

ASSESSMENT OF BANK FINANCIAL HEALTH IN LATVIA

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Abstract. Financially strong, trustworthy and reliable banks form the basis of every economy and are a vital precondition for the stable economic development of every country. The financial health of banks is important for different stakeholders, including bank clients, correspondent banks, state and others. Therefore, lack of appropriate measures for bank financial health can cause a number of risks for the bank stakeholders. Traditionally the assessment of bank financial health and reliability is done by the international rating agencies as Standard & Poor's, Moody's and Fitch. These ratings are widely recognized worldwide; however, due to different reasons ratings assigned by the international rating agencies historically are not available for the majority of European banks. Besides, after the global financial crisis of 2008 the number of banks with a rating by an international rating agency has substantially decreased. Therefore, the aim of the paper is to design a model allowing to assess bank financial health using publicly available information. The proposed model is based on the analysis of financial statements data of Latvian commercial banks in the period from 2003 till 2017, key macroeconomic indicators, and aggregate statistical data of Latvian commercial banks managed by the Financial and Capital Market Commission (FCMC). The methodology is based on the design of multiple choice model *ordered logit* using eViews 7.0. The paper determines the main factors affecting the bank financial health based on the *Moody's Investors Service Long Term Bank Deposit Ratings*. According to the developed model, the main factors involve bank assets structure, level of credit risk, profitability, bank capitalization, stability of resource base as well as macroeconomic factors, including investment and unemployment.

Keywords: *bank, financial health, financial strength, rating*

JEL classification codes: G21, G24

Introduction

Banking crises have been at the heart of both the causes and long-lasting consequences of the global financial crisis and the European debt crisis. However, these are only the most visible examples, Laeven and Valencia (2013) identified 147 banking crises over the period from 1970 to 2011. There is abundant evidence that bank distress and the resulting decline in credit provision has adverse consequences on growth (see e.g. Carlson and Rose, 2015 and Frydman et.al. (2015) for evidence from the early XX century or Iyer et al. (2015) for a recent analysis of the relationship between interbank lending and firm financing). Furthermore, Beck (2009) argues that there is strong evidence for a positive relationship between financial development and economic growth, while Creel et. al. (2015) show that financial instability (variously defined) has an adverse effect on economic growth.

Loan is the key link between banks and the broader economy. Song and Uzmanoglu (2016) provide evidence that bank financial health is relevant in liquidity provision during crises and argue that healthy banks are better positioned to provide liquidity relief to low-quality borrowers than unhealthy banks during a financial crisis. Similarly, Diamond (2001) points out that healthy banks may help providing liquidity to vulnerable firms during credit crises while unhealthy banks may inefficiently stop lending to viable borrowers. The soundness of banks also explains why bank recapitalization, which often involves significant fiscal costs, may have limited effects on the real economy. For example, Hoshi and Kashyap (2010) show that capital infusions are more effective in supporting healthy banks because unhealthy banks will tend to allocate the new capital primarily toward resuscitation efforts, instead of providing liquidity to the economy.

Therefore, banks matter; matter not only when they fail, but also when they function normally or when their financial health is impaired. Because of the importance of banks to a well-functioning economy, the banking industry is regulated all over the world. Barth et. al. (2013) document bank regulatory and supervisory policies in 180 countries and show that restrictions on bank activities have tightened in the aftermath of the financial crisis in eighty percent of the countries considered.

Diamond et. al. (2017) point to four major changes in the regulatory environment in the aftermath of the crisis. First, capital requirements were raised for all banks, especially for those with a large, global presence. Second, liquidity regulations were imposed requiring banks with less liquid assets to use more long-term funding. Third, new regulators have been created with the responsibility to look at the entire financial system with a variety of “macroprudential” tools at their disposal. Fourth, banking regulators have begun stress-testing of large banks, that is simulating the performance of their asset portfolio under a variety of macroeconomic environments. In the European Union the response to the crisis involved creating the cornerstone elements of the banking union – a single supervisory mechanism (SSM) and a single resolution mechanism (SRM). Latvian banking industry is now also part of these arrangements that aim to standardize bank supervision and treatment of failing banks across the EU.

