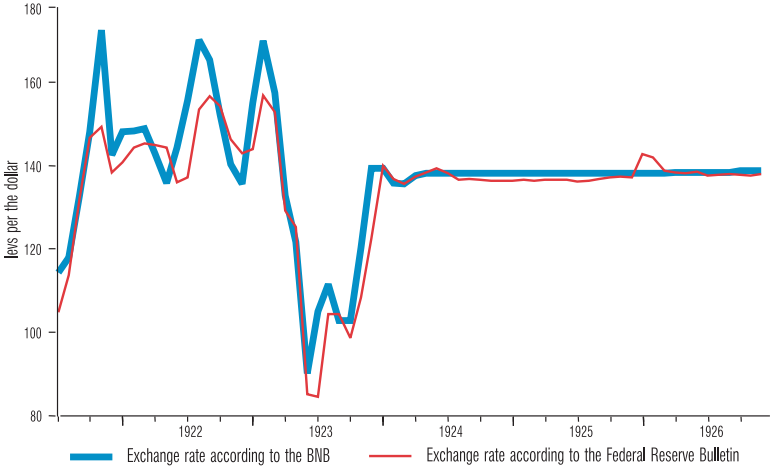


It is yet more difficult to find reliable data on the lev dollar exchange rate over the review period. Koszul (1932) uses monthly data from *The Federal Reserve Bulletin* which go back to no earlier than 1922. Comparing his data to the Bulletin reveals no differences, and so we may 'extend' the series back to July 1921 according to the *Bulletin*. Unfortunately, for given months during this period no average values are shown, there being only minimum and maximum values. Checking data available from *The Federal Reserve Bulletin*, we find that the monthly averages are not simple arithmetical means of maximum and minimum values. In the *Official Bulletin* of the BNB we find average monthly values for the lev against the US dollar for an earlier period: up to early 1919. Significant differences are notable between the two series (Chart 13). As with prices, if we leave aside intentional data manipulation (which was characteristic for the period before and during stabilization), deviations in data from BNB publications may be due to typographical errors, rounding off,

or lack of qualified statisticians.[64] The attempt to encompass the 1920 to 1926 period forces us to use the *Official Bulletin* of the BNB data which obviously show lesser deviations from parity.

Chart 13

LEV DOLLAR EXCHANGE RATE
(PARITY 5.1825 LEVS TO THE DOLLAR)



Note: lev dollar, therefore rises show lev falls and vice versa.

The third variable, circulation, shows the least disagreement, naturally, not taking into account various options in defining this indicator. In the Bulgarian case we examine only banknotes in circulation, since we were unable to find monthly statistics for other BNB liabilities (on-sight deposits and current accounts) prior to 1922. Since Koszul's data on banknote circulation is entirely in concord with the *Official Bulletin* of the BNB,[65] the Author had no difficulty in constructing an order of monthly data for the 1920 to 1926 period.

We may now turn to testing the statistics following the steps taken in analyzing the French pre-stabilization period.

[64]Thus the average monthly bid rate (lev dollar) for May 1924 is 147.2, whereas both minimum and maximum rates were 137.2. This putative typo failed to be noticed by editors even though the bid rate was shown as exceeding the monthly average offer rate of 139.0.

[65]Monthly data on banknote and coin circulation prior to 1928 are from Martin Ivanov.

Table 4

BULGARIA: STATISTICAL CHARACTERISTICS OF VARIABLES

January 1920 to May 1924 (in levels)

	Exchange Rate	Money in Circulation	Price Level
Mean	114.0643	2090.868	3713.604
Median	121.7300	2179.000	3788.000
Maximum	172.5500	2580.000	4145.000
Minimum	42.61000	1586.000	3133.000
Std. Dev.	37.90069	348.9954	262.8695
Skewness	-0.360766	-0.150511	-0.973746
Kurtosis	1.889355	1.445388	2.887818
Jarque–Bera	3.873726	5.537249	8.403389
Probability	0.144155	0.062748	0.014970
Sum	6045.410	110816.0	196821.0
Sum Sq. Dev.	74696.04	6333484.	3593221.
Observations	53	53	53

January 1920 to May 1926 variables (first difference of logs)

