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On Some Aspects of the History of Long-Wave Dynamics Research*

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Abstract

Among researchers of long waves there is a common belief that Nikolai Kondratieff discovered long cycles (waves) of conjuncture. Actually, this is not the case. This paper discusses this issue in detail. It deals with not so much the study of current status of long-wave dynamics research as some aspects of the history of these studies because they are understudied and poorly systematized. There is still no systematic description of their initial periods of given research. This article does not claim to be systematic in describing these aspects but it does attempt to clarify certain points, as well as to show what is wrong with some common statements. In contrast to the conscientious misconception that Kondratieff discovered long waves, sometimes there are opposite statements, for example there is an opinion that Nikolai Kondratieff did not introduce anything new (and what he introduced was wrong) and borrowed the idea of long waves from others, first of all from his teacher Mikhail Tugan-Baranovsky. As far as this misconception is 'conscientious', we will show it in this paper.

Keywords: *long cycles, long waves, medium-term cycles, short cycles, Kondratieff's predecessor, Mikhail Tugan-Baranovsky, cycle phases, crisis, periodization of the long-term cycles, the debate of 1926, secular trend.*

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The Formation of the Idea of the System of Economic Cycles in Economic Science

In 1922, in his work *The World Economy and its Conjunctures during and after the War* Nikolai Kondratieff for the first time formulated the basic tenets of the theory of long cycles (Kondratieff 1922, 2002 [1922]). Until that time the economic literature hardly knew any other cycles than ones with a characteristic period between seven and eleven years, which were called industrial, commercial, etc. Kondratieff quite logically called them ‘short cycles’ (*Idem.*: 2002 [1922]: 323, etc.). However, already in 1925, in the work *Long Cycles of Economic Conjuncture* (*Idem.*: 1925, 1993 [1925]: 25, 26), he began to call them as ‘medium cycles’.¹ Why? The fact is that in those years there were discovered some cycles with a characteristic period between three and four years manifested in fluctuations in inventories that could be denoted as truly ‘short cycles’ (Kitchin 1923). Later, these cycles became known as ‘Kitchin cycles’. Due to the fact that the medium-term cycles often had internal ups and downs, a group of researchers from Harvard School headed by Wesley Mitchell started to consider cycles statistically (not by their logic, but by the presence of recessions, from a recession to another recession, regardless of the fact that they may be significantly different as regards their strength and nature). As a result, there were also identified some cycles with a period between three and four years, which to a certain extent coincided with Kitchin cycles. Some years later, Simon Kuznets discovered construction cycles lasting from 17 to 30 years (Kuznets 1930). Thus, in the 1920s–1930s one could observe the formation of the idea of the system of economic cycles in economic science.

It seemed quite logical to consider different cycles as having a single nature. Such an attempt was made by Joseph Schumpeter in his monograph *Business Cycles* (Schumpeter 1939). However, due to the fact that he tried to compare the structure of long waves with the structure of the medium-term cycles, his attempt to create a general theory of cycles failed.² One should note that thanks to Schumpeter the medium-term cycles are known as ‘Juglar cycles’, whereas the long-term cycles are denoted as ‘Kondratieff waves’. The Great Depression intensified the economists’ interest in cyclical dynamics. According to Gottfried Haberler (2008: 431), there was no other period in the history of

¹ For more details see Grinin and Korotayev 2014b (note 17: 194). Apparently, Nikolai Kondratieff was the first economist who called these cycles ‘the medium-term’.

² While developing the theory of cycles with different periodicity, Joseph Schumpeter generally proceeded from the principle of the unity of the cause and the multiplicity of the effects (see Avramov 1992: 67), which is not entirely accurate. Long-term processes must also have corresponding impulse causes. Such causes for K-waves can be found in the expanded reproduction of the economy and the obstacles encountered.

economic thought when the problems of economic cycles were studied so intensively. Haberler himself, before the Second World War and on the instructions of the League of Nations compiled an exhaustive analysis of all the theories of business cycles, but he was sceptical about the idea of long cycles.

However, Keynesian Economic Theory shifted economists' attention to other aspects. On the one hand, Keynesian ideas contributed to the understanding of the internal predisposition of capitalist economy to recession and booms (*i.e.*, cycles), but on the other – the attractiveness of the opportunity to influence the course of cycles through public policy led to the fact that economic thought focused mainly on instruments of such influence. And the problems of nature and the root causes of cyclical changes gradually shifted to the periphery of economic science.

This was facilitated by the fact that in the second half of the 20th century (especially at the upswing phase of the fourth Kondratieff wave in the 1950s and 1960s) the flow of cycles significantly changed (primarily under the impact of active external influence on the economic situation).³ The recessions ceased to be as deep as before. Not surprisingly, the researchers began paying more attention to such issues as monetary regulation rather than to Juglar cycles.⁴ Such disregard for the study of Juglar cycles is definitely counterproductive. In our opinion, the current crisis in many respects is very similar in type to the classical crisis as an integral part of Juglar cycle (for more details see Grinin *et al.* 2010, 2016).⁵

Yet, the investigations of long cycles continued, especially in the period of prolonged depression in the 1970s and 1980s when substantial research based on the ideas of Schumpeter, Mensch, Mandel, Kleinknecht was produced (Mandel 1975, 1980; Gordon 1978; Mensch 1979; van Duijn 1979, 1981; Barr 1979; van der Zwan 1980; Marchetti 1980, 1986; Eklund 1980; Kleinknecht 1981; Senge 1982; van Ewijk 1982; Glismann *et al.* 1983; Cleary and Hobbs 1983; Dickson 1983; Bieshaar and Kleinknecht 1984; Freeman 1987). But although this topic was sometimes addressed by some very important researchers such as Jay Forrester (1978, 1981), Walt Rostow (1975, 1978), Immanuel Wallerstein (1984), on the whole this direction has never been among the top issues. This paper deals with not so much the study of current status of long-wave dynamics research as

³ For more detailed information of post-war cycles see Grinin and Korotayev 2010; Grinin 2013; Grinin L. E. and Grinin A. L. 2015: Appendix 2. Some economists believe that after 1945 most cyclical upswings were suspended by the Fed. 'None of the post-war expansions died of natural causes, they were all murdered by the Fed', this is Rudi Dornbusch's opinion (cit. ex Bonner and Wiggin 2003: 281).

⁴ Rather traditionally, they were usually given a special chapter in the textbooks on macroeconomics (see, *e.g.*, Mankiw 1994: Ch. 14; Sax and Larren 1996: Ch. 17; Abel and Bernanke 2008: Ch. 8, although not all textbooks like this have such chapters. *E.g.*, there is no such Chapter in Rudi Dornbusch and Stanley Fischer's textbook (1997).

⁵ The classical cycles were characterized by a rapid, sometimes explosive, upswing that required a huge strain on the economy, and then an even faster collapse.

some aspects of the history of these studies because they are understudied and poorly systematized. There is still no systematic description of their initial periods of given research. This article does not claim to be systematic in describing these aspects but it does an attempt to clarify certain points, as well as to show what is wrong with some common statements.