How can one know whether these efforts have been successful? Or, to put this question in more practical terms – there are ca. 20 banks and foreign banks subsidiaries operating in Latvia, so how can a potential client understand which bank is trustworthy and which bank has questionable characteristics? Supervisory institutions such as Financial and Capital Market Commission (FCMC) and European Central Bank are responsible for ensuring that each bank is fundamentally sound, but nevertheless periodically some banks fail for different reasons, for instance Parex bank, Krajbanka, Trasta bank and ABLV. Supervisory authorities have developed their own rating systems for banks, but these methodologies are generally not available to the public. In this paper, the authors aim to develop their own financial health rating system for banks that will be publicly available and can help potential bank clients to make decision regarding bank choice. Therefore, the paper aims to design a model allowing to assess bank financial health using publicly available information. The research is based on the analysis of data in the period from 2003 till 2017.

The remainder of the paper is structured as follows. Section 1 reviews the literature on assessing bank financial health. Section 2 documents the methodology of rating system design for bank financial health proposed by the authors. Finally, Section 3 points out the main results, including the rating model, scale and assessment of Latvian banks in the period of 2013 till 2017. Conclusions and recommendations are provided in the Section 4.

1. Literature review

In this paper, bank financial health represents one of the dimensions of bank stability. Financial health is seen as the bank’s ability to repay punctually its foreign and/or domestic currency deposit obligations.

The literature contains various ways to measure bank financial health relying on different statistical techniques and different variables. Most of the variables aim to proxy the dimensions of the CAMELS system introduced by the US

regulators in 1979, which focused on: Capital adequacy, Asset quality, Management quality, Earnings, Liquidity, and, since 1996, Sensitivity to market risk (Betz et al. 2014). Betz et. al. (2008) develop an early warning model for predicting distress in European banks that uses variables to proxy for each dimension of the CAMELS system: capital and tier 1 capital ratio, return on assets, cost to income ratio, return on equity and net interest margin, share of interest expenses to total liabilities, share of trading income in total income.

Another widely used proxy for bank financial health and stability in the economic literature is Z-score (Song, W., & Uzmanoglu, C. 2016). In fact, Chiaramonte et. al. (2015) argue that Z-score's ability to identify distress events in the European banking industry, is at least as good as the CAMELS variables, but with the advantage of being less data demanding.

It is also important to note the role of the broader economic environment in impacting bank financial health. The stability of the overall banking system is a large-scale counterpart to individual bank health. Macroeconomic determinants are considered to be relevant to the stability of the banking system, which means they are also relevant to health of individual banks. Many empirical studies consider macroeconomic and bank specific factors as a precursor for bank health. Claire (2004), for instance, explores the macroeconomic determinants of bank stability for the local banks of Singapore. Multiple regression analysis suggests that unemployment rate, exchange rate, aggregate demand and interest rate have a significant impact on bank stability. The same results are supported by Shijaku (2016) for Albanian banking system. Principal component approach and simple average are applied to analyse the impact of bank specific, market specific and macroeconomic indicators on the stability of 16 banks of Albania for a period of 2008–2015. Results suggest that bank specific and macroeconomic factors are found to effect bank stability in a more consistent manner as compared to market specific factors. Likewise, Madi (2016) examines the relationship of a set of micro-economic and macro-economic variables with bank stability. Recent analysis of bank stability in Latvia applying Z-Score found evidence that credit risk, liquidity risk, size, profitability, efficiency are the main bank-specific determinants of stability of banks in Latvia (Rupeika-Apoga & Zaidi, 2018; Kudinska et al., 2018). The results also highlighted the significant role of inflation and GDP growth (macroeconomic variables) in explaining bank's stability.

In general, the most accurate measurement of bank financial health can be achieved via a detailed examination of its books in an "on-site" inspection. Such inspections are a crucial part of the toolkit of any supervisory authority including the ECB in the European Union (Gren et. al., 2015). However, such inspections are costly and time consuming and cannot be repeated often enough for all banks. To supplement such inspections as well as to prioritize banks that need a more detailed analysis, supervisory authorities use off-site rating systems. Such systems can also be used by the general public including banks' clients, investors and counterparties, who are not able to inspect the bank in detail. This paper seeks to develop a ratings system and views bank financial health as a continuous concept with various ratings assigned.