	Exchange Rate DLEF	Money in Circulation DLMF	Price Level DLPF
Mean	0.022613	0.003534	0.007929
Median	0.011922	0.003543	0.006837
Maximum	0.250428	0.047775	0.158857
Minimum	-0.302440	-0.087476	-0.160037
Std. Dev.	0.113671	0.024098	0.046412
Skewness	-0.518051	-1.098621	-0.189827
Kurtosis	3.346138	5.988055	6.621983
Jarque–Bera	2.585523	29.80542	28.73629
Probability	0.274512	0.000000	0.000001
Sum	1.175889	0.183789	0.412319
Sum Sq. Dev.	0.658979	0.029617	0.109859
Observations	52	52	52

Correlation Matrix (in levels)

	Exchange Rate	Money in Circulation	Price Level
Exchange Rate	1	0.780339	0.793905
Money in Circulation	0.780339	1	0.691938
Price Level	0.793905	0.691938	1

Correlation Matrix (first difference of logs)

	Exchange Rate DLEF	Money in Circulation DLMF	Price Level DLPF
DLEB	1	0.141123	0.000123
DLMB	0.141123	1	0.019133
DLPB	0.000123	0.019133	1

The statistical characteristics in the above tables bring out exchange rate movements, though not as clearly as in the French case. Causality tests also show some differences from the dynamics of French monetary variables. Thus, the exchange rate causes price movements, yet the latter are also caused by circulation. In its turn, circulation is a function of the exchange rate.

What cannot be ruled out anywhere, however, are zero hypotheses: that prices do not affect exchange rate movements (in brief, PPP contends that no connection exists); that circulation does not affect price movements (in brief, QTM contends that no connection exists); and that prices do not affect circulation. This gives certain grounds for claiming that exchange rates affect prices in two ways: 1. directly; and 2. indirectly, through circulation. In both cases, this is effected through expectation.

Table 5

GRANGER CAUSALITY TESTS

Pairwise Granger Causality Tests
Sample: January 1920 to May 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

Chart 14

BULGARIA: MUTUAL SHOCK REACTION (IR)

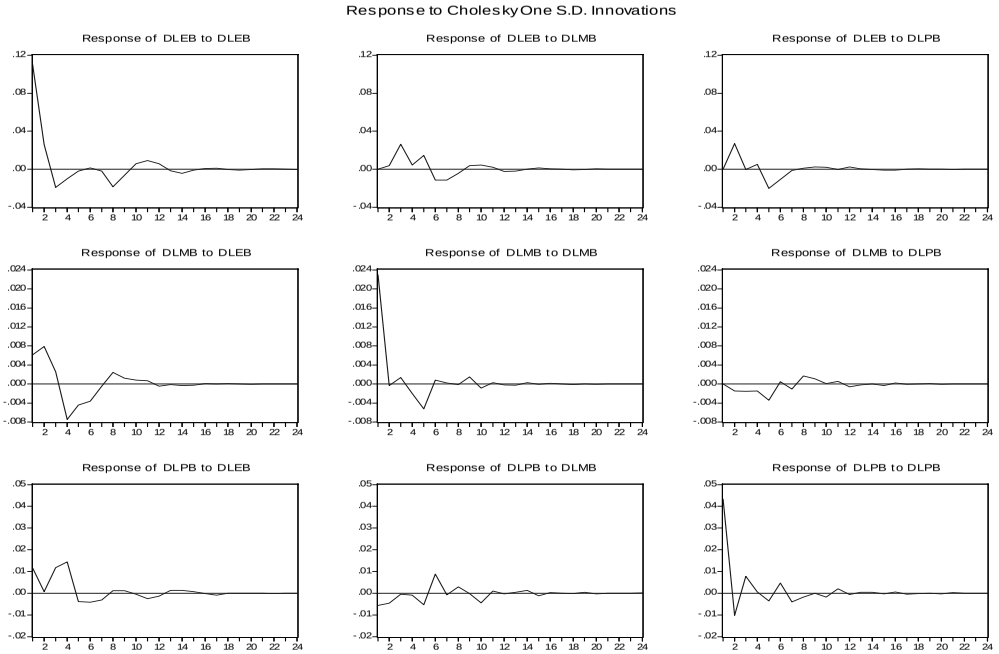
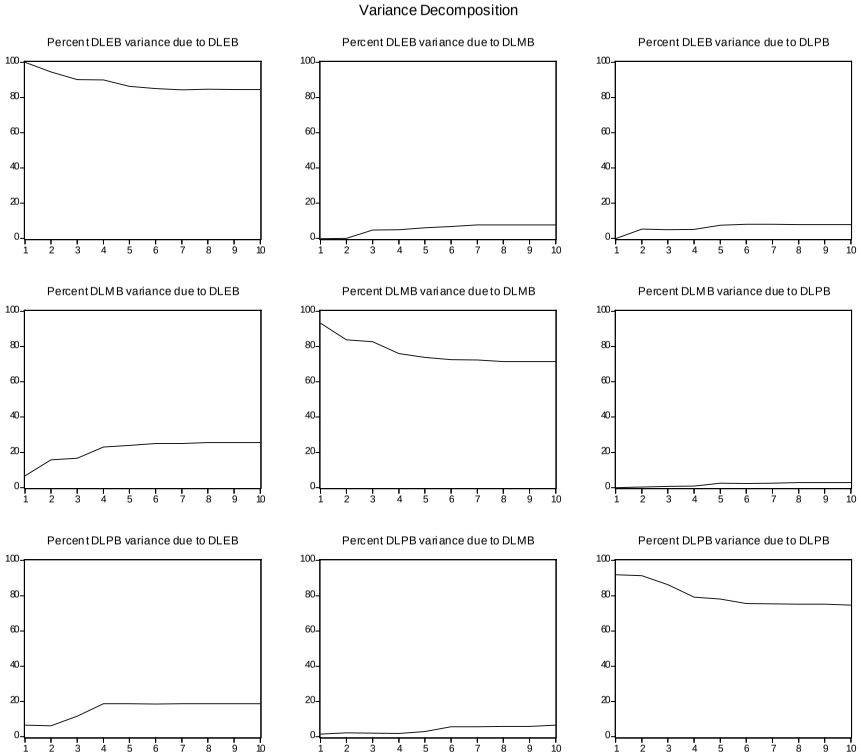


