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## METHODICAL ASPECTS OF THE DEVELOPMENT OF BANK'S INNOVATION CREDIT POLICY MECHANISMS SUBJECT TO ECONOMIC CYCLES' IMPACT

***The article analyses the impact of economic cycles on the mechanism of formation and implementation of a bank's innovation credit policy. The authors have been the first to develop the matrix for choosing the direction of issuing loans to legal and private entities according to the terms of credit use under the development of a bank credit policy in Ukraine.***
***Keywords:*** *commercial bank; innovation credit policy; nominal gross domestic product; economic cycle; phases of an economic cycle.*

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## МЕТОДИЧНІ АСПЕКТИ МЕХАНІЗМУ ФОРМУВАННЯ ІННОВАЦІЙНОЇ КРЕДИТНОЇ ПОЛІТИКИ БАНКУ З УРАХУВАННЯМ ВПЛИВУ ЕКОНОМІЧНИХ ЦИКЛІВ

***У статті розглянуто вплив економічних циклів на механізм формування і реалізації інноваційної кредитної політики банку. Вперше розроблено матрицю вибору напряму надання позик юридичним і фізичним особам за строками їх використання при формуванні інноваційної кредитної політики банку в Україні.***
***Ключові слова:*** *комерційний банк; інноваційна кредитна політика; номінальний валовий продукт; економічний цикл; фази економічного циклу.*
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## МЕТОДИЧЕСКИЕ АСПЕКТЫ МЕХАНИЗМА ФОРМИРОВАНИЯ ИННОВАЦИОННОЙ КРЕДИТНОЙ ПОЛИТИКИ БАНКА С УЧЕТОМ ВЛИЯНИЯ ЭКОНОМИЧЕСКИХ ЦИКЛОВ

***В статье рассмотрено влияние экономических циклов на механизм формирования и реализации инновационной кредитной политики банка. Впервые разработана матрица выбора направления предоставления займов юридическим и физическим лицам по срокам их использования при формировании инновационной кредитной политики банка в Украине.***
***Ключевые слова:*** *коммерческий банк; инновационная кредитная политика; номинальный валовой продукт; экономический цикл; фазы экономического цикла.*

**Introduction.** Modern development of a country is impossible without an innovative component, which is responsible for building up and implementation of new processes and products (services), which mirror in positive dynamics the major national trends.

Analytic centers of commercial banks run researches on the influence of exogenous and endogenous factors on macroeconomic situation to make tactical and strategic decisions, with preference to the principles of credibility and simplicity of transactions. Each separate commercial bank is unable to affect the results within the national scope, assuming that bank activity is one of the state regulated spheres.

In our opinion, in the period of development and implementation of innovative credit policy a special interest is attracted to the behavior of mid-term and long-term

economic cycles, which are not influential within a single bank, but have a destructive power for it in the periods of the reaching their minimal and maximal values. That is why forecasting further behavior of major national values and defining periods of economic cycles within the country will allow to forecast critical situations and minimize bank risks.

**Latest research and publications analysis.** Interchange of economic ups and downs aroused interest of national and foreign scientists: A. Aftalion (2007), Y. Bazhal (2009), L. Grynyn, S.Y. Malkov and A.V. Korotayev (2010), C. Juglar (1862), J. Keynes (1936), V. Kuzmenko (2011), S. Kuznets (1930), M.I. Tugan-Baranovsky (1997), J. Schumpeter (1982), M. Friedman and A. Schwarz (1982) and others.

**The object of this research** is the economic cycles that influence the mechanism of formation of innovative credit policy of banks.

**Unresolved issues.** We argue that commercial banks have to review external information of analytical origin and use it in terms of the mechanism of formation and implementation of innovative credit policy of the bank in order to increase the flexibility of the banking system to the recurrence of the market economy development, which supports the urgency of the given research.

**The research goal.** The goal of this research is to define the relation between the behavior of gross domestic product as one of the key national measures and the choice of credit terms for legal and private entities while forming a bank's innovative credit policy.