The financial health of a bank is represented by rating agencies (Thalassinos & Liapis, 2011) in several financial strength levels. The most popular are Moody's, S&P's and Fitch. According to the rating agencies definitions the following levels represents the bank's financial health:

A. Banks with superior intrinsic financial strength. Typically, they will be institutions with highly valuable and defensible business franchises, strong financial fundamentals, and a very attractive and stable operating environment.

B. Banks with strong intrinsic financial strength. Typically, they will be important institutions with valuable and defensible business franchises, good financial fundamentals, and an attractive and stable operating environment.

C. Banks with adequate intrinsic financial strength. Typically, they will be institutions with more limited but still valuable business franchises. These banks will demonstrate either acceptable financial fundamentals within a stable operating environment or better than average financial fundamentals with an unstable operating environment.

D. Banks that possess modest intrinsic financial strength, potentially requiring some outside support at times. Such institutions may be limited by one or more of the following factors: a vulnerable or developing business franchise, weak financial fundamentals, or an unstable operating environment.

E. Banks with very modest/weak intrinsic financial strength, requiring periodic outside support or suggesting an eventual need for outside assistance. Such institutions may be limited by one or more of the following factors: a business franchise of questionable value, financial fundamentals that are seriously deficient in one or more respects or a highly unstable operating environment (Moody's, 2018; Fitch, 2018).

Levels below D represent junk situations or non-investments or speculative areas.

The future role of these rating agencies seems to be further expanded with and after implementation of Basle III, but nowadays there is, especially from the side of Europe, a critical position against these agencies for non-transparency in methodologies that they use and for not consistent ratings the agencies awarded before and after the financial crisis. Besides, nowadays only some banks in Latvia have a rating awarded by an international rating agency as after the global financial crisis of 2008 the number of banks with a rating has substantially decreased.

For several years now, based on the results of the analysis of bank performance and the results of performed inspections of the FCMC, the FCMC has been assessing the risks of banks by rating each bank according to its risk size and risk management quality. In 2016, the key risks identified for banking activities comprised credit risk, liquidity risk, reputation risk, strategy risk, and business risk. Particular attention was paid to the operational strategies, business models, and the earning capacity of banks. As a result of the rating assignment process, each supervised institution is assigned, for supervisory purposes, a rating from 1.0 to 4.0, where 1.0 is the highest, whereas 4.0 is the lowest rating. FCMC ratings results and methodology are not available to public, only general results that can be seen in the Table 1.

Table 1

FMCS's rating system in 2016

Rating scale	1–2	2.1–3	3.1–4
Number of banks:	3	12	1

Source: FCMC, 2016

The financial health of banks is important for different stakeholders, including bank clients, correspondent banks, state and others. The paper aims to assess bank financial health using publicly available information.

2. Methodology of Research

The research is based on the analysis of publicly available bank annual financial statement data published by Latvian commercial banks in the period from 2003 till 2017 as well as the key macroeconomic indicators, and aggregate statistical data of Latvian commercial banks accumulated by the FCMC. Research is limited to the publicly available economic and financial data, therefore non-financial indicators (as bank reputation, internal processes) couldn't be taken into account.

The methodology is based on the design of bank financial health assessment model. The model design comprises four steps: initial selection of indicators, choice of indicators included in the model, figuration of the rating scale, calculation of bank rating for the assessment of bank financial health.

The initial selection of indicators is done based on analysis of special economic literature, research and working papers, FCMC data, statistical information, and results of research made by the authors. As a result of analysis three groups of indicators were selected for the modelling purposes:

1. Indicators suggested by the Moody's Investors Service methodology.

2. Indicators calculated by the Latvian financial market authority (FCMC).
3. Indicators depicting macroeconomic environment (macro indicators).

Choice of Moody's Investors Service rating methodology explicable due to popularity of ratings assigned by the Moody's as the majority of bank ratings in Latvia were/are assigned by the Moody's (see Table 2).

