# Credit Cycles under Conventional, Free and Islamic Banking:
# An Empirical Study of Risk-taking Behavior

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*Abstract:* - In this article, we conduct a comparative analysis of credit cycles in various modes of banking. Defining a credit cycle as movement of credit risk, we set ourselves a task to analyse the peculiarities of attitude towards credit risk in modes of traditional, free and Islamic banking. Using correlation analysis in more than 15 countries for the years from 1769 to 1850 and from 1985 to 2014, we come to the following conclusions. The willingness to take risk by lenders depends essentially on the degree of responsibility of creditors to depositors and investors. Thus, the regime of free banking and Islamic model demonstrate sustainable stability in credit cycles and risk aversion, greater duration of credit cycles. Credit market concentration has no significant effect on the amplitude and quality of credit cycles in any mode. Effect of high requirements for capital adequacy on attitude towards credit risk is ambiguous: in case of limited liability of creditors, a positive effect is neutralized. Economic growth and an accompanying rise in prices (expectations of income growth) increase willingness to take risk only in case of limited liability of creditors. In case of full liability (free banking mode) or in terms of profit-loss sharing (Islamic model) the effect of rising yields is also neutralized.

*Key-Words:* bank, credit cycle, credit risk, limited liability, free banking, Islamic banking

## 1 Introduction

Global financial turbulence has become the leitmotif of the current century. The Great Recession, debt crises that have shaken many countries of the world, forced to reconsider the role of credit in economic processes. The classical perception of the bank as an intermediary in financial transactions, transforming savings into investments is replaced by models of New Keynesians and behavioural economists, which focus on the ability of credit to create means of payment. Credit cycles again attracted attention of academic and expert communities. Achieving and maintaining financial stability of national economies has once again become a top priority. In theory of systemic risks, credit cyclicity is recognized as one of the sources of financial instability. Financial deregulation of the 1980s, reduction of requirements to activities of credit institutions, increased competition and declining liability of credit institutions to depositors and investors became the basis of the accumulation of risks of significant scale. The consequence of this process is deterioration in quality of bank loans' portfolio, reduction in lending standards with respect to maximize short-term financial results. A need of

strengthening control over the quality of banks' operations has led to a significant increase in studies aimed at unveiling destructive power of credit.

The vulnerability of conventional banking to economic shocks, comparable in strength with the Great Depression, has also forced to turn attention of researches to alternative modes of banking, such as the Islamic model. It is a fact that Islamic banks during the Great Recession have not suffered so severely. In addition to the Islamic model, in search of recipes against financial fragility, in the words of H. Minsky, the researchers turned to the era of free banking - a Scottish model and the Suffolk system of New England, which showed surprising resistance to shock phenomena, unlike England and the rest of the US in 18-19 centuries.

Conventional tools of banking regulation are mostly concentrated around the papers og the Basel Committee on banking supervision, main recipes of which include ensuring financial stability of the national economy. However, achievement of this goal is proposed only within the technical aspect – strengthening micro-prudential regulation in form of tightening capital adequacy requirements, leverage and liquidity; enhancing the quality of models of risk management. Macroprudential supervision is

focused around the creation of countercyclical capital buffers and countercyclical reserves, effects of which still cause a heated debate. The proposals to strengthen degree of responsibility of lenders which are able to tackle consequences of information asymmetry in form of adverse selection, moral hazard and the principal-agent problem by creating incentives to reduce the willingness of lenders to take risk in most cases is not considered in detail.

Due to these facts, we think that the study of credit cycles in different modes of banking as dynamics of credit risks' acceptance rate is quite timely. A use of historical experience of free banking era and conventional Islamic mode in fact may represent a direction for further improvement of banking sector in order to ensure the financial stability of national economic systems and protection against large-scale crises.

This study is organized as follows: section 2 presents a detailed literature review on the issue of credit cycles, theoretical positions of Islamic model of banking, and the era of free banking, and reveals the purpose of the study and its hypotheses. Section 3 deals with methods used in this study for empirical testing. In section 4 we present results of statistical, graphical and econometric analysis of our hypotheses. Section 5 presents conclusion of the research.

## 2  Literature Review

The revival of interest in the cyclical nature of the credit sector dynamics in the global research community can closely be associated with significant crises that started to hit the banking systems of different countries since the second half of the 1980s, so that today there are two main theoretical ways of describing and explaining credit cycle phenomena.

The first set of models includes the so-called exogenous models of credit cycles, the main essence of which is revealed through the financial accelerator model. Regardless of the source, credit cyclicity is a mirror reflection of economic cycles. [2,12,13]

The second approach to studying credit cycles consists of endogenous models. In these models, the main reason, the source of cyclicity is not considered as a reaction to economic shocks in demand or technology, but as presence of internal contradictions in the credit market, similar to Hegelian struggle and unity of opposites. If exogenous models of credit cycles lay in analogy with the neoclassical postulates (risk attitude is identified as stable, permanent in the form of risk

aversion, behaviour of economic agents is fully rational, and any realization of credit risk appears to be a result of uncertainty or information asymmetry), endogenous models, on the opposite, are built on the variability of perception, evaluation and forming attitudes towards risk, the presence of different risk attitudes, bounded rationality. [1,9,15,16] In other words, endogenous models of credit cycles describe the cyclical nature of credit market dynamics as the process of accumulation and realization of credit risk, both underestimated and conscious excessive risk-taking.