Was Kondratieff a Discoverer of Long Waves?

Among researchers of long waves there is a common belief that Nikolai Kondratieff discovered long cycles (waves) of economic conjuncture. Actually, this is not the case. Before proceeding to an in-depth consideration of the matter, let us make a little historical digression.

Among the major scientists there is a special type of those who on the basis of more or less known facts and phenomena, using a new approach, view or method, creates a fundamentally new theory. At the same time it may be far from being true (or even inappropriate on essential points). Nevertheless, a fresh angle on phenomena leads to the fact that science in some sense moves to the next level.

The remarkable correspondence between the structure of animals and the environment they lived in was known to humans from the moment they acquired the ability to analyze. However, the idea that it is the environment forms the anatomy of animals, was expressed by Jean-Baptiste Lamarck for the first time. Subsequently, it became clear that the driving forces of animal evolution were fundamentally different from what Lamarck had anticipated. He was an early proponent of the theory of biological evolution. Many plant breeders crossed different varieties of peas. But only Gregor Mendel began to apply strict scientific methods to discover the laws of inheritance. The most interesting thing is that peas are an atypical plant to analyze the results of crossing. In some cases, the signs may be mixed, and then no clear mathematical proportions of inheritance can be established. However, this shows that there is always the door to discovery in scientific search, as in life, although it is not always possible to find it.

It is still believed that Karl Marx discovered the theory of class struggle. However, in his letter dated March 5, 1852 he wrote to Joseph Weydemeyer (Marx 1962: 426–427) that this discovery was not made by him, but by ‘bourgeois historians’.⁶ Nevertheless, Marx gave a new significance to the study of the theory of class struggle. He saw its manifestation where some episodes of social confrontation had been studied before him. This theory became the univer-

⁶ Karl Marx referred to the historians of the French school of the Restoration – Guizot, Mignet, Terry, and others (for more detailed information see Grinin 2012: 172–174).

sal driving force of history in his works. It is obvious though that Karl Marx, Friedrich Engels, and their followers exaggerated the role of the theory of class struggle. However, their works turned attention to the most important subject of their research – social relations and social structure of society. It has become an inherent part of future sociology.

The famous redshift in the Universe was known long before Hubble's works. It was he who managed to summarize and interpret the data on this phenomenon accumulated by the mid-1920s in a way that proved empirically that our universe is expanding. This played a revolutionary role in the development of modern cosmology. It may be said that as a result of this discovery, our understanding of the Universe has changed. There is much speculation concerning the discovery of long cycles/waves by Nikolai Kondratieff, but this is not the case. The long-term price fluctuations (with a characteristic period of about 60 years) were known even before the birth of Kondratieff (see Jevons 1884; Chuprov 1889; see below). But it is extremely important to understand that in the works of his predecessors the analysis of long waves was incomplete and fragmentary, there was only a statement of the phenomenon itself. The description was established at the level of fragmentary and non-system mentions. If the description was more extensive or there were made some attempts to systematize it, no scientific explanation for this phenomenon was offered. Long periods of price fluctuations were observed in the literature long before Kondratieff, for example in William Jevons's works (1884). He studied long series of prices and found long periods of decline and rise in prices, but could not give the reasons for this phenomenon (see, e.g., Menshikov and Klimenko 1989: 7). In his research Jevons refers to the paper by H. Clyde (1847) (see Rumyantseva 2003: 16), who is sometimes called almost the first researcher of long waves (see, e.g., van Duijn 1983: 59). One should mention that Kondratieff in his own book *The World Economy and its Conjunctures during and after the War* refers to Jevons's book (Kondratieff 2002 [1922]: 322). Finally, none of the predecessors called long waves as cycles (because they did not imagine that these fluctuations could be periodic and caused by internal causes). It was N. D. Kondratieff who did it first, and he also (as we have seen above) started to describe the system of economic cycles.⁷

⁷ Nikolai Kondratieff mentioned several times that the economist Jean Lescure was among his predecessors. Therefore, it is useful to compare what Jean Lescure said about this, including the periodization of long waves. He does not mention the alternation of upswing and downswing phases. Lescure argued that the long period of depression, which lasted from 1873 to 1893, does not contradict his theory of business cycles, 'the law of development of capitalist societies' (the periods of rise and stagnation) (Lescure 1908: 167–168). 'The existence of long periods of stagnation does not only undermine our theory, but, on the contrary, explains it; it explains the features of periods of rise and stagnation that took place at that time' (*Ibid.*: 168). Lescure also high-

Thus, Kondratieff made long-wave economic and social dynamics the subject of special analysis and for the first time created a logical theory supported by numerous empirical data and their conceptual explanations. In other words, he was not the discoverer of long waves in economic and social dynamics but was the creator of the first scientific theory of waves, which can be deservedly called Kondratieff waves. We will return to this question below.

Therefore, we can refer Kondratieff to a special type of researchers who created a new theory that changes the ideas about the nature and regularities of phenomena in this or that area and opens wide horizons for further research on the basis of already known facts, phenomena and strangeness, which were not explained by science before.

On Nikolai Kondratieff's Predecessors, Contemporaries, and His Opponents in the Study of Long Waves and Long Cycles

The history of long-wave dynamics research should be considered in more detail. In this section we present a list of researchers who, according to Kondratieff, were his predecessors, contemporaries, and opponents.

Below you will find the list of authors who are listed in the works (Kondratieff 2002 [1922]: 323–323; 1988 [1923]; 1993 [1925]: 26–29; 2002 [1926]: 344–345; 1989b [1926]: 332; 2002 [1928]: 450–451), in the opponents' speeches (Spectator 1989 [1926]: 299; Falkner 1989 [1926]: 305, *etc.*) or in the notes to discussion (Belyanova *et al.* 1989: 483), in some cases other literature is also included.⁸

It should be emphasized that Kondratieff in his works since 1922 tried to scrupulously mention all the known economists who at least to some extent concerned the phenomenon of long price fluctuations, but he was not familiar with some of them at the time of creation of his theory (see, *e.g.*, Kondratieff 1935: 115, note 1).⁹

lights long periods of rise and stagnation without linking them directly to the price situation. It looks a little bit strange that these periods are not equal. 'In brief, one can say that the world experienced an upswing phase from 1825 to 1873, and from 1873 to 1894 – a downswing phase, and from 1895 there began again an upswing phase (*Ibid.*: 13). As one can see, Lescure strangely combined the downward period of 1825–1849 and the upward period of 1849–1873 into one depressive period. It is not clear why he did it, but it is evident that Lescure did not consider long waves as cycles with equal duration, and with respect to the periodization of long cycles, he was not an obvious Kondratieff's predecessor.

⁸ With regard to their contribution, recognition or rejection of the cyclical nature, determination of the causes of these fluctuations, *etc.*, we refer the reader to the relevant pages of Nikolai Kondratieff's works.