Table 2

Ratings assigned by international rating agencies to Latvian commercial banks, 2008–2017

Bank name	Moody's Investors Service	Standard & Poor's
a/s Trasta komercbanka	2008–2010: B2 2010–2014: B3	
a/s Latvijas Krājbanka	2008–2009: Ba2 2009: B3	
a/s Norvik Banka	2008–2011: Ba3 2011: B2	
a/s Baltic International Bank	2008–2010: B2 2010–2014: B3	
a/s Privatbank	2008–2012: B2 2012–2013: B3	
a/s Citadele	2010–2011: Ba3 2011–2013: B2 2013–2017: Ba2	
a/s Expobank	2015–2017: Ba3, B1	
a/s SEB (rating of the parent bank)	Aa3	
a/s Swedbank (rating of the parent bank)	Aa3	AA-

Source: Moody's, Standard & Poor's

Based on the methodology suggested by the Moody's Investors Service, we initially include in the model six groups of indicators (see Table 3).

Table 3

Selected groups of indicators for the assessment of bank financial health based on Moody's methodology

Groups of indicators	Indicators
bank size	<i>TA</i> – total assets <i>EQ</i> – the size of the paid equity capital
profitability/return	<i>YAEA</i> – yield on average employed assets <i>CAIL</i> – return on employed liabilities <i>NIM</i> – net interest margin <i>REP</i> – return on average assets (before taxes) <i>ROAA</i> – return on average assets <i>ROAE</i> – return on average equity <i>IE_II</i> – proportion between the interest expenses and income <i>DIV</i> – dividends/net profit
effectiveness of bank operations	<i>CIR</i> – cost – income ratio

Groups of indicators	Indicators
	<i>PE_OI</i> – payments to employees /total operational expenses
quality of bank assets	<i>PL_GL</i> – share of non-performing loans in the total loan portfolio <i>LLR_GL</i> – loan portfolio quality ratio <i>PL_EQLLR</i> – non-performing loans to shareholder equity and special provisions
bank capital adequacy	<i>TIR</i> – Tier 1 capital ratio <i>EQ_TA</i> – paid equity to total assets <i>CAR</i> – capital adequacy ratio
bank liquidity	<i>ANL_AD</i> – average net loans to average deposits <i>D_EQ</i> – deposits to equity paid <i>LIQ_B</i> – claims to credit institutions to liabilities to credit institutions

Source: made by the authors based on Moody's

Latvian financial market authority (FCMC) regularly publishes basic indicators characterizing situation in the Latvian banking sector: bank profit before taxes (*PPN_LVL*), bank equity capital to total assets (*K₉*), efficiency of bank financial performance (*Fin_ef*), costs to income (*Izd_Ien*), risk-weighted assets to total assets (*K₁₀*), liquidity ratio (*K₃*), long-term loans issued to non-banks to total loan portfolio (*K₆*), loans issued to non-banks to total assets (*K₄*), loans issued to non-banks to total deposits (*K₅*), demand deposits to total deposits (*K₇*). All these indicators were initially included in the model.

As a proxy of bank external environment we have used four macro indicators: annual growth of GDP, inflation (consumer price index), total investments to GDP and unemployment rate (number of unemployed to total labour force).

Based on the analysis of scientific literature we have chosen to use the multiple choice model *ordered logit* to design the rating model. The model indicators are assessed according to the method of the maximum likelihood with the standard errors in the form of White-Huber (Solovjova, 2011).

Modelling and secondary selection of indicators is done using eViews 7.0. The initially selected three groups of indicators are included in the model as explanatory and the *Long Term Bank Deposit Ratings* assigned by the Moody's to Latvian commercial banks as dependent variable (denoted as *MR*). Therefore, the sample was formed based on the financial data of Latvian commercial banks with a Moody's *Long Term Bank Deposit Rating*. After adjustments the sample included 112 observations.

The assessment of the quality of model parameters and the choice of the best fit model was based on the following set of criteria:

- Log likelihood;
- LR index (Pseudo-R²);
- LR statistic;
- Akaike information criterion;
- Schwarz criterion.

3. Research results and discussion

Based on the assessment of the quality of model parameters, the best fit model was chosen. The model selected to be used for the assessment of bank financial health is shown in Table 4.