When studying specifics of credit cycles in alternative modes of banking one should include reference to the existing achievements of academic thought on the era of free and Islamic banking.

Banking in the 18th and 19th century was strikingly different from modern conventional systems. The absence of central banks, as state regulators, significantly influenced the functioning of the credit market. The research of historians and economists, experts on the subject, in most cases highlight surprising resilience of these systems to shock phenomena of economic sense. For example, it is known that Suffolk system of New England since the 19th century functioned without substantial banking panics that shook the rest of the US. The same is true for UK. England, in the period of 19 –beginning of 20 centuries was systematically under pressure from bank runs, while the banking model of Scotland showed strong resilience. Thus, the ratio of frequency of banking panics in New England and in the U.S. overall, as well as in Scotland and England was 1 to 15 and 1 to 8 respectively. [3,5]

Conditions of free banking were characterized by the absence of barriers to entry on the market, quasi-perfect competition between the participants, absence of specific regulation in addition to general rules and provisions for all economic entities (setting the reservation ratio of species relative to bank notes issuance was a personal matter of a bank); absence of deposit insurance, that encouraged investors and depositors to thoroughly select the bank; absence of fractional reserve system; in some cases – condition of unlimited or full liability requirement: sharing of losses in case of bankruptcy was proportional regardless of owner's share in the bank capital. In case of significant debts, founders of the bank had to repay the debts with all assets they possessed. [7,26] The main source of loans granted usually was own and not borrowed capital. Equity level reached 80% or even 90%. [6, 8] The condition of full responsibility, the need to incur losses in full, according to the

researchers, was keeping creditors from excessive risk taking and succumbing to the euphoria of geographical discoveries of those times. [8,17]

In order to evaluate the specifics of credit cycles under Islamic mode of banking it would be better for research purpose to refer to the "Mudaraba" agreement, where the bank's involvement is inevitable.

The key difference between Islamic model of credit relations from traditional one is imposition of the ban on the extraction of surplus value from money relations. Islamic mode of banking is based on achieving reciprocity, equality and equity. The principle of responsibility sharing allows both parties to participate in the process, forcing each side to make efforts not only to secure value of funds, but also to its augmentation. [10,11] In the Islamic mode of banking lender's exposure to the risk of default in a natural way is strengthened by the prohibition on the use of collateral, forcing the lender to carefully approach the choice of potential partners. [11]

Another important feature of the Islamic model is the lack of lender's responsibility to depositors. To ensure stability of returns, Islamic bank is forced to seek reliable partners and to provide an acceptable level of return for their investors. If an Islamic bank excessively speculates through its investments, it would lead to a market correction. [4] The reflection of losses would reduce the rate of income, which in turn, would force investors to seek banks more lucrative for investment. The reduction of resource base is linked with reduction of potential for expansion, which will lead to reduced competitiveness. Excessive risk aversion of an Islamic bank would also lead to loss of market niche: depositors and investors. [14, 20]

In addition, the condition of profit and loss sharing serves as a counter-defence mechanism by changing the movement of cost per unit of capital in the same direction as the expected profit. This trend is reinforced by changes in the proportions in which business entities have to share profit with the financial intermediaries [21] In case of a rise in profits, Islamic creditors raise the price of funding making additional investments unprofitable to the borrower.

Most of studies emphasize relative efficiency of Islamic banks compared to conventional banks. [4, 10, 20] An impressive amount of research papers is devoted to empirical argumentation of significant achievements of Islamic banking in terms of lending efficiency; where in some cases they even bypass traditional banks. [11]

If we turn to research devoted to credit cycles in Islamic and free banking, we can only state their absence or a very small number.

Most of papers on free banking highlight the benefits of this model when dealing with banking panics, liquidity crises, but not banks' attitude toward credit risk. [7,18,19,22,26] Quantitative assessment of credit cycles in the era of free banking is also absent in the literature on the issue.

Research on Islamic banking is mostly concentrated around protection against liquidity crises, the effects of inflows and outflows of capital, its comparison with traditional banking. No research devoted to credit cycles in Islamic model was found.

Given the above, it seems actual to provide analysis of banking modes through the prism of credit cyclicity, given the significance of this pattern for the development of financial and economic markets.

In this regard, we set ourselves a task of providing comparative analysis of credit cycles in different modes of banking.

To achieve this goal, we set ourselves a number of tasks. First, to analyse the specifics of credit cycles in these modes according to the criteria of the amplitude of credit cycles, their duration, the accumulated volumes of credit risk. Second, we test empirically a hypothesis of a strong correlation between business and credit cycles under different banking modes. Third, we test a hypothesis of existing correlation between concentration level of a credit market, bank capital level and creditors' attitude to risk. Fourth, we assume that alternative models of banking are characterized by lower propensity of lenders to take credit risk, which means smoother amplitude of credit cycles, and smaller volumes of non-performing loans (NPL) due to the presence of full responsibility or shared responsibility in form of profit-loss sharing.