⁹ Among his predecessors, who to some extent noticed the long trends of economic conjuncture, Kondratieff in his work *The Long Cycles of Economic Conjuncture* (1925) mentions Moore, Lescure, Aftalion, Spiethoff, Leighton, Motylev, and Trotsky, who hesitated to identify these cycles as regular (see Kondratieff 1993 [1925]: 27–29). He also lists a number of scientists who did not recognize the

Among those economists Kondratieff mentions Aftalion (1913, 1930), Bresciani-Turroni (1917), Wicksell (1898), De Wolff (1924), de Pietri-Tonelli (1927); Gelderen (1913), Jevons (1884); Sombart (1911); Cassel (1918), Kautsky (1918), Layton (1922), Lenoir (1913), Lescure (1912, 1908, 1914), Mildschuh (1923, 1924), March (1925), Mukoseyev (1914), Moore (1923, 1914), Parvus (1901, 1908), Röpke (1926), Sauerbeck (1886), Tooke and Newmarch (1858, 1859), and Spiethoff (1925).

In addition, Bunyatyan, Hilferding, Tugan-Baranovsky were among the researchers who before Kondratieff or during Kondratieff's creative activity concerned the phenomenon of long waves of conjuncture in their works (Bunyatyan 1915;¹⁰ Hilferding 1910, Tugan-Baranovsky 1894, 2008 [1913], 1998 [1917]). It is also worth recalling William Beveridge¹¹ who discovered a wide range of cycles in the long-term dynamics of wheat prices. The characteristic period of one of these cycles was 54 years (Beveridge 1921, 1922).

It is also important to mention those who touched on the issue of long cycles already in connection with the works of Nikolai Kondratieff, primarily those with whom he directly polemized after the publication of his book *The World Economy and Its Conjunctures During and After the War* in 1922, including L. D. Trotsky (1923, 1926), N. Osinsky (1923a, 1923b), M. Bronsky (1923a, 1923b,¹² 1928), A. Kon,¹³ and V. E. Motylev (1923). It is worth noting the participants in the debate of 1926 and some of their works before and after the debate.¹⁴ This is primarily D. I. Oparin (1989a [1926], 1989b [1926]), who

regularity of long cycles, but actively discussed this problem, e.g. Cassel, Kautsky, Osinsky (*Ibid.*: 29). Kondratieff in his work *Dynamics of Industrial and Agricultural Prices* written in 1928 (Kondratieff 2002 [1928]: 450–451) gives an even more extensive list of economists who touched on the topic of long cycles of economic conjuncture. One should note that mentioning and even studying of long trends (cycles) of economic conjuncture already occurred in the first decade of the 20th century, and began to appear more actively from the beginning of the 1920s. Mikhail Tugan-Baranovsky, Kondratieff's teacher, also mentioned them in his work *Paper Money and Metal* (Tugan-Baranovsky 1998 [1917]). However, none of the authors studied long cycles and, moreover, created a theory of long cycles.

¹⁰ In 1916 Kondratieff wrote a review of this book (see Kondratieff 1916).

¹¹ He was better known as The Lord Beveridge, the author of the report 'Social Insurance and Allied Services' (1942), who laid the foundation for the development of the British welfare state, and, above all, the British National Health Service.

¹² Four Bronsky's works are mentioned in Kondratieff's article (Kondratieff 1988 [1923]: 64), but without detailed information: '...four Brodsky's articles and reviews in the *Journal of the Communist Academy* (№ 2 and 3, 1923 – *Review of Literature on World Economy*) and his own work in the *Socialist Economy* (№ 1, 1923)'. We have found only two works (Bronsky 1923a, 1923b).

¹³ The paper in *Press and Revolution* 1923, № 1.

¹⁴ Additional bibliographical information about opponents' works of the 1920s and early 1930s (as well as critics who became direct persecutors) can be found in the bibliography in the books Kondratieff 1989; Kondratieff *et al.* 1988. There are quite a lot of them, because, thanks to Kondratieff's activities, and partly because he became a political figure, the problem of long cycles,

was not only an opponent, but also a co-author of Kondratieff's book *The Long Cycles of Economic Conjuncture*, which was published in 1928 (together with Oparin); M. E. Podtyagin (1989 [1926]), V. A. Bazarov (1926);¹⁵ S. A. Per-vushin (1989 [1926], 1925, 1926, 1929), G. S. Kreinin (1989 [1926]); M. V. Ig-natiev (1989 [1926]); M. I. Spectator (1989 [1926]; Nachimson 1922); V. E. Bog-danov (1989 [1926], 1928); S. A. Falkner (1922, 1989 [1926]).

Nikolai Kondratieff and Mikhail Tugan-Baranovsky

On 'Discoveries' by A. Smirnov

In contrast to the conscientious misconception that Kondratieff discovered long waves, sometimes there are opposite statements, for example: there is an opinion that Nikolai Kondratieff did not introduce anything new (and what he introduced was wrong) and borrowed the idea of long waves from others, first of all from his teacher Mikhail Tugan-Baranovsky. Our works (Grinin and Ko-rotayev 2014a, 2014b) show the extent of 'conscientiousness' of this miscon-ception.

The author of this historiographical pseudo-discovery is Smirnov (see, *e.g.*, Smirnov 2014). Since he is actively spreading his ideas, it is necessary to par-tially disprove them as slander or delusion.¹⁶ However, it is useful to pose some problems, including the question of the connection between the ideas of Nikolai Kondratieff and Mikhail Tugan-Baranovsky, an attempt to analyze the relation-ship between the long and medium-term cycles, and the introduction of books and works that are rarely used today. The assertions that Kondratieff's theory originates in the works of Tugan-Baranovsky, primarily in the work *Paper Money and Metal* (1998 [1917]), that Kondratieff's theory cannot be properly evaluated without knowledge of Tugan-Baranovsky's work, that criticism of Kondratieff's theory in the debate of 1926 was devastating, that Kondratieff allegedly falsified long cycles, are basically wrong.

As will be seen below, Kondratieff relied on Tugan-Baranovsky's ideas on-ly with respect to the fluctuations in the accumulation and spending of capital.

according to one of the reviewers, was among the 'most urgent' in the literature of that time (see Belyanova and Komlev 1989: 27).

¹⁵ The text of Bazarov's speech during the discussion was not published.

¹⁶ The analysis of Smirnov's work confirms that the vast majority of Kondratieff's ideas and conclu-sions are incorrect, often deliberately distorting real facts and relationships. Many statements of Smirnov with which one can still agree are not original. At the same time, it is remarkable that Smirnov's article is devoted to criticism not only of Kondratieff's theory, but also of his ap-proaches, the origins of this theory. He does not quote much directly from Kondratieff. And this is not a coincidence. A direct quotation immediately shows what tricks the author uses to prove his assertions.