Chart 15

BULGARIA: VARIANCE DECOMPOSITION (VD)



Despite the relatively short period of 53 monthly observations (we ran 79 monthly observations for France), VAR models give some interesting results (see Appendix 5). First, the weak influence of circulation is apparent again, both on price formation and exchange rates (e. g., the third line in Chart 14). Both price and exchange rate fluctuations are determined foremost by their own behavior, i. e., inertia and expectation govern. Thus VD shows that 1. price fluctuations are explained to the tune of 74–75 per cent by their own past values, with some 19 per cent down to exchange rate movements, and only some 7 per cent down to circulation; 2. exchange rates are affected to the tune of some 84–85 per cent by themselves, with 8 per cent down to prices and another 8 per cent down to circulation; and 3. circulation is determined by itself to the tune of 71 per cent, with 25 per cent down to exchange rates and only 3 per cent down to prices.

It is apparent that as far as significance in explaining prices and circulation is concerned, the exchange rate is the second variable after 'own past behaviour.' Naturally, apart from purely statistical explanations (such as short orders), these low values may also have an economic explanation in the form of the significantly stronger non-market formation of exchange rates (through BNB intervention) prior to Bulgarian stabilization than was the case in the same period in France. Similar results in causality directions and VAR models are obtained when shortening the period under review to late 1923, after which *de facto* exchange controls were introduced and the central bank influenced exchange rates ever more.

Since Aftalion's theory and statistical tests were 'tested' against Bulgarian monetary history by his contemporaries, it would be interesting to compare their results with ours. As a whole, Koszul (1932) and Petkof (1926) reach conclusions close to ours.

According to the first author the analysis of curves and correlations in circulation, prices, and lev exchange rates show unambiguously that between 1920 and 1924 the causality chain began with the exchange rate (pp. 120–121, 187–191), as the significance of circulation grows in time.

The results of Petkof's statistical analyses are even closer to ours. That author finds that between 1920 (1921) and 1924 exchange rates dictated price and circulation movements, with upswing periods featuring the 'chain' of exchange rate – circulation – prices, while decline periods feature a chain (or rather twin chains) of exchange rate – prices and circulation – prices (p. 112). Overall, Petkof considers that two factors determine price movements: exchange rates and circulation or money supply (pp. 141–148, 361–377).