## 3  Research Methodology

To achieve this goal and solve these problems, we use methods of graphical and correlation analysis.

### 3.1 Conceptual Framework

In this study we use statistical techniques of research, allowing to reflect the cyclical nature of bank credit market's dynamics in the most optimum manner, and analyse necessary data in the form of time series.

### 3.2 Sample countries and data selection

For the analysis of credit cycles in different modes of banking we use different time periods of the sample, as well as different countries.

For analysis of traditional, modern model of banking, we use data for the following countries: USA, UK, Germany, France, and Russia. The time period of the sample includes data from 1985 to 2014 as available.

For analysis of free banking model we use data for Scotland, England in the UK and for New England and other States in the U.S. as a whole. The time period of the sample is from 1769 to 1850. Data was collected from different sources: statistical yearbooks, research papers and monographs.

For analysis of Islamic mode of banking, we use data on Malaysia, Bahrain, Kuwait, Pakistan, Iran, UAE, Saudi Arabia, and Indonesia.

To build time series reflecting basic characteristics of credit cycles in sampled countries for selected periods we use the following data:

• average growth rate of total lending by banking institutions on an annual basis;

• average growth rate of total lending by Islamic banking institutions to non-financial sector on an annual basis (for Islamic model);

• share of NPL\written-off losses on loan operations of banking institutions to non-financial sector of the economy on an annual basis;

The beginning of the credit cycle is determined by the transition from negative to positive credit growth rate.

To reflect main characteristics of credit cycles (duration, amplitude of the credit cycle on upward and downward phases, scale of credit risk accumulation) the following data are used:

• amplitude of the credit cycle on upward phase is defined as a mean value of credit growth rates for the period when growth rates has positive values;

• amplitude of the credit cycle on downward phase is defined as a mean value of credit growth rates for the period when growth rates has negative values;

• duration of the credit cycle is defined as the number of years between negative credit growth rates during the crisis;

• scale of credit risk accumulation is calculated as the ratio of the maximum value of NPL share in a crisis period to the average value of NPL on the upward phase of the cycle. In other words, the scale of the accumulated risk reflects how many times the maximum value of the NPL is above average for the trend on the upward phase;

• credit cycle's velocity is defined as the ratio of credit growth rates' sum to the number of years spent to achieve maximum growth rates.

To construct time series, reflecting economic dynamics we use the following data:

• to reflect an economy's growth annual GDP growth rate or turnover growth rates (for the model of free banking) are used;

• to reflect inflation we use data on the consumer price index (CPI) in percent on an annual basis or growth rate of prices for consumer goods and services (for model of free banking).

To reflect bank concentration and bank capital level we use data from official statistical agencies and central banks of countries in the sample, as well as expert evaluations in the absence of the necessary information are used.

For the purposes of providing optimal data analysis, allowing smoothing national specifics, averaging method is used.

The averaging is performed in two stages. First, data are averaged across sample countries by mode of banking. In result, we have average data for countries of the sample on time period t, t+1, etc. For the purposes of comparative analysis the data is averaged for all years. The resulting statistics are presented in the next section. For the purposes of correlation analysis, data are averaged only in the first stage, in order to preserve the time series to identify trends and relationships between variables.

## 4 Empirical Results & Discussion

Necessity of optimizing results of statistical analysis for research purposes dictates dividing all the countries and time periods of the sample into several groups to obtain representative and reliable results.

The first group includes all countries of the sample with the Islamic mode of banking. The second group includes countries with "pure" model of Islamic banking. For example, in case of Iran the deposit insurance system is actively applied, that is not standard for an Islamic model in other countries. The third group includes countries of the sample in free banking era, regardless of creditors' responsibility degree. The fourth group includes countries, banking systems of which operate in full or unlimited liability mode (Scotland and Suffolk system in New England). The fifth group includes countries with a traditional banking model. Table 1 presents the descriptive statistics of credit cycles in all five groups averaged first by sample of countries, and then by all years.

Table 1: Credit cycles' descriptive statistics under different modes of banking

| Variable\ Banking Type | CGRu (avrg), % | CGRd (avrg), % | NPL (avrg), % | BCL (avrg), % | Inflation (avrg), % | EGRu (avrg), % | EGRd (avrg), % | CR (avrg), % | CCV (avrg), p. | CCD (avrg), y. | CRLI (avrg), p. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Islamic Banking (avrg) | 8,2 | -2,4 | 5,3 | 57 | 7,3 | 6,9 | -1,2 | 52 | 4,5 | 7,2 | 5,2 |
| Islamic Banking (full liability) | 6,3 | -1,9 | 4,2 | 62 | 4,8 | 7,3 | -0,1 | 75 | 3,3 | 10,3 | 3,9 |
| Free Banking (avrg) | 28,6 | -3,4 | 11,3 | 75 | 18,3 | 10,4 | -4,3 | 46 | 3,9 | 8,3 | 16,7 |
| Free Banking (full\unlimited liability) | 14,2 | -1,3 | 5,6 | 82 | 6,2 | 6,3 | -0,3 | 78 | 2,7 | 11,4 | 4,1 |
| Traditional Banking (avrg) | 23,1 | -6,3 | 8,2 | 12 | 4,5 | 3,5 | -2,4 | 57 | 5,3 | 6,2 | 9,8 |