Moreover, he openly admitted it (Kondratieff 1989b [1926]: 342). However, for some reason Smirnov keeps silent about these Kondratieff's statements at the debate of 1926.¹⁷

On Interpersonal Relationships of Nikolai Kondratieff and Mikhail Tugan-Baranovsky

Kondratieff's book *Mikhail Ivanovich Tugan-Baranovsky* illustrates the relationship between Nikolay Kondratieff and Mikhail Tugan-Baranovsky. The second paragraph says, 'Not being a strict follower of Mikhail Tugan-Baranovsky and having different views about many issues, the author, however, considers himself one of his closest disciples. Therefore, he regards the proposed essay as his duty to the late and beloved teacher' (Kondratieff 1923a: 5–6).¹⁸ Kondratieff recognized Tugan-Baranovsky as his teacher, but at the same time he emphasized significant divergence of views. It seems rather strange that Smirnov does not even mention this book, although, while investigating scientists' continuity of views, apparently, he should have used it. Moreover, Kondratieff in this biographical sketch devotes a certain fragment to Mikhail Tugan-Baranovsky's work *Paper Money and Metal*. And Smirnov attaches particular importance to this book. One cannot accept the veracity of Smirnov's assertions that Kondratieff borrowed Tugan-Baranovsky's idea of long waves but at the same time he kept silent about this fact. Nevertheless, there was some interconnection between scientists' ideas. Let us consider the results of this interconnection. The real interrelation between these two scientist's ideas was the Kondratieff's development of Tugan-Baranovsky's important idea of capital accumulation, which was the basis of Tugan-Baranovsky's best-known book *Periodical Industrial Crises* (Tugan-Baranovsky 2008 [1913]). In the work *Paper Money and Metal*, this idea was not the leading one for the research subject, but it seemed rather successful to Mikhail Tugan-Baranovsky to mention it in connection with the long-term price fluctuations (see below). However, it is impossible to talk about any origins of the theory of long cycles in Tugan-Baranovsky's book, because there is no information about them. And is it not absurd to search for such information with a researcher who had not studied them?

¹⁷ For more detailed information about the interrelation between Kondratieff and Tugan-Baranovsky's ideas see the last part of this article and the following article: Grinin and Korotayev 2014a: note 15; see also note 10, 13, 14 of our second critical article 'In Kondratieff's Defence. Page Comments on the Article by Smirnov' (*Ibid.*: 2014b).

¹⁸ There is another shorter biographical Kondratieff's sketch about Tugan-Baranovsky published in the same 1923: Kondratieff 1923b. It was later republished (see Kondratieff 1990 [1923]; 2004 [1923]; 2015).

In his essay on Tugan-Baranovsky Kondratieff (1923a) describes the main ideas of the book *Paper Money and Metal* in sufficient detail. For example, he mentions Tugan-Baranovsky's monetary theory which was the basis of the book,

The quantity theory of money could be applied only in the sphere of paper money circulation. Only with respect to this limited sphere of circulation this theory is valid. And in this sense it has an element of truth. As for the basis of money circulation – metal money – the explanation of the value of money must be sought on the side of the commodity market, and Tooke was right here. However, the value of money, contrary to Tooke, is represented not by the function of prices of certain goods, but by the function of the state of a general economic conjuncture and its cyclic (emphasis added) fluctuations. This is the main idea of Tugan-Baranovsky's theory of money which he called conjunctural (Kondratieff 1923a: 72–73).¹⁹

Kondratieff adds, 'But having put forward this extremely original idea, Mikhail Tugan-Baranovsky unfortunately failed to give it a consecutive development and justification, did not find the mechanism connecting the fluctuations of conjuncture with the value of money' (*Ibid.*: 73). Then Kondratieff (*Ibid.*: 80–82) mentions Tugan-Baranovsky's ideas (from one of the earliest and best-known book *Periodical Industrial Crises*) about fluctuations in the accumulation and capital expenditure. He recognizes the value of this approach, but at the same time illustrates its weaknesses. The latter is of great significance because it allows us to see that Kondratieff while developing this idea in his theory, borrowed it rather consciously. Finally, one should refer to an extremely important point. Kondratieff concludes, 'It is obvious that here emerges the direction of and necessity for the further improvement and complication of the theory' (*Ibid.*: 82). In fact, he plans a field of activity for himself based on the development of the idea of his teacher. It should be reminded that it was written in 1923 long before the discussion in 1926. Nikolai Kondratieff openly claims that he is going to borrow and develop Tugan-Baranovsky's theory, namely – the theory of the impact of fluctuations in the capital accumulation, which he used to explain the causes of long-wave dynamics. In 1926 during the discussion Kondratieff spoke of this idea in his concluding remarks (Kondratieff 1989b [1926]: 342). At no point did he

¹⁹ Let us explain that although Kondratieff does not mention here which duration of cyclic fluctuations Tugan-Baranovsky wrote about, but it is clear from his book that he repeatedly mentioned in it exactly the medium-term cycles, which he called just cycles. And only in one fragment Tugan-Baranovsky (1998 [1917]: 319–322) suggested that longer fluctuations in market conditions also depend on the same reasons, which, however, he did not call cycles (and could not call them). But in the same sentence he called medium-term fluctuations as cycles. This selectivity cannot be explained by coincidence.

mention, as claimed by Smirnov (see below), about Tugan-Baranovsky's model of long (or medium) cycles, or the distortion of this periodization by Kondratieff.

We believe that it is absurd to make hypotheses about the extent to which Tugan-Baranovsky's ideas on the causes of continuous fluctuations of conjuncture influenced Kondratieff's theory of long cycles, if not to rely on Kondratieff's own statements. If a researcher directly says what and why he borrowed from his teacher, then only his words should be recognized as true.

Why did Kondratieff not Consider Tugan-Baranovsky as His Predecessor in Creating the Theory of Long Cycles?

The answer is very simple. Tugan-Baranovsky was successful in dealing with medium cycles (Kondratieff repeatedly referred to him on this topic), and wrote only a few paragraphs about the long-term price fluctuations (not about long cycles). But by the time Tugan-Baranovsky devoted these short fragments to long price trends in his work *Paper Money and Metal* (1917), in the 19th – and early 20th centuries the idea that in the 19th – and early 20th centuries long (with a characteristic period between 20 and 30 years) trends of rising and falling prices, alternately took place, was widespread (see above).²⁰ As we have seen above, Kondratieff, as an authoritative scholar, always mentions everyone who was somehow involved in developing the idea of the long-term fluctuations. Moreover, in each new work he adds new names to the previous lists.²¹ This is the first reason why we believe that neither Tugan-Baranovsky himself nor Kondratieff thought that Tugan-Baranovsky had created any theory of long-wave fluctuations. In all other cases Kondratieff mentions Mikhail Tugan-Baranovsky as a major developer of the theory of medium-term cycles and fluctuations (see, *e.g.*, Kondratieff 2002: 405).

The second reason is that Tugan-Baranovsky did not accept the regularity of the alternation of periods of high and low conjuncture, and therefore could not consider them as cycles. It is crucially important that Tugan-Baranovsky does not use the word 'cycles' in relation to the long periods of price trends. It should be taken into account that there is a fundamental difference in whether the economist is talking about long cycles (*i.e.*, periodic, regular and endogenous fluctuations)

²⁰ It should be pointed out that when speaking about long periods of higher and lower conjuncture Tugan-Baranovsky (1998 [1917]: 319–321) mentions them with no references. For a conscientious author, as he always was, this is a true sign that the fact does not require confirmation by sources. The idea of long price fluctuations was not a discovery at that time.