The given paper attempts to:

a) define the essence of economic cycles and consider their characteristics;

b) analyse periodization of economic cycles in Ukraine;

c) develop credit period priority matrix of crediting legal and private entities while forming a bank's innovative credit policy depending on the phases of mid-term economic cycles.

**The methods of the research** are systematic and comparative analysis of scientific literature and statistical information.

**Key research findings.** Economic cycles is a recurrence of increases and decreases in economic activities, which becomes apparent in changes of interrelated values – speed of economic growth as well as employment, production and inflation levels. It is necessary to define that theoretically the cycle is interpreted as a period of economic development between the beginning of one crisis until the end of the following one. The structure of economic cycles can be considered with the help of two models (Ashvanyan, 2009):

а) four-phase model developed by K. Marx (only 7–12 years long industrial cycles took part in the research), which contains serially changing phases of the cycle: crisis, depression, revival and increase;

б) two-phase model which covers the phases of increase (increasing wave) and decrease (decreasing wave).

Traditionally, three types of economic cycles are distinguished (Ashvanyan, 2009):

а) short-term (2–3 years long);

б) mid-term (about 10 years long);

в) long-term (10–60 years).

Despite the length of economic cycles as the basis of their classification, scientists have not come to a unified approach regarding it. For example, V. Kuzmenko (2011) proposes to classify economic cycles into 6 types (Table 1).

*Table 1.* **Classification of economic cycles by** *V. Kuzmenko (2011)*

| Cycle types | Term | Duration characteristics according to the criterion of duration |
|---|---|---|
| Agricultural (minute cycles) | Up to 1 year | Seasonal short-term fluctuations in agriculture |
| Financial and economical (small cycles) | 3–5 years (average 4 years) | Short-term fluctuations of financial and business activity |
| Industrial (business) average cycles | 7–11 years (average 9 years) | Short-term fluctuations related to renewal of active part of fixed capital in industry |
| Building (average cycles) | 16–20 years (average 18 years) | Short-term fluctuations related to renewal of passive part of fixed capital in industry, firstly lodging |
| Big cycles | 50–60 years (average 54–55 years) | Long-term "long waves" of technological improvements |
| Extra long secular cycles | 100–120 years (average 108–112 years) | Secular cycles of changes in economic and political leadership |

In our opinion, the most completed and recognizable list of economic cycles can be the following one, represented in Table 2.

*Table 2.* **Extended classification of economic cycles**

| Name of economic cycle | Term | Cycle characteristics |
|---|---|---|
| Cycles of A. Toffler | 1000–2000 years | Related to civilization development |
| Cycles of J. Forester | 200 years | Related to usage of energy and materials |
| Cycles of Kondratiev | 45–60 years | Essential changes in conditions of production and its structural rebuild |
| Cycles of S. Kuznets | 15–25 years | Change in renewing structure of production |
| Cycles of C. Juglar | 7–11 years | Influence of monetary and credit factors |
| Cycles of J. Kitchin | 3–5 years | Change of inventories at the production facility |
| Private economic cycle | 1–2 years | Fluctuations in investment activity |

Developed by the authors according to L. Sullivan (2009), M.I. Nebava (2003).

We suppose that scientific interest in terms of formation and implementation of a commercial bank's credit policy have C. Juglar's and C. Kuznets' cycles. This assertion is based on the idea that one of loan issuing parameters is the loan period and that the mid-term cycles have more flexibility than the short-term ones.

For example, according to the decree of the National Bank of Ukraine "About approval of the Rules for banks to supply consumers with information on terms of loans and overall value of the credit" N168 (National Bank of Ukraine, 2007) banks must supply the consumer with information on the terms of credit: possible amount of loan, credit terms possible etc. before signing up the loan agreement.

The key factor while defining the period of economic cycle, while developing innovative credit policy nominal gross domestic product should be chosen, keeping in mind, that this measure characterizes the value of final goods and services produced in the country within one year and it should be expressed in current prices.