CRA – average rates of credit risk accumulation on downward phases of the credit cycle in sample countries;

CGRu – average yearly credit growth rate in countries of the sample on upward phases of the cycle;

CGRd – average yearly credit growth rate in countries of the sample on downward phases of the cycle;

NPL – average share of non-performing loans/write-off losses on yearly basis in countries of the sample;

BCL – average level of bank capital  in countries of the sample;

Inflation – average yearly inflation rate in countries of the sample;

EGRu – average yearly economy's growth rate in countries of the sample on upward phases of the cycle;

EGRd – average yearly economy's growth rate in countries of the sample on downward phases of the cycle;

CR – average yearly growth rates of banks' concentration level on credit markets of sample countries;

CCV – average velocity of credit cycles in sample countries;

CCD – average duration of credit cycles in sample countries.

As can be seen from Table 1, credit cycles in various modes of banking differ significantly. For example, maximum annual rate of credit growth occurs in regime of free banking. However, excluding other U.S. states and England from the sample reduces credit growth rate by almost half. High growth rates in the era of free banking include large-scale credit expansions of commercial banks in the U.S. and England, the quality of which later turned out to be extremely low, and the level of NPL, as well as the scale of the accumulated credit risk tend to be one of the highest among modes studied. Thus, credit growth being 28,6% per year, the average rate of NPL is 11.3%, and the scale of the accumulated credit risk reaches 374. At the same

time mode of full responsibility shows moderate growth rates of credit (14,2%) accompanied by a relatively low level of NPL, and the scale of the accumulated risk is only 28 points. Downward phases of the cycle under free banking follow the trend. The relatively low level of decline in credit activity is associated with the use of opportunities to continue credit expansion even during times of crisis that hit banks of England and US.

Compared to sample of averaged free banking, full responsibility mode is also characterized by a lower degree of inflationary pressure, which is likely attributable to lower rates of credit growth that does not lead to a substantial increase in prices and the formation of bubbles on the markets for goods and services.

Another confirmation of our assumptions may be found in special statistics for credit cycles. The average duration of credit cycles in the mode of full responsibility is longer than in case of inflationary activities of banks in the U.S. and England. Velocity of credit cycles, as an indicator of elasticity of willingness to accept credit risk, also confirms our hypothesis, stating that increasing responsibility of creditors reduces incentives to excessive credit risk-taking.

The Islamic mode of banking also demonstrates impressive results.

First, the growth rate of credit supply is significantly lower than in the traditional model or the free banking (FB) mode; level of NPL (quality of credit expansions), is also lower than in traditional model. The inflation rate is higher than in developed countries; however, this may reflect the developing nature of sampled economies. The scale of accumulated credit risks also speaks in favour of the benefits of Islamic model in part of a lower willingness of creditors to accept it in full profit-loss sharing regime.

The duration of credit cycles and their velocity confirm a thesis about a more balanced credit policy and unwillingness to accept significant risks. High rates of economic growth are not, as we think, a result of banks' credit policy. Rather one should talk about developing status of economies in the sample of Islamic mode. The same is true for the economies of Scotland, England and the United States during the 18th-19th centuries.

In other words, the overall comparative analysis of statistical variables that reflect credit cyclicity, speaks in favour of alternative modes of banking.
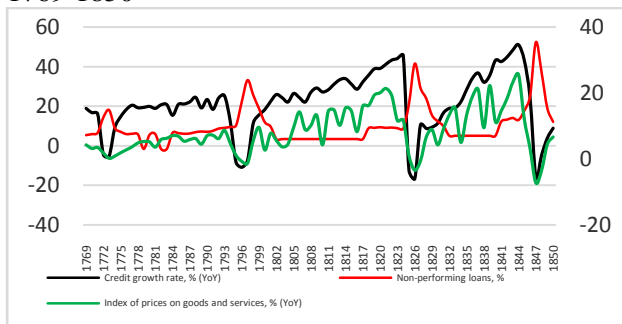
If we turn to a more detailed graphical analysis of the specifics of credit cycles in different modes of banking, it is possible to identify the following features. (Fig.1-4)