It is worth remembering that the tests we conducted show a Bulgarian causality chain similar to that of Germany: another defeated power. In this configuration, the exchange rate influences prices through two channels: di-

rectly and *via* circulation. As a whole, this is an argument in favor of the claim that the discipline effect (control over money supply) played a relatively greater role in Bulgarian stabilization than did the confidence effect (the exchange rate peg), more characteristic of French stabilization.

VI. Notes in Conclusion

Interwar financial stabilizations had a number of features in common with modern views displayed in discussions on the effectiveness of different monetary regimens, particularly those based on stabilizing the exchange rate, convertibility, and rules. Such monetary regimens enjoy the undoubted advantages of instilling confidence and creating discipline. This study draws up a comparative analysis of the French and Bulgarian stabilizations. The two types of stabilization are viewed as answers to the specific pre-stabilization dynamics of monetary variables which is hard to describe using traditional theories like QTM and PPP.

Albert Aftalion was among the first economists to stress the role of psychological factors, expectation, and confidence in analyzing inflation, exchange rates, and monetary circulation. In a number of ways, his psychological theory of money and exchange rates precedes modern understanding of the formation of exchange rates and inflation (the role of expectation, overshooting, the Random Walk, dynamic multiple equilibria, and self-fulfilling prophesies, *inter alia*). Aftalion constructed his theory by monitoring pre-stabilization experience in a number of European countries (though Bulgaria did not enter the scope of his empirical illustrations) and by using basic statistical methods (occasionally interpreted wrongly; thus, correlation is viewed as causality).

Modern econometric techniques allow a new (and rewarding) reading with which we may judge the extent to which Aftalion's theory was adequate to the facts of its time. Despite structural differences between France and Bulgaria in the pre-stabilization periods (administrative intervention by the state in monetary affairs was more marked in Bulgaria), Aftalion's theory offers a sound generalization of the facts.

The role of expectation is a leading one, with money supply not only failing to lead price movements and exchange rates, but most often being the last link in the chain of monetary interdependencies' causality. In both France and Bulgaria, the exchange rate was the basic focus of economic agents' expectations. Its actual and subsequently *de jure* stability, and national currency convertibility, became starting points for overall financial stabilization. Despite the differences between the two types of stabilization (in France, one may say more about the power of the confidence factor, while in Bulgaria one has to say more about the power of the discipline effect), there is no doubt that in both countries stabilization addressed similar problems and monetary depen-

dencies, all of them finding expression in the decisive short-term role of exchange rates and expectation.

Finally, the fact that Aftalion was born in Ruse, Bulgaria, was not devoid of significance. Though he left his country of birth at an early age, this facet of the great economist's life remains a symbolic link between Bulgaria and France.

Appendices

Appendix 1

MAJOR PUBLICATIONS BY ALBERT AFTALION
(after Dormard, ed., 2003 and Author's notes)

1896–1899

"Les théories politiques de Taisne", Conférence faite au Collège libre des Sciences sociales, *Revue de sociologie*, mars 1896.

La femme mariée, ses droits et ses intérêts pécuniaires. Ouvrage couronné par la Faculté de droit de Paris, Prix Rossi 1897. Publié aux éditions Pedone, 1899, 431 p.

Les lois relatives à l'épargne de la femme mariée, leur importance pratique pour la protection de l'épouse dans les classes laborieuses, Thèse de doctorat en sciences juridiques, soutenue le 25 mai 1898, Paris, 211 p.

L'œuvre économique de Sismonde de Sismondi, Thèse de doctorat en sciences économiques, soutenue le 26 juin 1899, Paris, 267 p., réimpression New York, Burt Franklin, 1970.

1901

"Les ports francs en Allemagne et les projets de création des ports francs en France", Rapport présenté à la Société d'économie politique nationale, *Bulletin de la Société*, 1901, pp. 1–35. "Le développement des principaux ports maritimes de l'Allemagne", *Revue d'économie politique*, février 1901, pp. 16–201, mai 1901, pp. 499–534, juin 1901, pp. 561–599.