The validity of the above statement is stressed by the fact that financial expenses are the expenses on interest rates and other expenses of a company, which are related to loans (Finance Ministry of Ukraine, 2006). Also, each subject of economic activity should be treated as a potential bank client, who takes into account financial

expenses while defining the cost of produced goods or services, paid by the buyer of the goods, thus ensuring payback of the credit and interest.

Traditionally, bank credit experts are not interested in the amount of goods produced by the recurrent client, but attention is riveted to the dynamics of receipts from selling the goods (services) and amount of income, which are essential for making payback schedule including interest rate.

Analysis of dynamics of Ukraine's nominal gross domestic product in 1991–2011 is represented in Table 3 (Figure 1).

*Table 3.* **Analysis of phases of economic cycle in Ukraine**

| Number of order | Year | Gross domestic product | Phase of economic cycle |
|---|---|---|---|
| 1 | 1991 | 77,464 | Recession |
| 2 | 1992 | 73,9423 | |
| 3 | 1993 | 65,6486 | |
| 4 | 1994 | 52,5496 | |
| 5 | 1995 | 48,2139 | |
| 6 | 1996 | 44,5581 | |
| 7 | 1997 | 50,1504 | |
| 8 | 1998 | 41,8832 | |
| 9 | 1999 | 31,5806 | Depression |
| 10 | 2000 | 31,2615 | |
| 11 | 2001 | 38,0093 | Revival |
| 12 | 2002 | 42,3929 | |
| 13 | 2003 | 50,133 | |
| 14 | 2004 | 64,8831 | |
| 15 | 2005 | 86,142 | |
| 16 | 2006 | 107,7531 | Increase |
| 17 | 2007 | 142,719 | |
| 18 | 2008 | 179,9924 | |
| 19 | 2009 | 117,2278 | Decrease |
| 20 | 2010 | 136,4184 | Growth |
| 21 | 2011 | 165,245 | |

Developed by the authors according to The World Bank (2012).

According to the results of the analysis, we can assert that in the period between 1999 and 2008 we are observing a classic demonstration of economic phase cycles developed by K. Marx: recession (from 1991 to 1998), depression (from 1999 to 2000), revival (from 2001 to 2005) and growth (from 2006 to 2008).

According to the represented data, a completed economic cycle in Ukraine lasts 18 years, which matches a mid-term economic cycle by S. Kuznets.

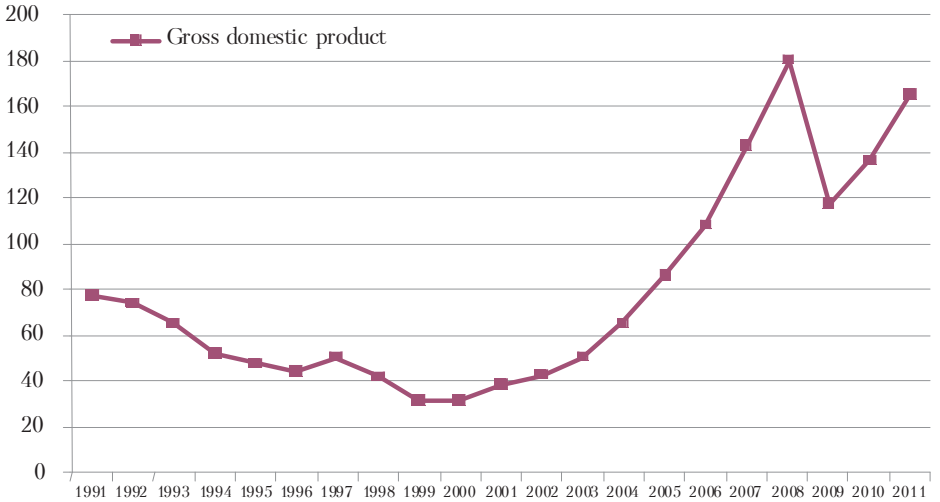
We take the view that modern concept of structuring of economic cycles with their division into two major phases (increase and decrease) is more universal in terms of research and modelling. That is why for further analysis we chose a full cycle from 1991 to 2008 and built a retrospective econometric model of defining the nominal gross domestic product of Ukraine, see Figure 2:

$$Y = 1{,}3009 \times X^2 - 20{,}765 \times X + 113{,}14, \quad (1)$$

where $X$ is a period during which the formation of value, expressed in current prices of the end products and services, occurs.