Table 4

Bank financial health assessment model

Dependent Variable: MR
Method: ML - Ordered Logit (BHHH)
Date: 12/27/18 Time: 10:49
Sample (adjusted): 2003 2017
Included observations: 112 after adjustments
Number of ordered indicator values: 6
Convergence achieved after 33 iterations
Covariance matrix computed using first derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
K6	-0.041924	0.008559	-4.898009	0.0000
EQ_TA	0.202006	0.043820	4.609916	0.0000
K4	0.125175	0.015444	8.105086	0.0000
PPN_LVL	0.199220	0.057106	3.488613	0.0005
K7	0.033795	0.014303	2.362828	0.0181
UNEMPLP	-0.154482	0.058662	-2.633441	0.0085
INV	0.073666	0.033454	2.202013	0.0277
Limit Points				
LIMIT_5:C(8)	8.131415	1.818424	4.471682	0.0000
LIMIT_6:C(9)	9.403681	1.809763	5.196085	0.0000
LIMIT_7:C(10)	11.39062	2.114747	5.386281	0.0000
LIMIT_8:C(11)	12.28297	2.150320	5.712159	0.0000
LIMIT_9:C(12)	15.77050	2.579157	6.114596	0.0000
Pseudo R-squared	0.368682	Akaike info criterion	2.255907	
Schwarz criterion	2.547175	Log likelihood	-114.3308	
Hannan-Quinn criter.	2.374083	Restr. log likelihood	-181.0987	
LR statistic	133.5358	Avg. log likelihood	-1.020811	
Prob(LR statistic)	0.000000			

Source: made by the authors

Based on the above mentioned model (see Table 4), the following Formula (1) is determined:

$$MR = 0.202006 \times EQ_TA - 0.041924 \times K6 + 0.125175 \times K4 + 0.199220 \times PPN_LV + 0.033795 \times K7 - 0.154482 \times UNEMPLP + 0.073666 \times INV \quad (\text{Formula 1})$$

Based on this bank financial health assessment model we set the bank financial health rating scale according to the limit points (see Table 5).

Table 5

Bank reliability rating model scale

Reliability category	Rating category	Rating group	Rating	Limit points	Rating description
High	Aaa	Aaa	9	≥ 15.77050	- the highest level of bank financial health, - the highest level of bank financial strength, - bank can fully meet it's obligations.
	Aa	Aa1, Aa2, Aa3	8	12.28297 - 15.77050	- very high level of bank financial health, - very high level of bank financial strength, - high quality of bank obligations.
	A	A1, A2, A3	7	11.39062 - 12.28297	- high level of bank financial health, - high level of bank financial strength, - relatively high quality of bank obligations.
Medium	Baa	Baa1, Baa2, Baa3	6	9.403681 - 11.39062	- adequate level of bank financial health, - adequate level of bank financial strength, - medium-grade quality of bank obligations.
	Ba	Ba1, Ba2, Ba3	5	8.131415 - 9.403681	- upper-medium level of bank financial health, - upper-medium level of bank financial strength, - bank obligations are a subject to relatively high credit risk.
	B	B1, B2, B3	4	<8.131415	- medium level of bank financial health, - medium level of bank financial strength, - bank obligations are a subject to high credit risk.
Low	Caa	Caa1, Caa2, Caa3	3	n.a. ¹	- low and very low level of bank financial health, - low and very low level of bank financial strength, - bank obligations are a subject to very high credit risk, - strong exposure to external disturbances.

Source: Made by the authors based on the model results and Moody's rating scale

Based on the designed model and the worked out bank financial health rating scale, we have assessed financial health of Latvian commercial banks (see Table 6).

¹ There are certain limitations in the design of the reliability rating model. Due to the use of the econometric analysis of the reliability ratings assigned by the international rating agency *Moody's Investors Service*, the model designed is not able to determine the marginal value limits for the category of low reliability ratings (Caa) as none of the banks in Latvia is assigned a rating in this category.

Table 6

Bank financial health ratings, 2013-2017

	rating 9	rating 8	rating 7	rating 6	rating 5	rating 4	Total number of ratings
2013	3	2	0	1	4	8	18
2014	2	0	1	2	3	9	17
2015	1	2	1	0	4	8	16
2016	2	1	3	1	5	4	16
2017	2	3	1	2	2	4	14

Source: made by the authors

Based on the analysis made, the selected best model suggests use of seven indicators to assess bank financial health: bank assets structure, level of credit risk, profitability, bank capitalization, stability of resource base, investment, unemployment.

Analyzing the selected indicators, we conclude, that the model has identified five indicators characterizing bank specific risk:

- indicator of bank capital adequacy (EQ_TA)
- indicator of bank profitability (PPN_LVL)
- indicator of bank loan portfolio (K4, K6)
- indicator of bank resource base (K7)

as well as two macroeconomic indicators: investment as percentage of GDP (INV) and norm of unemployment (UNEMPLP) characterizing level of bank.

