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Bank Market Power and Monetary Policy Transmission: Evidence from Loan-Level Data*

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Abstract

This paper asks the following questions. How does market structure reshape the transmission of monetary policy to bank lending? How are loan characteristics such as loan volume, maturity, lending rate, risk, and the extensive margin of lending affected? Is there a trade-off between financial stability and the strength of monetary transmission? We find that, on more concentrated markets, the effect of monetary policy on lending rate and risk taking is amplified whereas the effect on loan volume is muted. Our current findings may imply the existence of a trade-off between the strength of monetary policy transmission and financial stability, but are subject to further investigation.

Keywords: Monetary policy transmission; Market concentration

JEL Codes: E44, E52, G21, C14

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1 Introduction

This paper addresses three research questions: (i) How does monetary policy transmit to bank lending depending on the bank market structure? (ii) How are various characteristics of loans such as volume, maturity, lending rate, and riskiness affected? (iii) Is there a trade-off between the strength of monetary policy transmission and financial stability? All these questions are important for the conduct of monetary policy and macroprudential policy.

The paper is related to the emerging literature that studies the interlink between bank market power and transmission of monetary policy, which is briefly surveyed in Section 2. We contribute to this literature by exploiting cross-region differences in concentration, which is a remarkable feature of the market for bank lending in Russia.

In this study we employ confidential loan-level data from the credit register at the monthly frequency. It contains the information on all loans that were granted to corporate borrowers in the period between 2017 and 2022. The design of our study is inspired by Khwaja and Mian (2008) and Morais et al. (2019), both also using credit register data for Pakistan and Mexico, respectively. Morais et al. (2019) focus on the transmission of monetary policy from the U.S. and the euro zone to domestic lending by Mexican subsidiaries of foreign banks but it does not address the role of bank market power for this transmission. As Khwaja and Mian (2008) showed in their study, the substantial benefit that provide loan-level data is the power of identification: time-varying demand shocks at the firm level and time-varying shocks at the bank level can be controlled for in a simple way – by saturating loan-level panel data regressions with double time$\times$firm and time$\times$bank fixed effects, which cannot be done with bank-level data.

As outcome variables in regressions we use the volume of a loan, duration, interest rate, and also a few proxies for *ex ante* (credit spread, loan loss provision, and loan quality score) and *ex post* risk taking (the probability of default over 12 months following loan origination). Our regressor of interest is the double interaction of the Bank of Russia policy rate and the region-specific Herfindahl – Hirschman Index (HHI) as a proxy for bank market power in lending at the region level. As mentioned above, we saturate our regressions with single and double fixed effects in order to control as best as we can unobserved time-varying common factors, invariant firm- and bank-level factors, and also time-varying firm- and bank-level factors.

We test a number of hypotheses of interest. A cut in the policy rate stimulates bank lending both along intensive (the loan volume) and extensive margins (the probability of granting a loan to a new customer). It also incentivizes banks to grant riskier loans with longer maturity. These patterns are often referred to as *chasing for yield* and are presumably less pronounced in the environment with high market concentration. As theory suggests, the pass-through of policy rate into lending rate is predicted to be weaker in regional markets with high concentration. Contrary to these theoretical predictions and conventional wisdom, we find the opposite: on more concentrated markets, the response of lending rate is amplified whereas the effect on loan volume is muted. We plan to explore reasons for this in our future research. As regards a trade-off between the strength of monetary policy transmission and financial stability, our results can be viewed as preliminary and ambiguous. If such a trade-off exists, we believe, this is an important policy message, but further investigation here is warranted again.

The rest of the paper is structured as follows. Section 2 surveys related literature. Section 3 lays out methodology. Section 4 describes data. Section 5 presents findings. Section 5 concludes.

2 Related literature

Our paper is by no means the first study of the relationship between market concentration and the strength of monetary policy transmission. Drechsler et al. (2017) analyze the market power mechanism in deposit markets both theoretically and empirically. They show that in response to tightening of monetary policy banks having the market power over their local deposit markets and setting the deposit rate raise the households' opportunity cost of holding cash or so the called deposit spread (the difference between the Fed fund rate and the deposit rate) and households substitute deposits for bonds. In more concentrated deposit markets banks increase deposit spreads by more and show greater decline in deposits. Drechsler et al. (2017) coin such a mechanism as the deposits channel of monetary policy transmission and demonstrate its large aggregate effect.