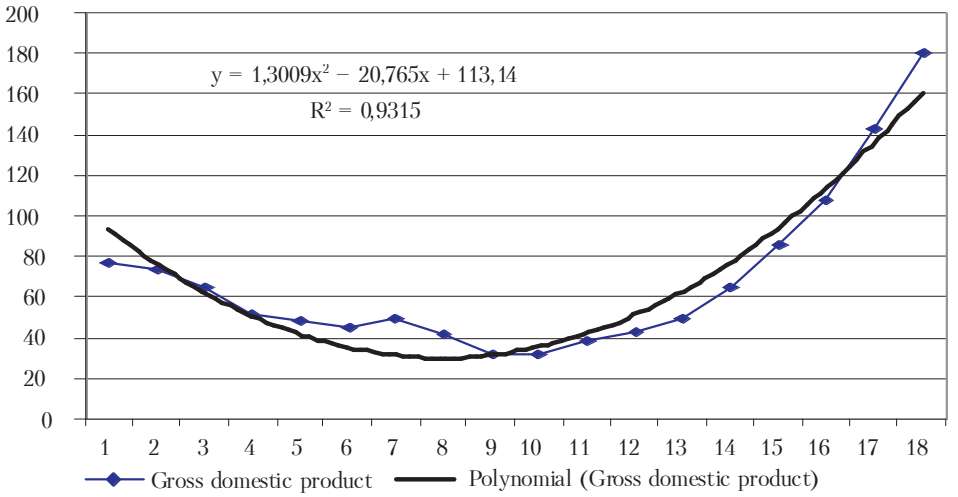
Supplied determination coefficient should be considered as a measure of concentration of actual receipt amount that is the relation between actual values to the theoretical ones, estimated by the line of the trend. Determination coefficient is equal

to 0,9315, which is the evidence of sufficient adequacy of the model (the closer the value to 1, the more the dependency is).




Based on the data from the World Bank (2012).

*Figure 1.* **Dynamics of Ukraine's nominal gross domestic product**




Developed according to the data from the World Bank (2012).

*Figure 2.* **Demonstration of S. Kuznets' economic cycle in Ukraine**

Determination area of the retrospective econometric function can be defined as follows: (93,6759; 160,8616).

Based on the data presented let's run a function study by the first derivative, defining periods of monotony and minimal value of the function.

According to the theorem (monotony attributes are necessary) (Aramanovich, 1967) the following conditions are necessary to satisfy the identification of monotony:

a) if a function $f(x)$ in the interval is increasing, its derivative is $f'(x) \geq 0$;

b) if a function *f(x)* in the interval is decreasing, its derivative is $f'(x) \le 0$;

c) if a function *f(x)* in the interval doesn't change, its derivative is $f'(x) = 0$.

Let's define the derivative of the econometric function according to the following formulae:

$$\frac{d}{dx} ax^n = anx^{n-1}; \quad (2)$$

$$\frac{d}{dx} c = 0, \quad (3)$$

where *a, n* are constants.

Let's represent the derivative definition formula:

$$f'(x) = anx^{n-1} - a + 0. \quad (4)$$

Thus, we obtained:

$$f'(x) = 2{,}6018x - 20{,}765. \quad (5)$$

In Table 4 we represented the monotony research of the function.