²¹ Thus, during the debate of 1926, Falkner (1989 [1926]: 305) pointed out an article by S. de Wolff among the works which, in his opinion, had not been taken into account by Kondratieff. Kondratieff (1989b [1926]: 341) admitted that he was unfamiliar with this work. However, three months later, de Wolff's article was included by Kondratieff in the list of works on the problem of long cycles (Kondratieff 1926: 172).

or only about long-term trends, which may be non-periodic and non-endogenous, and depend, for example, on external factors. During the debate of 1926 almost none of Kondratieff's opponents, including Oparin, denied the existence of such alternating trends or even waves. Falkner, one of the most eager Kondratieff's critics, said, 'There is no doubt and it has been stated many times in economic literature that long waves (not cycles, but waves! – *Auth.*) exist in glo-bal price movement' (Falkner 1989 [1926]: 309). Many opponents, including Oparin, refused to acknowledge the existence of long *cycles*. Kondratieff's merit lies precisely in the fact that he developed an idea of price and conjunctural long-term trends into the theory of long cycles and made an attempt to find the root causes of this cyclicity. It should be noted that there was one reason (but only one) for such cyclicity, which was based on Tugan-Baranovsky's ideas (namely, fluctuations in capital accumulation). Thus, despite the fact that statements and even studies of the long-term price fluctuations appeared in the 1880s–1890s, there was no clear understanding that these cycles could be regular; and most importantly, there was no scientific theory of long waves in economic dynamics. That is why Kondratieff in one of his works (1993 [1925]: 45) wrote the following about Tugan-Baranovsky, '...without knowing about the existence of long cycles, he is unable to explain these changes'.²² Tugan-Baranovsky called them 'extensive periods' of 'wavy fluctuations in the value of money' (Tugan-Baranovsky 1998 [1917]: 322). It is easy to feel the difference here: cycles or fluctuations. The matter is that cyclicity by the definition assumes periodicity, and fluctuations can be non-periodical (for more details see Grinin and Korotayev 2014b; a reader will also find a lot of additional information in the notes 10, 13, etc. of the above work).

Tugan-Baranovsky's Book: Quote and Comments

We present the whole fragment from Tugan-Baranovsky's book *Paper Money and Metal* in order to give the reader an opportunity to judge the economist's opinion. It helps to understand that the economist is concerned about the proof that money can change value regardless of its quantity in circulation, and not in proving the existence of long cycles. It is also clear that Tugan-Baranovsky could not observe any regular long cycles in the periods that he highlighted,

²² He refers here to the change in the nature of the medium-term cycles in the last third of the 21st century in England. This is the only place we managed to find where Kondratieff directly talks about Tugan-Baranovsky's attitude to long cycles. As far as we understand, Tugan-Baranovsky was aware of the long-term fluctuations in price conditions but did not realize that these fluctuations can be interpreted as regular cycles lasting about 50–60 years, and therefore did not represent the relationship of long and medium-term cycles.

Along with longer periods of change in commodity prices, periodic fluctuations in commodity prices which cover approximately a decade are also well-known. These fluctuations are due to the characteristic phenomenon of the capitalist system, which was called the industrial cycle by the author of this book. At the upward phase of the industrial cycle there is a rise of commodity prices; it is followed by the crisis and prices begin to fall, which characterizes a downward phase of the industrial cycle. The industrial cycle is a typical phenomenon of modern economy and is observed in all capitalist countries.

With regard to these periodic fluctuations in money prices, there can be no doubt that they do not have the slightest connection with fluctuations in the quantity of money. Meanwhile, these fluctuations are rather significant and are statistically determined using the method of 'indicators'. The 'indicator' curves show the correct waves of money prices depending on the phases of the industrial cycle, and in the upward phase, the 'indicator' is higher than in the downward phase, often by several tens of percent.

This is actual proof that the value of money can significantly change, regardless of changes in the quantity of money in the national economy. In the economic literature there are disputes about the causes of changes in the value of money in longer periods of time, for example, in the era of the great price revolution, in the sixties and in the modern era of the increasing prices. Some economists connect these changes in prices with the changes in the quantity of money, others deny such a connection. I find this connection very doubtful, and I think it is more correct to explain these fluctuations in the value of money by analogy with fluctuations in money prices in shorter periods of time. In any case, only changes in the value of money of this last kind, which are in connection with the phases of the industrial cycle, can be considered as sufficiently explained by science (Tugan-Baranovsky 1998 [1917]: 320–321).

The change of these phases is explained by the theory of industrial crises, which we will not touch here. Suffice it to point out the well-known mechanism by which the value of money changes depending on the movement of the industrial cycle.

By understanding this mechanism, we can also explain the fluctuations in the value of money in longer periods of time. What, for example, did the rise in commodity prices in the last two decades depend on, which is a period of pronounced rise in the cost of living, while the two preceding decades were characterized, on the contrary, by low prices? It depended on changes in market situation.

We cannot dwell on what caused this change in the conjuncture. Let us just say that (Smirnov began the quote with these words, which undoubtedly allowed him to distort the general idea of Tugan-Baranovsky in his favor. – *Auth.*) longer periods of decline and rise in the value of

money should be explained in the same way as we explain shorter periods of fluctuations in the value of money, covering approximately a decade. However, it should be recognized that more extensive periods of rise and fall of prices are much less studied by science than the shorter cyclical fluctuations. This opens up a new unexplored area for the economist. But everything makes us think that the same real forces are at work in this area, the mechanism of which is clear to us when applied to the phases of the industrial cycle (*Ibid.*: 322).

Other fragments, where Tugan-Baranovsky mentions the long periods of price increases, demonstrate that he did not notice any periodicity. Tugan-Baranovsky, for example, puts on a par periods of different duration: the era of the price revolution of the 16th century and the modern era – the beginning of the 20th century (Tugan-Baranovsky 1998 [1917]: 321). This means that there can be no question of any cycles, since the epochs are different in duration (the price revolution takes almost a whole century) and are separated by a huge interval. Epochs are different in their content (Tugan-Baranovsky explains the price revolution [*Ibid.*: 318] by the increasing monetization of the 16th century and the ‘development of the cash economy’). Moreover, he considers such epochs not only as synchronous in the global economy, but also as local ones. Thus, he mentions increase in agricultural commodity prices over a hundred years in Russia (*Ibid.*). Any attempt to make Tugan-Baranovsky the author of the theory of long cycles is refuted by Tugan-Baranovsky himself, because he believes that only industrial medium-term cycles (with a characteristic period between seven and eleven years) can be called cycles. And the fact that the mechanism of increasing the value of money may have been similar in longer periods did not mean that they also had a cyclical nature. The researcher intuitively felt that the analogy was quite appropriate here but no more than that. He does not properly develop the idea of long periods. He writes that along with long periods of the rise in commodity prices, there are *regular periodic* fluctuations of commodity prices covering approximately a decade (*Ibid.*: 319–320). Thus, he does not consider long periods as correct and periodic, no matter how much Smirnov wants it.