The validity of the deposit channel is checked empirically with the use of the US bank-level data and geographic variation in the local deposit markets (counties) controlling for the bank-specific lending opportunities. Drechsler et al. (2017) compare deposit market variables (spreads and volume changes) of the same bank located in regions with different deposit market concentrations. The authors also examine the effect of the deposit channel on lending. They find that when the Fed fund rate rises lending decreases in counties where loans are mostly provided by the banks that raise deposits in high-concentrated markets. The paper proposes a measure of banks' market power (deposit spread beta) – the sensitivity of banks' deposit spreads to changes in the Fed fund rate. The average deposit spread of the US banks is estimated at 0,54.

Bellifemine et al. (2022) introduce the banking market power channel of the transmission of monetary policy in their Heterogeneous Bank New Keynesian (HBANK) model where banks have market power on both credits and deposits. In response to a monetary policy contraction, banks decrease their mark-ups on loans and increase their mark-ups on deposits. In addition, the model features heterogeneity of banking market power: both credit and deposit mark-ups are increasing in size and profitability. The paper provides micro-level evidence of these stylized facts with the use of the US bank-level data.

Afanasyeva and Güntner (2020) show theoretically that a monopolistic bank prefers a higher leverage ratio of the borrower after a monetary expansion. Brissimis et al. (2014) find that banks with even moderate levels of market power are able to buffer the negative impact of a monetary policy change on bank loans and credit risk. Scharfstein and Sunderam (2016) document that high concentration in mortgage lending reduces the sensitivity of mortgage rates and refinancing activity to mortgage-backed security rates. Using a structural model of the banking sector, Wang et al. (2022) estimate that bank market power explains much of the transmission of monetary policy to borrowers, with an effect comparable to that of bank capital regulation. Using a theoretical model of banking sector, Martinez-Miera and Repullo (2020) show that lower safe rates lead to lower intermediation margins and higher risk-taking when intermediaries have low market power, but the result reverses for high market power.

3 Methodology

For this study, we employ granular data at the loan level (see Section 4 for details), and this allows us obtain more persuasive identification of the effects of interest. Our econometric framework follows Khwaja and Mian (2008) and is close to Morais et al. (2019). The main idea is to use dyadic fixed effects – firm×time and bank×time – as controls for demand and supply of credit at the firm and bank level, respectively. Our regression specification is:

$$\begin{aligned} Y_{bft} &= \beta_0 + \beta_1 \, HHI_{r,t-h-1} + \beta_2 \, HHI_{r,t-h-1} \times KeyRate_{t-h} \\ &\quad + \alpha_{bt} + \zeta_{it} + \gamma_t + \delta_f + \mu_b + \epsilon_{bft} \end{aligned} \tag{1}$$

where index b refers to a bank, f to a firm borrowing from this bank, t to time. An observation (b, f, t) is a loan granted by bank b to firm f in period t. Y_{bft} is a loan characteristic such as volume, rate, maturity, risk, or extensive margin. HHI_{rt} is the Herfindahl – Hirschman index at the region ("oblast", "kray", or "republic") level. $KeyRate_t$ is the Bank of Russia's policy rate. α_{bt}'s are bank×time fixed effects. ζ_{it}'s are industry×time fixed effects. Regretfully, we cannot use firm×time fixed effects because of perfect multicollinearity with the regressor of interest $HHI_{r,t-h-1}KeyRate_{t-h}$, and this is why we employ industry×time fixed effects ζ_{it} to control for demand for loans. Bank×time fixed effects α_{bt} account for all factors that are specific to bank b and change over time thus controlling for supply of credit by bank b. Industry×time fixed effects ζ_{it} account for all industry-specific factors that change over time. This is a way to control for demand for credit at the industry level on average. Time fixed effects γ_t capture all factors that change over time and has a uniform effect across all loans. Bank and firm fixed effects, μ_b and δ_f, control for all time-invariant factors that are specific to bank b and firm$f$, respectively. The term ϵ_{bft} is regression error.

As is standard in the literature, we allow the effect of monetary policy on lending to be dynamic. For each outcome variable Y, we therefore estimate a set of regressions each corresponding to the response of that variable to $KeyRate$ at a certain horizon $h = 0, 1, \ldots, 6$. In the language of time series econometrics, we thus estimate impulse the response function of Y with respect to $KeyRate$ in a panel data setting by the method of Local Projections (Jordà (2005)).