*Table 4.* **Monotony research of the function using the derivative**

| Value (X) | Area of function (Y) | Area of derivative | Monotony periods |
|---|---|---|---|
| 1 | 93,6759 | -18,1632 | Function in the interval is decreasing |
| 2 | 76,8136 | -15,5614 | |
| 3 | 62,,5531 | -12,9596 | |
| 4 | 50,8944 | -10,3578 | |
| 5 | 41,8375 | -7,756 | |
| 6 | 35,3824 | -5,1542 | |
| 7 | 31,5291 | -2,5524 | |
| 8 | 30,2776 | 0,0494 | Function in the interval is increasing |
| 9 | 31,6279 | 2,6512 | |
| 10 | 35,58 | 5,253 | |
| 11 | 42,1339 | 7,8548 | |
| 12 | 51,2896 | 10,4566 | |
| 13 | 63,0471 | 13,0584 | |
| 14 | 77,4064 | 15,6602 | |
| 15 | 94,3675 | 18,262 | |
| 16 | 113,9304 | 20,8638 | |
| 17 | 136,0951 | 23,4656 | |
| 18 | 160,8616 | 26,0674 | |

Estimated by the authors according to the World Bank (2012).

Important task for modelling is defining maximal and minimal values of domestic economic entities. Actual minimal value of nominal gross domestic product was reached in 2000 and it equals to 312615 bln USD, and the maximal one – in 2008 and it equaled to 1799924 bln USD.

Weierstrass (Aramanovich, 1967) theorem affirms that a function has the smallest and the biggest value if it is continuous on the segment [*a; b*]. In turn, if a function is continuous in some point and around this point to the left the derivative has a negative value and positive to the right, than this point is the minimum of the function.

Let's estimate the value (*x*), in case the derivative is equal to 0, namely:

$$2{,}6018x - 20{,}765 = 0;$$

$$x = \frac{20{,}765}{2{,}6018} = 7{,}98.$$

According to the calculations run, we get the value $X = 7{,}98$, which equals around 8 years. According to the econometric model presented, Ukraine got minimal nominal gross domestic product value in 1998. Thus, according to the graph, starting from 1999 the activity of economic entities has been increasing, which mirrored in positive change of the resulting measure – nominal gross domestic product of the country.

According to the results of the research, we can come to the following conclusions:

a) retrospective econometric model of defining the dynamics of nominal gross domestic product in Ukraine in the period between 1991–2008 is adequate, which is supported by the determination coefficient – 0,9315;

b) the model created bears warning features: according to the estimations, minimal value of nominal gross domestic product is 1998, though according to facts, 2000 is a crucial one;

c) defining the derivative of the developed function gives us the possibility to affirm, that every 8 years it is necessary to develop innovative credit policy taking into account changes of macroeconomic environment.

It is quite difficult to model the behavior of the participants of loan relations, but we propose to use the matrix of choice for loan direction according to the loan terms while forming and implementing innovative credit policy (Table 5).

The matrix we have created is a recommended one and gives us the possibility to answer some questions: "Who is necessary to credit: legal or private entities?", "Which of the loan periods should be preferred: long- or short-term?"

The matrix we represent is based on the assumptions:

a) all potential bank clients are divided into legal and private entities;

b) according to the terms of payback loans are divided into: short-term – up to 1 year; mid-term – from 1 to 3 years; long-term – over 3 years;

c) it is obligatory to form innovative credit policy taking into account increasing and decreasing wave in the 9th and 18th year according to S. Kuznets' economic cycle;

d) the represented matrix does not take into consideration the priority directions in social and economic development of the country or the world trends.

The matrix we have developed (Table 5) contains some signs which can be found at crossings of years and subjects of loan relations taking into account loan terms, which have to be considered as follows:

a) the first number in brackets (1;_) indicates the priority of issuing loans to legal or private entities; in turn (0;_) demonstrates, that this direction is not of a priority in terms of increasing or decreasing wave;

b) the second number in brackets (_;1) indicates the first priority of issuing loans according to the terms of their payback, which varies from 1 to 3 (1 – issuing loan is of the first priority; 2 – is important; 3 – is not of high priority).

We suppose that during the economic recession it is necessary to increase issuing loans to legal entities, and at the expense of increasing prices for credit products for private entities and decreasing limits for the latter. Vice versa, during the periods of economic growth it is necessary to activate issuing loans for private entities by decreasing interest rate and increasing the limits.