1902

"La coopération et son but", *Revue du christianisme social*, mai 1902.

1903

"La décadence de l'industrie linière et la concurrence victorieuse de l'industrie cotonnière", *Revue d'économie politique*, mai, juillet et octobre–novembre 1903, pp. 420–447, 616–636 et 827–853.

1904

La crise de l'industrie linière et la concurrence victorieuse de l'industrie cotonnière, Paris, éd. Larose, 1904, 183 p. "Déposition sur la décroissance de l'industrie linière faite devant la Commission parlementaire de l'industrie textile le 20 janvier 1904", *Bulletin de l'Université de Lille et de l'Académie de Lille*, 3e série, 8e année, 1904, N l, pp. 1–9.

Cahiers lillois d'économie et de sociologie, N 39, I^er semestre 2002 "L'importance industrielle de la région du Nord et les formes de l'organisation économique contemporaine", *Revue internationale de l'enseignement,* 15 juin 1904, pp. 490–501.

1905

"Le développement de la fabrique et le travail à domicile dans les industries de l'habillement", *Revue d'économie politique,* 1905, pp. 827–843 et 914–936.

1906

"Le développement de la fabrique et le travail à domicile dans les industries de l'habillement", *Revue d'économie politique,* 1906, pp. 115–158.

Le développement de la fabrique et le travail à domicile dans les industries de l'habillement, Paris, éd. Larose, 1906, 313 p.

1907

La conciliation dans les conflits entre patrons et ouvriers, Publication de l'Association pour la protection légale des travailleurs, Paris, 1907, 84 p.

1908

"Les cartels dans la région du Nord. Les cartels à formes simples dans les filatures de coton et de lin (1899–1907)", *Revue économique internationale,* janvier 1908, pp. 107–165.

"Essai d'une théorie des crises périodiques. La réalité des surproductions générales", *Revue d'économie politique,* octobre 1908, pp. 696–706.

1909

"Essai d'une théorie des crises périodiques. La réalité des surproductions générales", *Revue d'économie politique,* février, mars et avril 1909, pp. 81–117, pp. 201–229 et pp. 241–259, articles réunis sous le même titre dans une brochure d'une centaine de pages. Paris, éd. Larose et Ténin, 1909.

"La théorie de l'épargne en matière de crises périodiques de surproduction", *Revue d'histoire des doctrines économiques et sociales,* 1909, N 3, pp. 229–262.

1910

"La réalité des surproductions générales. Réponse à quelques objections", *Revue d'économie politique,* N 4, avril 1910, pp. 283–302.

1911

La conciliation dans les conflits collectifs. Rapport à l'Association française pour la protection légale des travailleurs, mars 1911, 24 p. "Les métho-

des d'enseignement de l'économie politique et les salles de statistique", *Revue internationale de l'enseignement,* 15 avril 1911, pp. 289–295.

Compte rendu de l'ouvrage d'Irving Fisher, The Purchasing Power of Money. Its determination and Relation to Credit, Interest and Crises, *Revue d'histoire des doctrines économiques et sociales,* 1911, N 4, pp. 409–412.

"Les trois notions de la productivité et les revenus", *Revue d'économie politique,* N *2,* mars–avril 1911, pp. 145–184, et N 3, mai–juin 1911, pp. 349–369.

"La filature de coton et les crises périodiques de surproduction", *Revue économique internationale,* avril 1911, pp. 51–79. "Les cartels dans la région du Nord de la France. Les cartels des mines de charbon du Nord et du Pas-de-Calais", *Revue économique internationale,* mai 1911, pp. 274–308.

Compte rendu de l'ouvrage d'H.L. Moore, Laws of Wages. An Essay in Statistical Economies, *Revue d'histoire des doctrines économiques et sociales,* 1911, pp. 392–394.

1912

"Les oscillations périodiques des salaires et les crises", *Revue économique internationale,* juillet 1912, pp. 124–146. "Le salaire réel et sa nouvelle orientation", *Revue d'économie politique,* septembre–octobre 1912, pp. 541–552.

Compte rendu de l'ouvrage d'H.L. Moore, Laws of Wages. An Essay in Statistical Economies, 1911, *Revue d'histoire des doctrines économiques et sociales,* N 4, 1912, pp. 392–394.