Strictly speaking, specification (1) does not allow us to estimate the absolute level of the impulse response of Y_{bft} to $KeyRate_{t-h}$ since the regression has time fixed effects γ_t on the right hand side. Our regressor of interest is the interaction between policy rate and the concentration index, $HHI_{r,t-h-1} \times KeyRate_{t-h}$. Let us denote the concentration-invariant component of the policy rate effect as $\nu \, KeyRate_t$. The marginal effect of a unit change in the $KeyRate_{t-h}$ on outcome variable Y_{bft} equals $\nu + \beta_2 HHI_{r,t-h-1}$. The term $\nu \, KeyRate_{t-h}$ enters the right-hand side of (1) implicitly: it is absorbed by the time fixed effects γ_t. The correct interpretation of the coefficient on the interaction term $HHI_{r,t-h-1} \times KeyRate_{t-h}$ is the incremental change in the response of Y_{bft} to $KeyRate_{t-h}$ as $HHI_{r,t-h-1}$ increases by one unit. Economic theory predicts that monetary tightening leads to a decline in the intensive (loan volume) and extensive (new borrowers) margins of lending ($\nu < 0$), an increase in lending rates ($\nu > 0$), and lower propensity to risk taking by banks ($\nu < 0$). A positive value of β_2 implies that, on more concentrated markets, the negative effect of monetary policy tightening is muted in the case of loan volume, extensive margin, and the propensity to take risks and its positive effect is amplified in the case of lending rates. Although specification (1) does *not* allow us to estimate the *overall* marginal effect of monetary policy on loan outcomes, it does allow us to estimate the *difference* in the marginal effect of monetary policy across regions with different degree of market concentration.

Regression (1) is estimated by OLS with standard errors of coefficients clustered at the bank-firm level.

Assuming that monetary policy tightening results in a decline in loan volume, the extensive margin, and propensity to risk taking ($\nu < 0$), and an increase in lending rates ($\nu > 0$), we test the following *hypotheses of interest*:

1. If Y is loan volume, then $\beta_2 > 0$: on more concentrated markets, the stimulating effect of looser monetary policy on the amount of individual loan is muted.

2. If Y is lending rate, then $\beta_2 < 0$: on more concentrated markets, the pass-through of the key rate to lending rates is muted.

3. If Y is risk, then $\beta_2 > 0$: on more concentrated markets, the stimulating effect of looser monetary policy on risk taking is muted.

4. If Y is new lender dummy, then $\beta_2 > 0$: on more concentrated markets, the stimulating effect of looser monetary policy on the extensive margin of lending is muted.

5. Lower sensitivity of lending rate and risk to changes in the key rate on more concentrated markets would suggest the existence of a trade-off between the strength of MP transmission and financial stability.

4 Data

The core of our dataset is confidential monthly data of the Bank of Russia's credit register (Form 303) that contains information on all loans granted by Russian banks to corporate borrowers from 2017 to 2021. An observation in our dataset corresponds to a newly issued loan. We exclude loans marked as government guaranteed ones in the credit register and do not employ data on servicing an existing loan. The Bank of Russia's key rate is taken from the Bank of Russia.

Tables 1 and 2 contain the definition of variables and their descriptive statistics, respectively.

[TABLES 1 AND 2 ABOUT HERE]

Figure 1 shows the dynamics of mean and median values of 12-month moving average HHIs in the interquartile range in the cross-section of regions on a given date. HHI is calculated using monthly bank branch-level data as the sum of squared shares of new issued loans to firms in region r by bank b in the total volume of new issued loans in region r, as shown in formula (2) below. The index can take values from 0 to 1 (or from 0 to 10000, if shares are calculated as percentages). A low value of HHI corresponds to a highly competitive environment. By contrast, a value close or equal to 1 indicates a highly concentrated market.

$$HHI_r = \sum_{b=1}^{B} s_b^2 = \sum_{b=1}^{B} \left(\frac{l_{b,r}}{L_r} \right)^2 \tag{2}$$

where $b = 1, \ldots, B$ is the bank's index, r is the region's index, $l_{b,r}$ – the sum of new issued loans to firms by bank b in region r, L_r – the sum of all new corporate loans in region r. On Figure 1, one can observe a high degree of variability of HHI both in terms of the mean tendency and in the cross-section of regions. At the same time the entire cross-region distribution of HHI exhibits a general upward trend through the decade from 2012 to 2021. In the period of 2012–2014 the median Russian region with the HHI below 1500 represents an low concentrated market of corporate loans, according to the conventional interpretation. However, since the year of 2015 the median regional HHI has exceeded the value of 1500, but stayed below 2500, indicating the moderate concentration in the regional corporate loan markets. Over the last three years of our sample, 2019–2021, the average degree of regional market concentration does not change significantly.