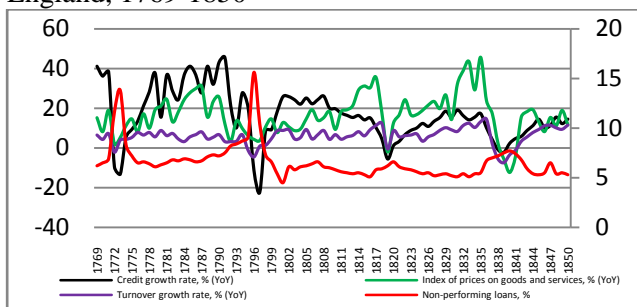Fig 1: Credit cycles under free banking: Scotland, 1769-1850
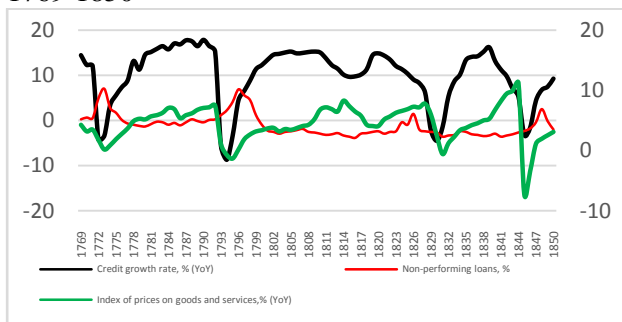


**Source:** author's calculations upon [3,7,17,19,22]

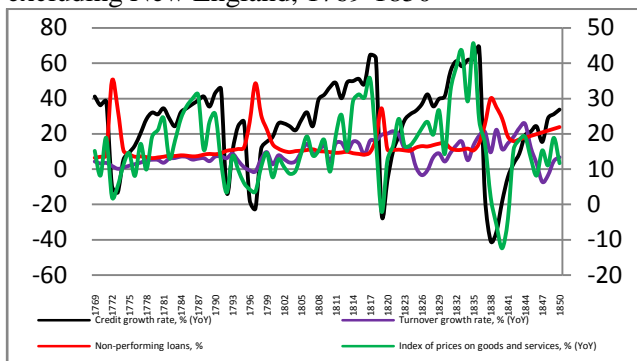Fig 2: Credit cycles under free banking: England, 1769-1850



**Source:** author's calculations upon [3,7,17,19,22]

Fig 3: Credit cycles under free banking: New England, 1769-1850



**Source:** author's calculations upon [23,24,25]

Fig 4: Credit cycles under free banking: USA excluding New England, 1769-1850



**Source:** author's calculations upon [23,24,25]

As can be seen, in the period from 1769 to 1800 differences between cyclical components of the economy and credit in Scotland and England are not traceable. Cycles are of a spasmodic character,

growth - fast, busts – deep and relatively long. In general, the scale effect is present. However, after the crisis of 1772-1773, key banks of Scotland carried out a series of countermeasures to strengthen the security and stability of its own banking. A result of these reforms has become a sharp change in the cyclical pattern of bank credit and economy in Scotland relative to England.

Data presented in Figures 1, 2 clearly shows that the amplitude of credit cycles in Scotland fell by almost two times in comparison with England. Picture is similar in terms of losses (risk exposure) for loan transactions of banks. After reforms, average growth rates of losses on loan operations in Scotland reduced by 40%-45%, in England the pace only continued to grow on the background of systematic increase of note issuance and limited liability of creditors. Noteworthy is the reaction of Scottish bankers on the possibility of extracting additional revenue due to the growth rate of return (total growth of prices in the markets of goods, services and assets). With increasing inflationary pressure, the Scottish banking system responds by reducing the supply of credit, rationing of funds, their allocation to high-quality borrowers. In England, the effect of profitability channel manifests itself fully.

If we turn to data on the dynamics of lent funds, the volume of losses on loan operations, as well as growth rate of the economy and price level in the U.S. overall during the studied period (see Fig.3, 4), we can see that the amplitude of credit cycles in the US is rather spasmodic in nature – a sharp rise on upward phases and a sharp, deep enough decline on downward phases. Moreover, it is important to note that the average growth rate for upward phases of the cycles is on average 46%-49%.Until the early 18th century average downward phases is about 75% -95%. The average growth rate on downward phases after the beginning of the 19th century was in the range of 53%-66%. Such a disproportionate movement was due to the fact, that the U.S. government actively began to use enforcing bans on exchange of paper bank notes on species, which is a violation of the natural course of the cycle – crisis cleansing of the market from the existing contradictions.

In the post-war period with the introduction of indulgences in exchange of banknotes for real money, nominal level of losses as a relative rate of growth has reduced (due to the fact that bankruptcies of inflationary banks were stymied by U.S. Government), while actual losses, measured as a number of unsold banknotes of chartered banks increased up to 180%-350%. Until the early 19th
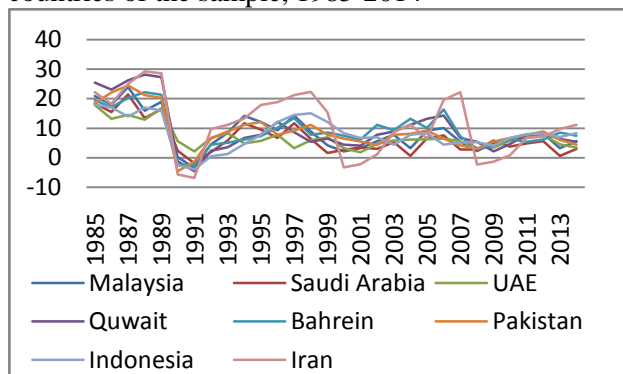
century, credit expansion was facilitated by spasmodic and abrupt growth of the economy, sales of goods and services. This growth usually was accompanied by a very high level of price pressure. Since the 19th century, the pace of price growth has increased significantly in the continental U.S. as a whole. If, before the 19th century the average growth rates ranged from 15% to 20%, respectively, with the development and increasing number of inflationary banks, a growth rate of prices in different states and in the whole USA reached 35-45%.