1913

Les crises périodiques de surproduction, tome 1, *Les variations périodiques des prix et des revenus, les théories dominantes ; tome* 2, *Les mouvements périodiques de la production, essai d'une théorie,* Paris, éd. M. Rivière, 324 et 419 p.

1921

"Évolution de la production. Le rythme de la vie économique", *Revue de métaphysique et de morale,* N 2, avril–juin 1921, pp. 247–278.

1922

"La théorie socialiste de l'exploitation dans les échanges et sa critique", *Revue d'histoire économique et sociale,* 1922, N 1, pp. 1–16 (Extrait de l'ouvrage ci-dessous, *Les fondements du socialisme).*

1923

The Effect of the War upon the French Textile Industry, Carnegie Endowment for International Peace, Oxford, 1923, 1 vol.

Les fondements du socialisme. Étude critique, Paris, éd. Rivière, 1923, 1 vol., 310 p.

1924

L'industrie textile en France pendant la guerre, Paris, P.U.F.; New Haven (U.S.A.), Yale University Press, 1924, 324 p. (Publications de la Dotation Carnegie pour la Paix internationale: Histoire économique et sociale de la guerre mondiale, série française). "La circulation, les changes et les prix. Les expériences de 1922–1923 et leur enseignement", *Revue économique internationale,* février 1924, pp. 256–286.

1925

"Les variations du change en France tiennent-elles aux cycles économiques?", *Revue économique internationale,* février 1925, pp. 283–310.

"Les expériences monétaires récentes et la théorie quantitative", *Revue d'économie politique,* vol. 39, N 3, mai–juin 1925, pp. 657–685. "Les expériences monétaires récentes et la théorie du revenu", *Revue d'économie politique,* vol. 39, N 4, juillet–août 1925, pp. 813–841. "Les expériences monétaires récentes et la théorie psychologique de la monnaie", *Revue d'économie politique,* vol. 39, N 5, septembre–octobre 1925, pp. 1009–1031.

"Prix, circulation et change en France de 1920 à 1924", *Revue d'économie politique,* vol. 39, N 6, novembre–décembre 1925, pp. 1236–1264.

"Existe-t-il un niveau normal du change?", *Revue économique internationale,* décembre 1925, pp. 423–450.

1926

"Les théories dominantes du change. Étude critique", *Revue d'économie politique,* vol. 40, N 4, mai–juin 1926, pp. 769–795.

"La circulation, les changes et les prix. Les expériences de 1924–1925 et leur enseignement", *Revue économique internationale,* juin 1926, pp. 506–536.

"Théorie psychologique du change", *Revue d'économie politique,* vol. 40, N 5, juillet–août 1926, pp. 945–986.

1927

Monnaie, prix et change. Expériences récentes et théorie, Paris, Sirey, 1927, 353 p.; 2e tirage, 1933; 3e tirage, 1935; 4e tirage, 1937.

Traduction en japonais, 1937. Nouvelle édition remaniée et très augmentée, 1940, 565 p. (Rééditée ensuite sous forme du tome I de l'ouvrage cité ci-dessous: *La valeur de la monnaie dans l'économie contemporaine,* 1948–1950).