Figures 2 and 3 display the heatmaps for the HHI distribution across the Russian regions at the beginning of 2019 and 2021. For instance, the numbers of the Russian regions which can be characterized as low concentrated and moderate concentrated markets of corporate loans equal to 19 and 53 in end-2018 and to 17 and 60 in end-2020 respectively.

[FIGURES 1–3 ABOUT HERE]

The dynamics of 12-month moving average of HHI for all regions in our sample, grouped by the federal districts, are shown in Figures 4–11. As expected, among the most concentrated regional markets for corporate loans, with the HHI exceeding even 4,000 over the sample period, are remote and low populated regions and some regions of the southern part of Russia. Those regions are Nenets Autonomous Okrug (Northwesten Federal District), Republic of Kalmykia (Southern Federal District), Republic of Ingushetia, Dagestan (North Caucasian Federal District), Yamalo-Nenets Autonomous Okrug (Ural Federal District), Republic of Tuva (Siberian Federal District), and Chukotka Autonomous Okrug (Far East Federal District).

However, even in the Central Federal District there are regions with HHI indicating fairly high concentration of their local corporate loan markets. For instance, the HHI of Moscow and Tula Oblast has exceeded 2,500 since mid-2019. At the same time, the corporate loan markets of Moscow Oblast and Kaluga Oblast can be described as low concentrated. The same is true for Saint Petersburg, but not for Leningrad Oblast (Northwestern Federal District).

[FIGURES 4–11 ABOUT HERE]

For the purposes of our analysis, it might be important to trace the connection, if any, between measures of regional market concentration and measures of regional credit risks, as banks can persistently perceive lending to firms from some regions as riskier than to firms from other regions. At the current stage of our study, we can only acknowledge that among fairly highly concentrated regional markets for corporate loans are probably regions both with high and low credit risks. In other words, an increase of HHI in the case of low credit risk regions may improve the quality of the corporate loan portfolios for banks operating in those regions, while the higher HHI in the case of high credit risk regions may lead to some deterioration of banks' assets. Banks with market power may incorporate this additional dimension into account in their decisions on lending rates, lending volumes and risk-taking in responses to changes in the policy rate.

Figure 12 shows the time path of the Bank of Russia's key rate. One can see that the key rate varies considerably over the sample period, which is favorable for the identification of the effect of interest.

[FIGURE 12 ABOUT HERE]

Figure 13 shows the distribution of loans by quality. The quality is measured by a score that a bank that issued a given loan assigns to this loan. The score of 1 corresponds to the highest quality, the score of 5 to the poorest quality. One can see that the majority of loans have the score of 2 or 3.

[FIGURE 13 ABOUT HERE]

5 Findings

5.1 Lending rates

As shown in Table 3, the estimated effect of market concentration on the average lending rate is surprisingly negative: in more concentrated regions, the average lending rate tends to be lower. Furthermore, the key passthrough in more concentrated regions, is more pronounced: if one considers two regions with HHI differing by 4 standard deviations, which is about 0.4, the effect of the policy rate increase by 1 percentage point on lending rate is stronger in the region with higher HHI by $0.4 \times 0.9 = 0.36$ percentage points, which is economically significant. This funding is at adds with the conventional wisdom that banks with more market power respond less to changes in the policy rate. The size of the effect materializes starting from the one-month horizon and persists at longer horizons up to six months.

[TABLES 3 AND 4 ABOUT HERE]

Regressions shown in Table 4 contain loan quality dummies as additional controls. The estimated coefficients on the regressors of interest, the HHI and the HHI interacted with the key rate, are similar to those shown in Table 3. As anticipated, the loan quality dummies are highly statistically significant. It is quite natural that the credit risk premium as measured by the coefficient on a respective quality dummy increases from risk category 2 to 3 but it declines from 3 to 4, which is counter-intuitive. One could speculate that the reason is that there are not so many observations with quality score of 4 in our sample and/or these loans are special in some sense. Figure 13 shows the distribution of loans by quality in the sample.

[FIGURE 13 ABOUT HERE]

5.2 Loan maturity

Table 5 reports estimation results for loan maturity. There is no statistically significant effects of the two variables of interest. The only exception is the effect of concentration on loan maturity, which is marginally significant and positive.

[TABLE 5 ABOUT HERE]

5.3 Loan volume

Table 6 presents estimation results for loan volume. In regions with more concentrated loan markets, loan volume tends to be smaller on average: estimated coefficients on the HHI are negative and statistically significant. This suggests that banks with more market power prefer to issue loans of smaller size.

The estimated coefficients on the interaction of the HHI and policy rate are positive at horizons up to six months are all positive and statistically significant. Their positive sign implies that, in more concentrated markets, banks decrease loan volume less actively in response to a rise in policy rate. Alternatively, the expansion of lending by banks with more market power is less pronounced when monetary policy is easing.