For comparison, let us refer to similar data for New England. Since the 19th century, the organization of banking in this state has undergone significant changes. We therefore feel justified to divide the time period of our sample in the pre-reform and after the reform periods.

If we turn to data on bank credit and economic sector of New England before the reform, (see Fig. 4), we see that the cycles were similar to those of other states of US. The average upward phase for the period 1769-1800 was about 37%-39%. Average growth rates during the crisis in the banking sector for the same period were between -15%-20%. Average growth rates of NPL and charge-off rates accounted for approximately 25%-40%. If we turn to the data for the post-reform period, we can see that the picture significantly changes as compared to previous years and relative to the U.S. as a whole. After the reform of the banking credit market, average credit growth rate has reduced to 15%-20%, while the average for the crisis period has reduced to -2% -4%. If in pre-reform period, average loss was 25% -40%, after the reform - 3% -5%. This suggests that credit cycles reduced in amplitude of accumulation and realization of risk due to a more prudent and conservative credit policy.

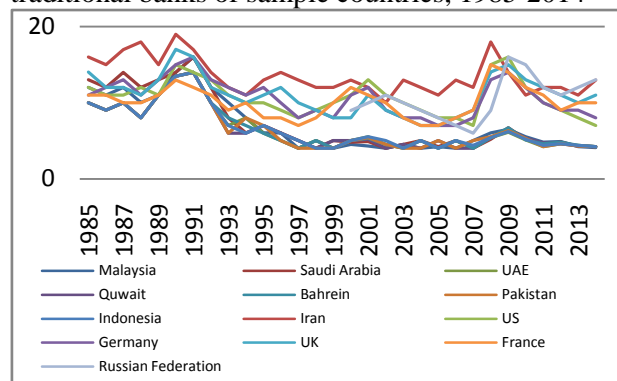We now turn to analysis of Islamic model over the period from 1985 to 2014. (see Fig.5,6).

Fig 5: Credit growth rates of Islamic banks in countries of the sample, 1985-2014

For comparison, we also present similar data for commercial banks of several developed and developing countries with the classical mode of banking organization (sample countries include USA, UK, Germany, Russia, France).

Fig 6: Level of non-performing loans in Islamic and traditional banks of sample countries, 1985-2014

As can be seen from the data presented in Figures 5,6 over the sampling period key economies of the world were shaken by credit, financial and/or currency crises. In order to ensure statistical validity and to avoid correlation errors for the selected period, we have focused on three key crises in the credit sector: the crisis of the 1990s, the crisis of 2000-2001, and the Great Recession in 2008-2009, beginning from subprime mortgage crisis in August 2006. One major difference, clearly appearing on graphs is that there is a significant difference in amplitude of credit cyclicity in economies with advanced Islamic model in contrast to the countries with the dominance of the traditional model.

Thus, the difference in credit amplitude of countries with Islamic banking from classic banks is 48% on average, where the minimum value is 15% (Iran), while the maximum value of deviation from average for conventional banks reaches 62% (Malaysia). It is important to note that the case of Iran is the exception rather than the rule. Iran, unlike many other countries in the sample, has a deposit insurance system that provides guaranteed payments to depositors in case of bank failure. From the theory it follows that the willingness to take risk increases – manifesting in an increase of supply of funds on the one hand, and an increase in the share of NPL in the total portfolio on the other.

A shift in supply of funds by creditors in Iran is captured in our study.

Speaking specifics of credit cycles it is also necessary to note the existence of important

differences. As graphs show, amplitude of credit cycles in Islamic countries is quite different from the amplitude in countries with dominant traditional banking. Average upward phase of the credit cycle in the countries with traditional banking is 35%; the average downward phase of the cycle (even in general for all crisis episodes) is -7%. As countries with traditional model of banking demonstrate continuous cyclic growth of NPL on loaned funds in the range of 53% to 266%, countries with Islamic model demonstrate a higher level of quality: the ratio of peak values of NPL in the crisis period to the upward phases of the cycle does not exceed a threshold of 35%.

Thus, the first hypothesis about the existence of advantages in credit cyclicity in the modes of free and Islamic banking gets another indirect advantage. The need to test remaining hypotheses on the relationship between credit and economic cycles, impact of credit market concentration and bank capital level on willingness to take credit risk leads us to conducting a series of correlation tests in order to identify presence or absence of stated relationships.

For the correlation analysis, all countries and sample periods were divided into relevant modes. (see Table 1) If we turn to results of the correlation analysis of conventional mode of banking (CMB) (Table 2), we can identify the following patterns.