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Appendix 2

DATA ON FRANCE AND BULGARIA USED IN MODELING

Year	*France*			*Bulgaria*		
	E	P	M	E	P	M
1920						
January	226	487	376	42.61	1648	3291
February	275	522	379	45.68	1622	3248
March	271	555	373	48.95	1678	3226
April	313	588	377	56.31	1586	3191
May	283	550	382	69.98	1617	3139
June	244	493	378	60.38	1650	3133
July	237	496	377	47.58	1696	3158
August	270	501	383	53.25	1988	3203
September	286	526	392	64.33	1694	3331
October	296	502	391	72.92	1726	3494
November	322	461	386	85.34	1734	3601
December	326	435	379	86.37	1709	3603
1921						
January	302	407	379	85.53	1718	3582
February	269	377	378	81.39	1676	3580
March	274	360	384	82.36	1645	3689
April	267	347	382	82.04	1628	3753
May	231	329	382	81.07	1630	3753
June	239	325	374	89.01	1711	3765
July	247	330	369	114.34	1642	3788
August	249	331	368	117.92	1756	3807
September	265	344	371	132.51	1876	3927
October	267	331	372	148.00	2028	3939
November	269	332	365	172.55	2119	3979
December	247	326	365	142.48	2143	3916
1922						
January	237	314	366	148.16	2179	3588
February	221	306	363	148.32	2191	3602
March	214	307	355	148.91	2209	3734
April	208	317	358	142.93	2229	3728
May	211	317	360	135.83	2438	3759
June	221	325	360	144.32	2261	3801
July	235	325	360	155.59	2246	3785
August	243	332	364	170.25	2321	3874
September	252	329	366	165.35	2371	3941
October	262	337	367	152.30	2383	3964
November	283	352	361	140.28	2405	3955
December	267	362	364	135.52	2463	3886
1923						
January	289	387	371	155.00	2463	3801
February	313	422	374	169.89	2554	3800
March	307	424	372	157.37	2580	3902
April	290	415	365	132.77	2552	3877
May	291	407	367	121.73	2460	3924
June	306	409	367	89.96	2407	3811
July	324	407	373	104.94	2273	3714
August	341	413	374	111.55	2221	3722
September	331	424	376	102.80	2179	3873
October	327	421	378	102.81	2175	3975

November	343	442	373	120.28	2257	3977
December	373	458	379	139.30	2440	4145
1924						
January	414	495	388	139.35	2490	3905
Февруари	437	544	393	135.76	2576	3969
March	416	500	399	135.55	2562	3867
April	316	450	400	137.59	2522	3891
May	331	459	396	138.1	2489	3955
June	368	465	397	138.1	2685	4124
July	376	481	403	138.1	2609	4100
August	353	477	400	138.1	2690	4258
September	364	486	403	138.1	2744	4362
October	369	497	405	138.1	2833	4496
November	366	504	404	138.1	2996	4623
December	357	508	406	138.1	3062	4534
1925						
January	358	514	405	138.1	3137	4458
February	364	515	408	138.1	3241	4380
March	372	513	409	138.1	3181	4277
April	372	513	430	138.1	3127	4171
May	374	520	427	138.1	3080	4174
June	405	543	430	138.1	3226	4155
July	411	558	453	138.1	3041	4129
August	411	558	447	138.1	2870	4221
September	409	556	464	138.1	2834	4190
October	434	573	480	138.1	2823	4073
November	489	606	492	138.1	2831	3820
December	517	633	511	138.1	2921	3655
1926						
January	512	634	515	138.1	2901	3460
February	525	635	521	138.1	2899	3410
March	539	633	521	138.17	2844	3466
April	570	652	522	138.4	2774	3807
May	616	688	538	138.4	2938	3619
June	657	739	539	138.4	2842	3569
July	790	837	560	138.4	2838	3548
August	684	768	551	138.4	2759	3627
September	676	787	550	138.44	2723	3708
October	658	752	546	138.75	2708	3804
November	564	684	533	138.75	2739	3659
December	489	628	529	138.75	2718	3481

Source and note: Data on France is taken from Aftalion (1927, pp. 58–64) where *E* is the exchange rate, or rather the index of the dollar rate in Paris (base: parity = 100), *M* is money in circulation in million francs (called circulation), *P* is the price index of the French *National Statistics Office* (1913 = 100). Data on Bulgaria: M is banknotes in circulation, thousand levs, *Statistical Yearbooks* of *the Kingdom of Bulgaria* and *BNB Annual Reports, P* is the food, heating, and lighting price index for 12 county towns (1913 = 100) and brought forward to 1920–1923 (Nedelchev, 1940), with Yearbook data for 1924; *E* is exchange rate (lev dollar), parity levs 5.1825 = 1 dollar, Annual Reports. Also used are data presented by Koszul (1932, pp. 361–377). The table shows absolute values for the lev rate, while models use the exchange rate index (as in French simulations). Apart from being methodologically more correct, the use of indices gives the opportunity of comparing contemporary 1920s' analyses directly; indices were used by Aftalion (1927), Koszul (1932), and Petkof (1926), *inter alia*.