[TABLE 6 ABOUT HERE]

5.4 Extensive margin

Regressions in Table 7 estimate the effect of monetary policy on the extensive margin of lending depending on market concentration. The binary dependent variable equals one if bank b did not lend to firm f before time t since early 2017 (when the credit register starts) and zero otherwise. All estimated coefficients on the two concentration regressors are not statistically significant, the only exception being the contemporaneous effect of the HHI interacted with policy rate. The positive sign of this coefficient means that the effect of changes in the policy rate on the probability to attract new borrowers is muted on more concentrated markets: when the policy rate declines, the probability to attract new borrowers is lower for banks with more market power. But the estimated effect is only marginally significant and is not persistent.

[TABLE 7 ABOUT HERE]

5.5 Risk taking

We proxy the degree of risk in four ways. Our first dependent variable is the amount of loan loss provisions (LLP) allocated by lender for each individual loan. A higher amount signals that either the respective loan is viewed by lender as riskier or that this lender pursues more prudent policies in terms of LLP compared with its peers. Our second dependent variable is a score that a bank issuing a given loan assigns to this loan (loan quality dummies, see above). Our third dependent variable is another proxy for *ex ante* risk. We calculated it as a spread between the loan rate offered to a borrower of interest and the average rate offered by this bank to its all other borrowers on the same date. A higher value of spread indicates that a lender classifies the respective borrower as relatively riskier compared with the rest of its borrowers. Finally, we construct a dummy variable that equals one if a borrower defaults on its loan within twelve months after loan origination and zero otherwise. We interpret this dummy as *ex post* measure of risk.

Table 8 shows estimations results for LLP regressions. The effect of the two concentration variables is statistically significant and persistent. The effect of HHI on LLP is positive. There are two possible interpretations. First, on more concentrated markets banks tend to serve riskier borrowers. Second, banks with more market power have greater capital buffers, and therefore they can afford allocating more capital for LLP. The effect is economically significant. If one considers two banks in two different regions such that the difference in the HHI is four standard deviations, then the average difference in LLP is roughly $1.7 \times 0.8 = 1.4$ percentage points.

The effect of policy rate interacted with HHI on LLP is negative. On the one hand, if we interpret higher LLP as an indication of riskier behavior of lenders, this implies that, on more concentrated markets, lenders reduce (raise) LLP more aggressively when monetary policy tightens (loosens), which means a more pronounced effect of monetary policy on risk taking. This is consistent with the view that the risk taking channel is more pronounced on more concentrated markets. This result, however, contradicts the conventional wisdom that banks with more market power have a greater franchise value and therefore less incentive for the search for yield when monetary policy is loose.

On the other hand, if we consider higher LLP as an indication of more prudent or conservative behavior of lenders (less risk taking), then the negative sign of the coefficients on the interaction of HHI with policy rate implies that, on more concentrated markets, the effect of monetary policy on risk taking is muted. Lenders reduce (raise) LLP less aggressively when monetary policy loosens (tightens).

[TABLE 8 ABOUT HERE]

As shown in Table 9, regressions for loan quality score on a discrete scale for 1 (best) to 5 (worst) reconfirm the results for LLP discussed above, implying more risk taking by banks on more concentrated markets in response to decline in the policy rate. The coefficient on the interaction of policy rate and concentration is negative and statistically significant at horizons of up to two months.

[TABLE 9 ABOUT HERE]

Tables 10 and 11 report the results for credit spread and *ex post* risk proxies, respectively. No statistically significant effects are found.

[TABLES 10 AND 11 ABOUT HERE]

6 Conclusion

Our findings can be summarized as follows. With respect to changes in the key rate, on more concentrated markets, (i) loan volume is less sensitive; (ii) lending rate is more sensitive; and (iii) risk taking as proxied by LLP at the loan level and the ex-ante loan quality score is more pronounced. We do not find any effect of market concentration on the response of loan maturity, the extensive margin of lending, credit spread, and *ex post* measures of risk. An alternative interpretation of (iii) regarding LLP though is that banks with more market power adopted more prudent or conservative practices on loan loss provisions, either deliberately or according to the regulations for systemically important financial institutions (SIFIs) introduced by the Bank of Russia.

Our findings pose are not in line with other studies that commonly find that, on more concentrated markets, the passthrough of policy rate into lending rates is muted, on the on hand, and incentives for risk taking during monetary easing are weaker, on the other hand, than on more competitive markets. Most of those studies deal with bank-level data. The two important features of our empirical approach that distinguish our work are: (i) we employ loan-level rather than bank-level data; and (ii) we exploit the variation in market concentration across Russia's regions.