Table 2: Results of correlation test for conventional banking mode

| Variable | CR (avrg), % | EGRu (avrg), % | EGRd (avrg), % | Inflation (avrg), % | CGRu (avrg), % | CGRd (avrg), % | NPLd (avrg), % | Bank capital level (avrg), % |
|---|---|---|---|---|---|---|---|---|
| CR (avrg), % | 1 | | | | | | | |
| EGRu (avrg), % | 0,111 | 1 | | | | | | |
| EGRd (avrg), % | -0,129 | -0,366 | 1 | | | | | |
| Inflation (avrg), % | 0,118 | 0,877 | -0,278 | 1 | | | | |
| CGRu (avrg), % | 0,341 | 0,592 | -0,567 | 0,717 | 1 | | | |
| CGRd (avrg), % | -0,462 | -0,393 | 0,817 | -0,225 | -0,352 | 1 | | |
| NPLd (avrg), % | 0,152 | 0,178 | -0,618 | 0,372 | 0,241 | -0,593 | 1 | |
| Bank capital level (avrg), % | -0,321 | -0,112 | 0,089 | -0,213 | -0,147 | 0,093 | -0,012 | 1 |

**Source**: author's calculations upon data of Federal Reserve System of USA, Bank of England, Bank of France, Deutsche Bank and Bank of Russia.

Results for conventional mode show that there is a strong positive correlation between economic growth on an upward cycle's phases and growth rates of prices on the markets of goods, services and assets. The relationship can be interpreted as the existence of a correlation between economic growth due to a rise in prices on different markets. In other words, economic growth in developed and developing countries is largely characterized by the formation of bubbles in different markets, which enhances not only economic growth in the short run,

but also increases inflation pressure in certain markets. The same is true for the relationship between credit expansion and price level. Bank credit expansion (mainly mortgage loans) led to a substantial increase in property prices, the cost of maintenance, and the boom of consumption. Then it can be assumed that the price growth largely depends on credit expansion of traditional banks, parallel to supporting economic growth.

Another important feature is manifested in the presence of a close positive correlation between the growth rate of the economy and credit market at downward phases.

Another important correlation is evident in the relationship between amplitude of GDP, bank credit and NPL. The scale of credit risk accumulated in the conventional mode is significant. Thus, the presence of significant negative correlation between the growth rate of GDP, bank credit and NPL allows us to talk about low quality of credit expansion and economic growth – a significant reduction in credit and economic results is accompanied by a significant increase in bad debts.

Testing hypotheses about the relationship between the specifics of credit cycles, capital adequacy and credit market concentration in CMB showed no significant correlation.

The second correlation test, designed to identify relationships between variables in the Islamic mode of banking revealed the following links. (Table 3)

Table 3: Results of correlation test for countries with Islamic banking (excl. Iran)

| Variable | CR (avrg), % | EGRu (avrg), % | EGRd (avrg), % | Inflation (avrg), % | CGRu (avrg), % | CGRd (avrg), % | NPL (avrg), % | Bank capital level (avrg), % |
|---|---|---|---|---|---|---|---|---|
| CR (avrg), % | 1 | | | | | | | |
| EGRu (avrg), % | 0,149 | 1 | | | | | | |
| EGRd (avrg), % | -0,178 | -0,617 | 1 | | | | | |
| Inflation (avrg), % | 0,176 | 0,173 | -0,108 | 1 | | | | |
| CGRu (avrg), % | 0,366 | 0,889 | -0,374 | 0,109 | 1 | | | |
| CGRd (avrg), % | -0,349 | -0,389 | 0,937 | -0,157 | -0,833 | 1 | | |
| NPL (avrg), % | 0,155 | 0,211 | -0,849 | 0,422 | 0,096 | -0,825 | 1 | |
| Bank capital level (avrg), % | 0,322 | 0,224 | -0,229 | 0,197 | 0,243 | -0,002 | 0,024 | 1 |

**Source**: author's calculations upon data of national and reserve banks of sample countries.

Firstly, unlike the CMB, ratio of average economic growth and average rates of economic downturn are in proportion to a greater extent unlike in CMB (-0,598 against -0,336). This suggests that the rise and decline in Islamic economies are more proportional and balanced. In the traditional model we can see relatively low economic growth with deep decline in the growth rate of GDP, which indicates the presence of imbalances between the economic and financial spheres.

Secondly, the relationship between economic expansion and inflation is a positive but not significant (0,877 against 0,216). The same is true for the relationship between credit market and inflationary pressure. Unlike CMB, Islamic mode doesn't contribute significantly to the formation of bubbles on the markets for goods, services and assets.

Thirdly, results manifest an existence of a balance between economic and credit growth, as well as the balance between credit growth rates on upward and downward phases, which indicates a more steady nature of credit and economic cycles, that also showed graphical analysis.

Fourthly, the test revealed a significant negative correlation between the rate of economic and credit growth during the recession and the growth in the NPL. This shows the existence of a balance between the degree of a minor downturn in the economy and credit market and a small increase in outstanding debt, which indicates a cautious banks' attitude toward risk.

Testing the hypotheses about the impact of market concentration and bank capital level on a willingness to take risks in Islamic mode also failed. Correlation between changes in market concentration and the volume of NPL is of positive, but weak character.