Appendix 3

BANKNOTE COVERAGE IN BULGARIA, 1912 to 1918

Calculating gold and silver banknote coverage, Nedelchev used the maximum volume of banknotes in circulation reported on a set day each year, plus gold and silver holdings on 31 December. Researching *BNB Annual Report* data, we found certain differences, mainly concerning the volume of banknotes in circulation.

a. Nedelchev's approach using official *Annual Report* data

Year	Gold Notes	Gold Reserves	Coverage per cent	Silver Notes	Silver Reserves	Coverage per cent
	million levs (1)	million levs (2)	(2/1)	million levs (3)	million levs (4)	(4/3)
1912	141.9	51.1	36.0	28.5	16.8	58.9
1913	181.8	55.3	30.4	28.0	23.4	83.6
1914	198.9	55.1	27.7	28.3	28.5	100.7
1915	304.7	61.4	20.2	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	324.3	16.9	5.2
1918	1 969.4	64.0	3.2	344.4	19.4	5.6

Since Nedelchev's approach may be questioned, we have calculated coverage in two alternative ways: 1. by taking the maximum gold and silver holdings for each respective year, and 2. by taking all indicators as on the year's close. Mean values are not recommended, since a more detailed study of data showed that the so-called average value turned out to be a simple arithmetic mean of indicators' maximum and minimum values.

b. Maximum values of all indicators included in official *BNB Annual Reports*

Year	Gold Notes	Gold Reserves	Coverage per cent	Silver Notes	Silver Reserves	Coverage per cent
	million levs (1)	million levs (2)	(2/1)	million levs (3)	million levs (4)	(4/3)
1912	141.9	51.1	36.0	28.5	23.9	83.9
1913	181.8	56.4	31.0	28.0	30.7	109.6
1914	198.9	55.6	28.0	28.3	28.8	101.8
1915	304.7	61.6	20.2	65.1	22.2	34.1
1916	577.1	68.2	11.8	256.8	17.2	6.7
1917	1 176.0	82.1	7.0	324.3	20.3	6.3
1918	1 969.4	64.0	3.2	344.4	19.6	5.7

c. Values of all indicators as on 31 December and official data from *BNB Annual Reports*

Year	Gold Notes	Gold Reserves	Coverage per cent	Silver Notes	Silver Reserves	Coverage per cent
	million levs	million levs		million levs	million levs	
	(1)	(2)	(2/1)	(3)	(4)	(4/3)
1912	50.5	51.1	101.2	44.5	16.8	37.8
1913	59.1	55.3	93.6	30.6	23.4	76.5
1914	69.7	55.1	79.1	38.1	28.5	74.8
1915	58.8	61.4	104.4	34.3	22.5	65.6
1916	64.9	68.2	105.1	34.6	17.2	49.7
1917	175.0	62.9	35.9	50	16.9	33.8
1918	528.1	64.0	12.1	81.7	19.4	23.7

Appendix 4

A VAR MODEL FOR FRANCE

Vector Autoregression Estimates
Date: 03/24/06 Time: 12:01
Sample (adjusted): June 1920 to July 1926
Included observations: 74 after adjustments
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)
	[-1.71324]	[-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)
	[-0.32761]	[-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)
	[-1.46511]	[-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)
	[-0.17619]	[-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 resid covariance (dof adj.)	6.94E-10
Determinant resid covariance	3.89E-10
Log likelihood	486.6935
Akaike information criterion	-12.09982
Schwarz criterion	-10.88552

Appendix 5

A VAR MODEL FOR BULGARIA

Vector Autoregression Estimates
Date: 03/27/06 Time: 12:38
Sample (adjusted): June 1920 to May 1924
Included observations: 48 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	DLEB	DLMB	DLPB
DLEB(-1)	0.152272	0.076154	0.045539
	(0.15511)	(0.03339)	(0.06360)
	[0.98172]	[2.28052]	[0.71605]

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

Log likelihood	45.31574	119.0323	88.11014
Akaike AIC	-1.346489	-4.418010	-3.129589
Schwarz SC	-0.839706	-3.911227	-2.622806
Mean dependent	0.014162	0.004814	0.008986
S.D. dependent	0.112936	0.024645	0.047106

Determinant resid covariance (dof adj.)	1.20E-08
Determinant resid covariance	4.64E-09
Log likelihood	256.1725
Akaike information criterion	-9.048855
Schwarz criterion	-7.528504

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