The Debate of 1926 and Mikhail Tugan-Baranovsky

Not everyone knows that during the debate, a number of Kondratieff's opponents pointed out that he borrowed important ideas for his theory from Tugan-Baranovsky: the upturns and downturns in medium-term cycles are explained by the fact that during the recession capital is accumulated faster than it is spent, and

during the upturns capital is spent faster than it is accumulated.²³ As a result, in the first case there is an accumulation of forces for a breakthrough, and in the second case there is an ‘exhaustion’ of the upturn which results in crises. Tugan-Baranovsky in his later work *Paper Money and Metal* (Tugan-Baranovsky 1998 [1917]: 319–321) suggested that the reason for the change of long periods of high and low conjuncture is similar to the reasons for the change of phases in medium-term cycles.²⁴

It was this idea of different rates of capital accumulation and expenditure that Kondratieff used and significantly developed as one of a number of reasons for explaining the mechanism (regularity) of long-wave cycles (in particular, illustrating it by the example of fluctuations in the accumulations in French savings banks).

For the explanation of long-wave cycles Kondratieff formulated four empirical regularities. The uneven capital accumulation was included in the first regularity of ‘significant changes in the basic conditions of economic life’ (Kondratieff 2002: 370) along with uneven changes in the conditions of currency circulation, market expansion, gold mining and most importantly – uneven innovation and investment in durable buildings and basic capital goods, radical changes and ‘regrouping of the main productive forces in society’ (*Ibid.*: 370–374, 390–391).²⁵

Speaking about the borrowing and development of Tugan-Baranovsky's idea, it should be noted that, recognizing the connection between his concepts and Tugan-Baranovsky's theory, Kondratieff quite clearly states that it is not a simple transfer of Tugan-Baranovsky's theory, and except for the idea of accumulating ‘free capital’ and the role of this accumulation, his concept is fundamentally different from the concept of the latter (see Kondratieff 1989b [1926]: 342). Tugan-Baranovsky makes no mention of the fact that during upsurge there are ‘radical changes and regrouping of the main productive forces in society’ (Kondratieff 2002 [1926]: 391), which is extremely important and actually anticipates the further idea of researchers of long cycles about changing technological modes.

²³ This idea, as already mentioned, was developed in his famous book *Periodical Industrial Crises* (the first edition was published in 1894, but it was constantly updated by the author, the most complete edition was published in 1913 and 1914, see Tugan-Baranovsky 2008 [1913]).

²⁴ But, as we have stated, one should take into account that Tugan-Baranovsky did not talk about any long cycles, but only about long periods of high and low conjuncture, since, as can be seen from the analysis of his views, he did not consider such changes as periodic, in contrast to the medium-term cycles.

²⁵ He did not include the last points in the first regularity commenting on this idea in detail a little further (Kondratieff 2002: 390–391).

In order to show the differences in approaches, let us compare excerpts from the works by Kondratieff and Tugan-Baranovsky. In concluding his report, Kondratieff says, 'It should be remembered that each new cycle (*long cycle – Auth.*) proceeds in new concrete historical conditions, at a new level of development of productive forces and therefore is not a simple repetition of the previous cycle' (Kondratieff 2002: 397). Tugan-Baranovsky writes,

The whole mechanism (of the medium-term cycle. – *Auth.*) can be compared to the mechanism of steam engine. The role of steam in the cylinder is played by the accumulation of free cash flow; when the steam pressure on the piston reaches a certain limit, the resistance of the piston is overcome, the piston moves, reaches the end of the cylinder, a free outlet is opened for the steam, and the piston returns to its initial position. In a similar way, the accumulated free cash flow, having reached a certain amount, penetrates into industry, stimulates it, is spent, and industry returns to its previous state. Under such conditions crises, of course, will repeat periodically. Capitalist industry must *constantly go through one and the same cycle of development circle* (emphasis added) (Tugan-Baranovsky 2008 [1913]: 326).

Thus, Tugan-Baranovsky speaks of the same development circle as a result of cycles, whereas Kondratieff speaks of a radical regrouping of productive forces. The difference is obvious.²⁶

Let us quote the participants of discussion who mentioned Tugan-Baranovsky in connection with Kondratieff's theory of long cycles.

M. I. Spectator (one of the strongest critics and a real Marxist): 'I remain entirely on the basis of Marxist analysis, while Kondratieff shifts his attention from Tugan-Baranovsky's ideas toward modern mathematicians' ideas. Kondratieff's point of view on *crises* (emphasis added. – *Auth.*) is Tugan-Baranovsky's point of view' (Spectator 1989 [1926]: 309). **Comment:** *Spectator speaks of the point of view on the crises not about the fact that Kondratieff borrowed the idea of long cycles from Tugan-Baranovsky (and not about the structure of medium-term cycles, to which Smirnov gives an incomprehensible meaning). It is all the more important to take into account that in long cycles, in comparison with medium-term ones, there is no crisis as an element of the cycle.*

But he failed to connect long cycles even with this theory. If we continue to maintain the view that economic cycles are caused by the renewal of fixed capital, then how does mathematical statistics come into the picture which must establish some permanent laws of regularly repeated cycles

²⁶ Note that in the work written in 1925 (Kondratieff 1993 [1925]: 69) he says that the development proceeds through both medium-term cycles and crises, and through long cycles.

regardless of the composition of fixed capital or the size of its recovery (Spectator 1989 [1926]: 309).

Comment: *It is precisely because of the cyclicity associated with the fluctuation of investments that all participants of the discussion saw a connection between Tugan-Baranovsky's and Kondratieff's theory, rather than Smirnov's mythical 'model' of the cycle.*

V. E. Bogdanov: 'When the speaker (Kondratieff. – *Auth.*) developed this second argument (that the reason for the periodicity of long cycles is fluctuations in the capital accumulation, see the paragraph above. – *Auth.*), it reminded me and many of my comrades of Tugan-Baranovsky' (Bogdanov 1989 [1926]: 301). **Comment:** *Bogdanov also notes that Kondratieff and Tugan-Baranovsky share the same idea that cyclicity and crises are determined in the medium-term cycles by fluctuations in the capital accumulation. But he says nothing about the fact that Kondratieff borrowed Tugan-Baranovsky's theory of long cycles. And then the speaker criticizes Kondratieff for the idea of fluctuations in the capital accumulation.*