These indicators allow assessing different aspects of bank performance. The indicator of bank capital adequacy (EQ_TA) is important as an adequate level of capital creates a peculiar “pillow” that provides the bank an ability to remain solvent under changing economic conditions allowing continuing its operations and performing its functions. Nowadays, after the financial crisis and a number of bank rescues, the supervisory authorities pay an elevated attention to the issue of bank capitalization. The indicator of bank profits (PPN_LVL) characterizes the level of bank efficiency, as a decrease in profits may indicate inefficient operations of commercial bank management and problems in risk management and control; on the other hand, it may indicate overcapitalization of the bank.

Bank loan portfolio is the basis of bank operations. The indicator K₄ characterizes the degree of aggressiveness of bank's lending policy, overloaded or insufficient loan portfolio. Traditionally, lending is the main operation of commercial banks being a source of high income in times of economic growth and a reason of relatively high losses during the economic downturn. Therefore, it's important to balance bank assets, avoiding high concentration risk that can be seen as a great challenge for bank management. Besides, the indicator K₆ characterizes the share of long-term loans in the bank loan portfolio. The maturity structure of the loan portfolio is another source of risk asking for careful management.

The indicator of bank resource base (K₇) is also very important for the assessment of bank financial health as it characterizes the level of stability of bank resource base. Demand deposits are undoubtedly a resource base for a commercial bank, raising the necessity of its management to provide stable resource base for banking operations as on one hand, demand deposits are the least expensive bank resources available to commercial banks. On the other hand, demand deposits are the most unpredictable source of bank resources bringing potential liquidity risk.

Unemployment (UNEMPLP, the percentage of job searchers among the employable population, 15–74 of age) is an important macroeconomic indicator that directly affects the financial health of the bank. Especially during the periods of

economic instability unemployment increases affecting the dynamics of such indicators as bank deposits, loans, overdue debt, increasing risks. Bank loan portfolio, its quality and profitability are especially exposed to the impact of unemployment. Moreover, investment (INV) plays a crucial role in maintaining and building up the economic potential of a country. In turn, this favourably affects the businesses, leads to an increase in GDP as well as improves the position and competitiveness of the country in the external market. Accordingly, an increase in investment in the economy is a kind of catalyst for the development of the country's economy as a whole and a guarantee that banking products and services will be demanded on the market. Thus, the volume of investments has a positive effect on the bank profitability, which is, according to the results of the study, an important component of a financially healthy bank. Besides, evaluation of macroeconomic indicators improves the efficiency of management decisions and, accordingly, strengthens the financial health of both the bank and the banking system as a whole.

4. Conclusions, proposals, recommendations

This paper aimed to develop a rating system to assess bank financial health in Latvia. Based on the analysis made, we have selected seven indicators that can be used for the assessment of bank financial health: bank assets structure, level of credit risk, profitability, bank capitalization, stability of resource base, investment, unemployment. Analyzing the selected indicators, we conclude, that the results are feasible as the selected indicators are important to assess different aspects of bank operations and management: it provides assessment of bank capital adequacy that is a precondition of bank existence, assessment of bank loan portfolio that is the main source of income for the majority of banks as well assessment of bank resource base allowing to avoid liquidity problems.

As a result of the rating determination process, each bank was assigned a rating from 4 to 9, where 9 is the highest rating, whereas 4 is the lowest rating. Ratings from 7 to 9 respond from high to highest level of bank financial health and during last five years were assigned to five banks in average. Ratings from 6 to 5 respond from medium to upper-medium level of bank financial health and during last five years were assigned to five banks in average too. The last rating level (4), is the lowest rating assigned according to our model and represents the medium level of bank financial health. This is the largest category by number of banks with an obvious tendency to decrease in 2016 that can be explained by banks active work on improving their main indicators.

The model developed by the authors can be used by potential and existing bank clients and outside observers to analyze Latvian banks in case other ratings are not available or to complement them. Besides, the model can be used by Latvian commercial banks as a control mechanism to ensure adequate financial health. Further research can be extended to other Baltic countries, and emerging European markets, which have received comparatively little attention in the literature.

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