We now turn to the results of correlation analysis of indicators of credit and economic cycles in a free banking mode (Table 4, 5)

Table 5: Results of correlation test for sample countries in free banking era (all sample countries)

| Variable | CR (avrg), % | EGRu (avrg), % | EGRd (avrg), % | Inflation (avrg), % | CGRu (avrg), % | CGRd (avrg), % | NPL (avrg), % | Bank capital level (avrg), % |
|---|---|---|---|---|---|---|---|---|
| CR (avrg), % | 1 | | | | | | | |
| EGRu (avrg), % | 0,161 | 1 | | | | | | |
| EGRd (avrg), % | -0,133 | -0,588 | 1 | | | | | |
| Inflation (avrg), % | 0,154 | 0,464 | -0,223 | 1 | | | | |
| CGRu (avrg), % | 0,359 | 0,769 | -0,387 | 0,379 | 1 | | | |
| CGRd (avrg), % | -0,392 | -0,374 | 0,691 | -0,295 | -0,785 | 1 | | |
| NPL (avrg), % | 0,217 | 0,121 | -0,694 | 0,357 | 0,101 | -0,798 | 1 | |
| Bank capital level (avrg), % | 0,239 | 0,298 | -0,241 | 0,056 | 0,159 | -0,012 | 0,059 | 1 |

As can be seen from Table 5, the patterns of relationship between different variables are present. First, there is a medium strength correlation between the rate of economic growth and recession, which indicates a relative proportionality of economic growth. The same holds true for the credit cycle. However, the relationship between economic growth, credit growth and inflation is rising in comparison with the Islamic model.

Table 6: Results of correlation test for sample countries in free banking era (New England, Scotland)

| Variable | CR (avrg), % | EGRu (avrg), % | EGRd (avrg), % | Inflation (avrg), % | CGRu (avrg), % | CGRd (avrg), % | NPL (avrg), % | Bank capital level (avrg), % |
|---|---|---|---|---|---|---|---|---|
| CR (avrg), % | 1 | | | | | | | |
| EGRu (avrg), % | 0,312 | 1 | | | | | | |
| EGRd (avrg), % | -0,293 | -0,852 | 1 | | | | | |
| Inflation (avrg), % | 0,121 | 0,113 | -0,329 | 1 | | | | |
| CGRu (avrg), % | 0,275 | 0,528 | -0,512 | 0,142 | 1 | | | |
| CGRd (avrg), % | -0,314 | -0,618 | 0,785 | -0,381 | -0,925 | 1 | | |
| NPL (avrg), % | 0,092 | 0,117 | -0,877 | 0,237 | 0,079 | -0,901 | 1 | |
| Bank capital level (avrg), % | 0,232 | 0,251 | -0,189 | 0,108 | 0,117 | -0,141 | 0,014 | 1 |

An important feature of the model of free banking (Scotland, New England) is a low correlation between economic growth and credit growth. The same is true for inflationary pressures. In other words, results confirm our assumption about the unwillingness of lenders to take risks in the conditions of formation of bubbles and expectations of a higher rate of return on markets for goods and services.

In the model of free banking a hypothesis of a strong relationship between market concentration, bank capital level and willingness to take risks (in the form of the relationship with NPL growth) is also not confirmed. As can be seen from Table 1, even a significant level of bank capital does not serve as good protection from limited liability problem if banks obtain explicit or implicit guarantees that negate the effect of high capital level (as in the case of New England and other U.S. States).

## 5 Conclusion

In the result of the conducted research, we have managed to achieve goals set. First, analysing the specifics of credit cycles in conditions of conventional, Islamic and free modes, we have come to conclusion that free and Islamic modes of banking actually have advantages over conventional mode. A key source of longer duration of credit cycles, lower velocity, smaller amplitude and a significantly smaller scale of accumulated credit risk in the Islamic model is the principle of profit and loss sharing (the principle of liability sharing); free banking – a principle of full or unlimited liability. Consequently, the result is a reduced willingness to accept risk, lower volumes of funds lent, but at the same time, the reduction of inflationary pressures on the markets for goods, services and assets, improving the quality of economic growth, reduction of its procyclicity.

Second, the hypothesis about the relationship between the economy and credit market does not receive a clear answer. For example, in the case of Scotland and New England, relationship between growth rates of economy and credit market is of a secondary nature. This is because lenders anticipating the growth of rate of return in the economy are not willing to take risks associated with possible formation of a bubble. In the Islamic mode, possibility of bubbles formation is limited due to the lack of bank multiplication processes on one side and a built-in countercyclical mechanism of protection in the form of income from investment rate changes alongside with the market conjuncture.

Thirdly, the hypothesis about the impact of bank capital level and market concentration on the willingness of creditors to accept risk, does not receive an unequivocal confirmation. Even with a high level of market concentration and high bank capital level, willingness to take risks may be high in case of limitation of lenders' liability. This thesis presents an answer for the fourth task of this study. Indeed, the use of modes of banking, different from the conventional model of limited liability reduces the appetite for risk, thereby curbing credit and economic cycles, which is the main source of violation of financial stability in the modern world.

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