In terms of policy implications, our results may uncover a challenge for the conduct of monetary policy and its coordination with macroprudential policy. On more concentrated markets, loan rates are found to be more responsive to the key rate, and so is risk taking as measured by the LLP at the loan level and the loan quiality score. One interpretation of these findings is that, on more concentrated markets, monetary policy better transmits through bank corporate lending although at the expense of the risk of financial instability. Once again, this conclusion is subject to the view of the source of variation in LLP depending on market power as mentioned above.

There are a few natural extensions of our study that might be worth undertaking: (i) the estimation of cross-region average effects of monetary policy on volume, maturity, lending rate, risk taking, and the extensive margin of lending; (ii) the use of an alternative (to HHI) metric for bank market power, e.g., the elasticity of bank credit spread to changes in the key rate (Drechsler et al. (2017)); (iii) the use of Taylor rule residuals in place of the key rate as a proxy for monetary policy shocks; (iv) the role of the interaction between market concentration at the region level and lender characteristics such as size, liquid asset ratio, capital-to-asset ratio, core deposit ratio for monetary policy transmission. We leave these topics for future research.

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Table 1: Definition of variables

Variable name	Definition
	Dependent variables:
Volume	Loan volume, RUB
Interest rate	Loan interest rate, % per annum
New lender	Dummy equal to 1 if a bank did not lend to a borrower in the past and 0 otherwise
Maturity	Loan maturity, months
LLP	Loan loss provision, percent
Score	Loan quality score, 1 (best) to 5 (worst)
Spread	Credit spread, the difference between lending rate on a given loan and the average rate across all borrowers of a given bank on a given date
Default	Dummy equal to 1 if a given borrowers defaults on its loan in 12 months after loan origination and 0 otherwise
	Regressors of interest:
Key rate	Bank of Russia policy rate, % per annum
HHI	Herfinahl–Hirschman index, decimal fraction

Table 2: Descriptive statistics

Variable	Mean	Median	S.D.	Min	Max
		Dependent variables:			
Volume	14.62	14.75	2.34	6.67	20.21
Interest rate	12.67	12.85	4.28	0.01	23.96
New lender	0.08	0.00	0.27	0.00	1.00
Maturity	502.9	327.0	539.1	14.0	3240.0
LLP	2.71	1.00	7.95	0.00	100.00
Score	1.91	2.00	0.53	1.00	5.00
Spread	5.81	5.57	3.71	-9.97	19.25
Default	0.01	0.00	0.09	0.00	1.00
		Regressors of interest:			
Key rate	6.77	7.25	1.59	4.25	10.00
HHI	0.18	0.15	0.09	0.07	1.00
No. observations			3,929,721		

Table 3: Regressions for loan interest rate I

	Dependent variable: Interest rate$_{b,f,t+h}$						
Regressors	$h=0$	$h=1$	$h=2$	$h=3$	$h=4$	$h=5$	$h=6$
HHI$_{r,t-1}$	-0.374	-0.569**	-0.645***	-0.641***	-0.660***	-0.605**	-0.522*
	(0.392)	(0.254)	(0.187)	(0.187)	(0.214)	(0.250)	(0.275)
HHI$_{r,t-1}$ × Key rate$_t$	0.046	0.079**	0.090***	0.090***	0.093***	0.084**	0.069*
	(0.054)	(0.034)	(0.026)	(0.025)	(0.030)	(0.035)	(0.038)
Maturity$_{b,f,t}$ > 1yr	-0.249	-0.249	-0.249	-0.249	-0.249	-0.249	-0.249
	(0.280)	(0.280)	(0.280)	(0.280)	(0.280)	(0.280)	(0.280)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank×time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry×time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. obs	3,531,069	3,531,069	3,531,069	3,531,069	3,531,069	3,531,069	3,531,069
R^2 adjusted	0.82	0.82	0.82	0.82	0.82	0.82	0.82

Notes: See Table 1 for the definition of variables.

Clustered at the bank×firm level standard errors are shown in the parentheses.

*, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively.