*Table 5.* **Matrix of choice of prioritized direction of loans to legal and private entities according to the terms of usage while forming the bank's innovative credit policy in Ukraine,** *developed by the authors*

| Subjects of loan relations | Period, years | Cycle, year | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Decreasing wave | | | | | | | | | Increasing wave | | | | | | | | |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| Legal entities | 0–1 | (1;1) | (1;1) | (1;1) | (1;1) | (1;1) | (1;1) | (1;1) | (1;1) | (1;1) | (0;1) | (0;1) | (0;1) | (0;1) | (0;1) | (0;1) | (0;1) | (0;1) | (0;1) |
| | 1–3 | (1;3) | (1;3) | (1;3) | (1;3) | (1;3) | (1;3) | (1;2) | (1;2) | (1;2) | (0;2) | (0;2) | (0;2) | (0;2) | (0;2) | (0;2) | (0;2) | (0;2) | (0;2) |
| | 3–9 | (1;2) | (1;2) | (1;2) | (1;2) | (1;2) | (1;2) | (1;3) | (1;3) | (1;3) | (0;3) | (0;3) | (0;3) | (0;3) | (0;3) | (0;3) | (0;3) | (0;3) | (0;3) |
| Private entities | 0–1 | (0;1) | (0;1) | (0;1) | (0;1) | (0;1) | (0;1) | (0;1) | (0;1) | (0;1) | (1;1) | (1;1) | (1;1) | (1;1) | (1;1) | (1;1) | (1;1) | (1;1) | (1;1) |
| | 1–3 | (0;2) | (0;2) | (0;2) | (0;2) | (0;2) | (0;2) | (0;2) | (0;2) | (0;2) | (1;3) | (1;3) | (1;3) | (1;3) | (1;3) | (1;3) | (1;2) | (1;2) | (1;2) |
| | 3–9 | (0;3) | (0;3) | (0;3) | (0;3) | (0;3) | (0;3) | (0;3) | (0;3) | (0;3) | (1;2) | (1;2) | (1;2) | (1;2) | (1;2) | (1;3) | (1;3) | (1;3) | (1;3) |

In our opinion, while creating new or modified loan product it is important to get familiar with the programs of social and economic development of the country and modern trends in the sphere of world crediting. While formulating conceptual approaches in terms of issuing loans it is necessary to take into account analytical researches of international financial institutions and directions of social and political programs, which will let competitive positions of a bank.

**Conclusions.** The above research enables to make the following conclusions:

a) S. Kuznets' long-term economic cycle crucially influences the decision making with regard to forming innovative credit policy in long-term periods;

b) production recession in 2009, the so-called "financial crisis" is a natural process, consequences of which must be alleviated for each of the participants of financial relations at the expense of correctly made management decisions of banks;

c) recommendations developed regarding the use of the matrix of choosing the direction of issuing loans according to the terms of payback while forming innovative credit policy on the basis of S. Kuznets' economic cycles bear a practical character and can be combined in use with proposals to reduce the influence of mid-term economic cycles by C. Juglar.

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## КНИЖКОВИЙ СВІТ




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Має гриф підручника від Міносвіти України.

У даному підручнику, котрий дає системне і змістовне уявлення щодо управління капіталом у всіх його формах. Комплекс питань, що стосуються фінансово-кредитних відносин на макро- і мікрорівні з точки зору міжнародних стандартів фінансового розвитку, дозволяє сформувати у читача глибоке уявлення про взаємозв'язки комерційної діяльності підприємств з державним механізмом регулювання монетарної сфери через розробку і реалізацію фінансової і грошово-кредитної політики в Україні.

Включає тезаурус з більш як 700 понять, використаних у підручнику.

*Представляє інтерес для студентів вищих навчальних закладів, наукових працівників, викладачів, аспірантів, практичних працівників, а також усіх тих, хто цікавиться фінансовим менеджментом.*