S. A. Falkner (one of Kondratieff's strongest critics who most closely examine the connection between his ideas and Tugan-Baranovsky's concepts): 'His thought, his theory is nothing but a transfer of Tugan-Baranovsky's *theory* (emphasis added) of capitalist cycles to the phenomena of long waves in the world movement of prices' (Falkner 1989 [1926]: 308). **Comment:** *This refers to the use of the theory (explanation of the mechanism) of medium-term cycles rather than to borrowing the idea of long cycles.* Further, Falkner notes that 'Kondratieff's attitude to Tugan-Baranovsky is not entirely satisfactory' and gives a long quote from Tugan-Baranovsky's work *Paper Money and Metal*, which was given above. After this quote Falkner says, 'Thus, Kondratieff realizes Tugan-Baranovsky's idea, but does not even refer to him' (*Ibid.*). He is the only one who reproached Kondratieff for the lack of references to Tugan-Baranovsky, and perhaps not without reason. Probably, it would be more correct for Kondratieff to show more openly the interrelation of his ideas with the Tugan-Baranovsky's theory (particularly since he did so during the discussion; see below). However, we note again: Falkner says nothing about borrowing the structure of the medium-term cycles to explain long-term cycles. Indeed, the structure was established a long time ago (even before Juglar). The main thing was (and still is) an explanation of the root causes of cyclicity! Tugan-Baranovsky's theory was new and interesting in this respect, since his ideas were then recognized and used by a number of researchers of the medium-term cycles (for more details see Tugan-Baranovsky 2008 [1913]: 56; Haberler 2008). But, of course, this theory found (not without good reason) ardent opponents, who were especially numerous among orthodox Marxists. And in the

context of the increasing spread of Marxist theories among Soviet economists, this or that connection with Tugan-Baranovsky (a relative Marxist who ended his life in the ranks of opponents of the Soviet government) was not an advantage. Perhaps, this is why Kondratieff did not emphasize the connection of his ideas with Tugan-Baranovsky, although we do not exclude that there was also some jealousy of the student to the teacher. But, in any case, during the discussion, Kondratieff recognized this connection, showed its nature and what he used in developing Tugan-Baranovsky's ideas. We will refer to this point below. It is a pity that Smirnov did not even mention this text.

Finally, Falkner concludes, 'Despite this transfer of Tugan-Baranovsky's theory to long waves, Kondratieff does not fix at all on the obvious drawbacks that exist in this theory, which are clear in relation to normal capitalist cycles'. Falkner concludes that 'it is absolutely impossible to apply this concept for the explanation of long waves' (Falkner 1989 [1926]: 308, 309). *Comment: Without going into the details of the arguments about the shortcomings of Tugan-Baranovsky's theory, we will again point out: the dispute was about the causes of cyclicity, namely, whether Kondratieff convincingly proved the mechanism and manifestations of the cyclical nature of long cycles, without in any way touching on the question of the medium-term or the long-term cycles.*

D. I. Oparin: 'Even less fundamental is the concept of Kondratieff, who transfers Tugan-Baranovsky's ideas from medium-term to long cycles. Even if Tugan-Baranovsky's theory was correct with respect to the medium-term cycles, it would not be applicable to the long-term cycles' (Oparin 1989a [1926]: 279). *Comment: The transfer of ideas, according to Oparin, meant not borrowing the theory of long cycles, as Smirnov claims, but transferring the explanation of the mechanism of the medium-term cycles to the long-term ones.* Further, Oparin disputes Kondratieff's conclusions about the accumulation and the role of interest.

It is clear that opponents criticized Kondratieff for borrowing Tugan-Baranovsky's idea of fluctuations in the accumulation of funds by the non-productive classes.

Although belatedly, Kondratieff in his final word, responding to criticisms, says, 'It is true that there is a certain connection between my concept and Tugan-Baranovsky's concept. But it is also true that there is no transfer of Tugan-Baranovsky's theory. I consider Tugan-Baranovsky's idea of "free capital" accumulation and the role of this accumulation to be very fruitful. In other aspects my concept is very different from Tugan-Baranovsky's one'. He also adds, 'And I do not see anything negative in relying on the ideas that were known before me and appear to be correct' (Kondratieff 1989b [1926]: 342). In this

paragraph, everything is said about the connection with Tugan-Baranov-sky's ideas, including the recognition of teacher's thought, and about differences in their views.²⁷

Periodization of Long Cycles

To understand the above-mentioned questions about Kondratieff's predecessors, his attitude to their works and how Kondratieff used his predecessors' achievements to synthesize his theory, it is useful to consider the problem of periodization of long cycles. In particular, there is Kondratieff's direct evidence about the origin of his periodization. In his concluding remarks during the debate of 1926, Kondratieff (1989b [1926]: 332) mentions the book by the Swedish economist K. Wicksell, published in 1898 (Wicksell 1898) about the correlation of prices, interest, and accumulation. 'In the empirical part of the book Wicksell establishes from 1782 to 1896 (the book appeared from the late 90s) almost the same long waves as I do'.²⁸ Wicksell's book appeared 20 years earlier than Tugan-Baranovsky's work *Paper Money and Metal* to which Smirnov gives a mystical meaning. Moreover, Tugan-Baranovsky could be familiar with Wicksell's periodization – he refers to Wicksell's book in his work (*Ibid.*: 289, 292). But if Tugan-Baranovsky did not use this periodization, it is just because he did not need it for the purposes of his work, and most importantly, because he did not seriously deal with long waves of conjuncture, and certainly did not think of them as long cycles.

Thus, Kondratieff quite logically and legitimately added the wave of 1896–1920 (or the upswing phase of the third Kondratieff wave) to Wicksell's waves.

On Incorrect Mathematical Methods and Kondratieff's 'Mistakes'

It has sometimes been suggested that the mathematical methods, which Kondratieff used to prove the existence of long cycles are inaccurate and that is the reason why Kondratieff was able to demonstrate their existence. Smirnov even accuses him of 'fabrication' of long cycles, referring to the opinions of the dis-

²⁷ One should also add that Smirnov could also use the text of the editorial note to Kondratieff's explanation. Let us cite it, 'Kondratieff, following Tugan-Baranovsky, made the accumulation of monetary capital dependent on fluctuations in the price level and their impact on the savings of rentiers, as well as other persons with fixed incomes. In this mechanism of accumulation, Kondratieff identified another factor – fluctuations in the prices for agricultural goods relative to industrial prices and the resulting changes in consumption and savings. In contrast to Tugan-Baranovsky, Kondratieff did not consider the accumulation of monetary capital as a self-sufficient cycle-forming factor' (Belyanova *et al.* 1989: 486).