Table 4: Regressions for loan interest rate II

	Dependent variable: Interest $\text{rate}_{b,f,t+h}$						
Regressors	$h = 0$	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$	$h = 6$
$\text{HHI}_{r,t-1}$	-0.408	-0.607**	-0.687***	-0.681***	-0.696***	-0.640**	-0.557**
	(0.380)	(0.244)	(0.181)	(0.189)	(0.220)	(0.256)	(0.281)
$\text{HHI}_{r,t-1} \times \text{Key rate}_t$	0.049	0.083**	0.094***	0.094***	0.097***	0.088**	0.073*
	(0.053)	(0.034)	(0.026)	(0.026)	(0.030)	(0.035)	(0.038)
$\text{Maturity}_{b,f,t} > 1\text{yr}$	-0.246	-0.246	-0.246	-0.246	-0.246	-0.246	-0.246
	(0.279)	(0.279)	(0.279)	(0.279)	(0.279)	(0.279)	(0.279)
$\text{Quality}_{b,f,t} = 2$	0.367***	0.367***	0.367***	0.367***	0.367***	0.367***	0.367***
	(0.057)	(0.057)	(0.057)	(0.057)	(0.057)	(0.057)	(0.057)
$\text{Quality}_{b,f,t} = 3$	0.720***	0.720***	0.721***	0.721***	0.721***	0.720***	0.720***
	(0.144)	(0.144)	(0.144)	(0.144)	(0.144)	(0.144)	(0.144)
$\text{Quality}_{b,f,t} = 4$	0.551***	0.551***	0.551***	0.551***	0.551***	0.551***	0.551***
	(0.156)	(0.156)	(0.156)	(0.156)	(0.156)	(0.156)	(0.156)
$\text{Quality}_{b,f,t} = 5$	-0.240	-0.240	-0.240	-0.240	-0.240	-0.240	-0.240
	(0.423)	(0.423)	(0.423)	(0.424)	(0.424)	(0.424)	(0.424)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank×time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry×time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. obs	3,529,120	3,529,120	3,529,120	3,529,120	3,529,120	3,529,120	3,529,120
R^2 adjusted	0.82	0.82	0.82	0.82	0.82	0.82	0.82

Notes: See Table 1 for the definition of variables.

Clustered at the bank×firm level standard errors are shown in the parentheses.

*, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively.

Table 5: Regressions for maturity

	Dependent variable: $\text{Maturity}_{b,f,t+h}$						
Regressors	$h=0$	$h=1$	$h=2$	$h=3$	$h=4$	$h=5$	$h=6$
$\text{HHI}_{r,t-1}$	72.1*	63.5	55.4	46.8	40.0	35.5	31.1
	(43.4)	(49.7)	(53.1)	(56.8)	(58.3)	(59.4)	(60.2)
$\text{HHI}_{r,t-1} \times \text{Key rate}_t$	-5.36	-4.34	-3.17	-1.71	-0.93	-0.45	-0.15
	(4.26)	(4.76)	(5.07)	(5.38)	(5.52)	(5.57)	(5.57)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank×time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry×time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. obs	3,627,788	3,627,788	3,627,788	3,627,788	3,627,788	3,627,788	3,627,788
R^2 adjusted	0.71	0.71	0.71	0.71	0.71	0.71	0.71

Notes: See Table 1 for the definition of variables.

Clustered at the bank×firm level standard errors are shown in the parentheses.

*, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively.

Table 6: Regressions for loan volume

	Dependent variable: Loan volume$_{b,f,t+h}$						
Regressors	$h = 0$	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$	$h = 6$
HHI$_{r,t-1}$	-0.246***	-0.299***	-0.347***	-0.389***	-0.387***	-0.378***	-0.385***
	(0.092)	(0.098)	(0.105)	(0.112)	(0.115)	(0.117)	(0.115)
HHI$_{r,t-1}$ × Key rate$_t$	0.027***	0.036***	0.043***	0.049***	0.048***	0.047***	0.047***
	(0.009)	(0.011)	(0.012)	(0.013)	(0.015)	(0.015)	(0.014)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank×time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry×time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. obs	3,719,368	3,719,368	3,719,368	3,719,368	3,719,368	3,719,368	3,719,368
R^2 adjusted	0.74	0.74	0.74	0.74	0.74	0.74	0.74

Notes: See Table 1 for the definition of variables.

Clustered at the bank×firm level standard errors are shown in the parentheses.

*, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively.

Table 7: Regressions for extensive margin

	Dependent variable: New lender$_{b,f,t+h}$						
Regressors	$h = 0$	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$	$h = 6$
HHI$_{r,t-1}$	-0.021	-0.002	0.002	0.010	0.015	0.023	0.027
	(0.020)	(0.029)	(0.032)	(0.038)	(0.040)	(0.043)	(0.045)
HHI$_{r,t-1}$ $\times$ Key rate$_t$	0.004*	0.001	0.001	-0.000	-0.001	-0.002	-0.003
	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.005)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank×time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry×time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. obs	3,719,368	3,719,368	3,719,368	3,719,368	3,719,368	3,719,368	3,719,368
R^2 adjusted	0.24	0.24	0.24	0.24	0.24	0.24	0.24

Notes: See Table 1 for the definition of variables.