²⁸ Note that Wicksell as one of the early explorers of long waves is mentioned less often than others which looks undeserved.

cussion participants. However, Smirnov here distorts the truth. Anyone reading discussion materials will see that none of the opponents declared the manufacture of false evidence, on the contrary, a number of discussants spoke about its correctness (e.g., Ignatiev).²⁹ Thus, Oparin, Kondratieff's main opponent, referred to Kondratieff's methods as 'very interesting mathematical tricks' (Oparin 1989a [1926]: 228). Although Oparin disputed them, he did not say a word about the fact that there were conscious falsifications. Further, Oparin describes in some detail the alignment using a nine-year moving average (a method of eliminating all fluctuations of nine years and shorter duration) as quite legal. After describing Kondratieff's method, including 'extracting the secular trend and smoothing of different types of fluctuations', after which 'only the fluctuations of the long-term cycles remained in the elements he considered' (*Ibid.*: 231). He even says, 'The above-mentioned Kondratieff's method undoubtedly represents a significant step forward in comparison with his previous theoretical statements regarding the concept and methods of studying the conjuncture'. 'Kondratieff correctly measures the market fluctuations of long cycles not in relation to previous moments, but in relation to secular trends' (*Ibid.*). He also speaks of Kondratieff's merit that he applied 'updated mathematical techniques' to the processing of rich empirical data (*Ibid.*: 292). Thus, despite all the detailed Oparin's criticism, there was no question of any fraud in his report and concluding remarks.³⁰ The main differences were in the method of determining the 'age-old trend', that is, the non-cyclical trend of changes (e.g., prices or wage growth) over a long period of time. Long cycles should be shown around this trend line. These lines, 'if only they are found correctly, can be called... lines of the equilibrium scheme for the long-term fluctuations' (Oparin 1989a [1926]: 231). A significant part of the discussion (and not only between Oparin and Kondratieff but also other discussants, e.g. Podtyagin, Ignatiev, etc.) was devoted to the disputes over how to calculate this line of the secular movement. According to Podtyagin (1989 [1926]: 293), earlier in the study of the medium-term cycles, 'the problem of the secular movement neither statistically nor economically required much attention, and the secular movement was studied to the extent that its forms influenced the form and duration of short cycles'. In other words, to study a new type of cycles, Kondratieff needed to create a new method that could be disputed, but did not deserve

²⁹ An important argument (especially Oparin's argument, see, e.g., Oparin 1989b [1926]: 347, 348; Bogdanov 1989 [1926]: 301) was the difficulty of applying mathematical methods to the analysis of one and a half and two cycles. But today the number of cycles has significantly increased.

³⁰ In some places, Oparin seems to hint at arbitrariness on the opponent's part (see, e.g., Oparin 1989a [1926]: 235), but Kondratieff's explanations fully explain his actions (e.g., that the deviation from the formal mathematical method in relation to some periods was not due to arbitrariness, but to the lack of data, etc. [Kondratieff 1989b [1926]: 324–325]).

the characteristics of fraud. Despite fierce disputes, it is difficult to say who was right. However, even modern Kondratieff's critic Gubanov, while questioning the methodology, in no way reproaches Kondratieff not only for fraud, but also for some subjective 'arbitrariness'. Then he writes,

But logically, this led to the following conclusion: objectively, arbitrariness is not excluded, it is necessary to avoid it subjectively, and then everything is left to researcher's discretion and depends on his understanding of the limits of arbitrariness – in this case, different researchers may have very different, including mutually exclusive, results. Pursuing a similar line of reasoning, many discussants emphasized the inadequacy of Kondratieff's method (Gubanov 1999: 65).

As there were no tools for the analysis of long cycles, Kondratieff created a new method, which was not irreproachable, but quite legitimate. New methods are always criticized before they become generally accepted. Gubanov does not accept either Kondratieff's or Oparin's methods, stating that the previous statistics and methods of economic science were objectively weak and could not solve the problem of long cycles. Gubanov offers his own 'objective' verification method. We strongly doubt that his method is more 'objective' than Kondratieff's one, but that is another story. It is clear that, first of all, the critics did not accuse Kondratieff of fraud and arbitrariness in the choice of methods. Such accusations are Smirnov's interpretations. Secondly, according to Smirnov, Kondratieff's theory was not 'a very easy target of harsh criticism' on the part of Soviet economists. Even Gubanov cannot give preference to either Kondratieff or Oparin here. Moreover, he had to admit that Oparin's 'scientific criticism failed' (Gubanov 1999: 63). The main problem of the discussion was that there were very few cycles for which statistics were given: from two to one and a half or even one. It was very difficult to draw a firm conclusion. It is not without reason that Kondratieff himself said that the probability of existence of long cycles is high. Therefore, we could agree with Pervushin's conclusion that from a statistical point of view, neither Kondratieff proved anything, nor Oparin disproved anything, since they used one and a half or two cycles (Pervushin 1989 [1926]: 294).³¹ Kondratieff's significance as a scientist lies in the fact that, despite huge statistical and methodological difficulties, he noticed the presence of long cycles and was able to find very significant explanations for them. Further research, as well as further development of the economy, confirmed rather than disproved the theory of long cycles. Although this theory is

³¹ Menshikov and Klimenko say the same (1989: 12), neither used by Kondratieff nor even more advanced mathematical tools can confirm or disprove with sufficient probability the existence of long cycles.

still in the status of hypothesis, one cannot agree with Gubanov and Smirnov that it exists only due to some illusions and economic and mathematical errors.

As for the technical performance of calculations and graphs, it was at its best. V. A. Bazarov, a critic of mathematical techniques for identifying Kondratieff's long cycles, wrote, 'All these technical operations are performed thoroughly, including all precautions required by the existing theory, this is confirmed by the very name of N. S. Chetverikov, who took part in the mathematical part of the work of Kondratieff's work' (Bazarov 1926: 86; see also Belyanova *et al.* 1989: 477, note to p. 178). Anyone with an unbiased opinion will understand that it is simply unthinkable not to trust the person who does some of the math work for you.

One should take into account that Kondratieff never concealed which methods and techniques of data processing and data representation on graphs he used. On the contrary, he showed them in detail in all of his works (especially in the work *Dynamics of Industrial and Agricultural Prices* written in 1928 [Kondratieff 2002 [1928]). At the same time, all obvious weaknesses of these methods were demonstrated by him.

It means that he did not consider his methods as unfair (*Idem* 1989a [1926]: 178). On the contrary, he emphasized that he tried to avoid arbitrariness. If the methods were not sufficiently scientific, he would not have dared to present them at the discussion. It simply meant exposing himself to criticism. Therefore, unlike Smirnov, Kondratieff's conclusions and methods were not 'easy target for harsh criticism' for Soviet economists.

It should be noted that the aim of the debates about the new theory is testing it by harsh criticism. The purpose of debates is not to praise but to test out the theory. Therefore, to be surprised that Kondratieff's theory was criticized is at least strange. And herein lies the discussion. The main prerequisites of the discussion are: a) to listen critically to a speech of the main speaker; b) if the speaker does not criticize, it seems that he does not work; c) everyone wants to present his own speech.

However, it is important to remember that criticism of Kondratieff's various opponents was contradictory. In general, if we quantify all critical comments in groups, there are not so many comments about the illegality of methods of mathematical processing of graphs and mathematical methods of data interpretation. At the same time, most of them concern rather complex issues, for example, which method of price determination for taking into account the secular trend, is more correct, Cassel's or Kondratieff's method. Oparin (1989a [1926]: 236) states that if the method is suitable for the medium-term cycles, then the formal mathematical method is of little use for the long-term cycles. It is clear that this is a dispute over the methods, and it is extremely difficult to determine

who is right and who is wrong. A rather detailed analysis of the mathematical processing of Kondratieff's statistical series and some of his followers is presented in Fomina's book (2005: Ch. 1, § 3) with quite satisfactory conclusions about the correctness of their application.

In conclusion, we repeat that the history of long-wave dynamics research should be considered in more detail, but we hope that this work will provide assistance in it.

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