Clustered at the bank×firm level standard errors are shown in the parentheses.

*, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively.

Table 8: Regressions for risk I: loan loss provision

	Dependent variable: $\text{LLP}_{b,f,t+h}$						
Regressors	$h = 0$	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$	$h = 6$
$\text{HHI}_{r,t-1}$	1.643***	1.742***	1.769***	1.714***	1.664***	1.533**	1.350**
	(0.569)	(0.578)	(0.562)	(0.585)	(0.596)	(0.623)	(0.664)
$\text{HHI}_{r,t-1} \times \text{Key rate}_t$	-0.173***	-0.182***	-0.183***	-0.175***	-0.169***	-0.150**	-0.124*
	(0.063)	(0.064)	(0.060)	(0.062)	(0.063)	(0.067)	(0.073)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank×time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry×time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. obs	3,579,622	3,579,622	3,579,622	3,579,622	3,579,622	3,579,622	3,579,622
R^2 adjusted	0.63	0.63	0.63	0.63	0.63	0.63	0.63

Notes: See Table 1 for the definition of variables.

Clustered at the bank×firm level standard errors are shown in the parentheses.

*, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively.

Table 9: Regressions for risk II: loan quality score, 1 (best) to 5 (worst)

	Dependent variable: $\text{Score}_{b,f,t+h}$						
Regressors	$h=0$	$h=1$	$h=2$	$h=3$	$h=4$	$h=5$	$h=6$
$\text{HHI}_{r,t-1}$	0.128***	0.129**	0.126**	0.121**	0.110*	0.103	0.094
	(0.046)	(0.051)	(0.054)	(0.060)	(0.062)	(0.065)	(0.067)
$\text{HHI}_{r,t-1} \times \text{Key rate}_t$	-0.011***	-0.011**	-0.011**	-0.010	-0.009	-0.008	-0.007
	(0.004)	(0.005)	(0.005)	(0.006)	(0.007)	(0.007)	(0.007)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank×time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry×time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. obs	3,717,421	3,717,421	3,717,421	3,717,421	3,717,421	3,717,421	3,717,421
R^2 adjusted	0.64	0.64	0.64	0.64	0.64	0.64	0.64

Notes: See Table 1 for the definition of variables.

Clustered at the bank×firm level standard errors are shown in the parentheses.

*, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively.

Table 10: Regressions for risk III: credit spread

	Dependent variable: $Spread_{b,f,t+h}$						
Regressors	$h = 0$	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$	$h = 6$
$\text{HHI}_{r,t-1}$	0.136	0.099	0.012	-0.027	-0.103	-0.133	-0.176
	(0.256)	(0.261)	(0.227)	(0.207)	(0.176)	(0.154)	(0.138)
$\text{HHI}_{r,t-1} \times$ Key rate_t	-0.027	-0.020	-0.007	-0.002	0.010	0.015	0.021
	(0.036)	(0.037)	(0.033)	(0.030)	(0.026)	(0.023)	(0.020)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank×time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry×time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. obs	3,181,180	3,181,180	3,181,180	3,181,180	3,181,180	3,181,180	3,181,180
R^2 adjusted	0.92	0.92	0.92	0.92	0.92	0.92	0.92

Notes: See Table 1 for the definition of variables.

Clustered at the bank×firm level standard errors are shown in the parentheses.

*, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively.

Table 11: Regressions for risk IV: *ex post* risk

	Dependent variable: *Ex Post* $\text{Risk}_{b,f,t+h}$						
Regressors	$h=0$	$h=1$	$h=2$	$h=3$	$h=4$	$h=5$	$h=6$
$\text{HHI}_{r,t-1}$	-0.003	-0.005	-0.006	-0.008	-0.009	-0.009	-0.010
	(0.005)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
$\text{HHI}_{r,t-1} \times \text{Key rate}_t$	0.000	0.001	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank×time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry×time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. obs	3,719,353	3,719,353	3,719,353	3,719,353	3,719,353	3,719,353	3,719,353
R^2 adjusted	0.54	0.54	0.54	0.54	0.54	0.54	0.54

Notes: See Table 1 for the definition of variables.

Clustered at the bank×firm level standard errors are shown in the parentheses.

*, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively.

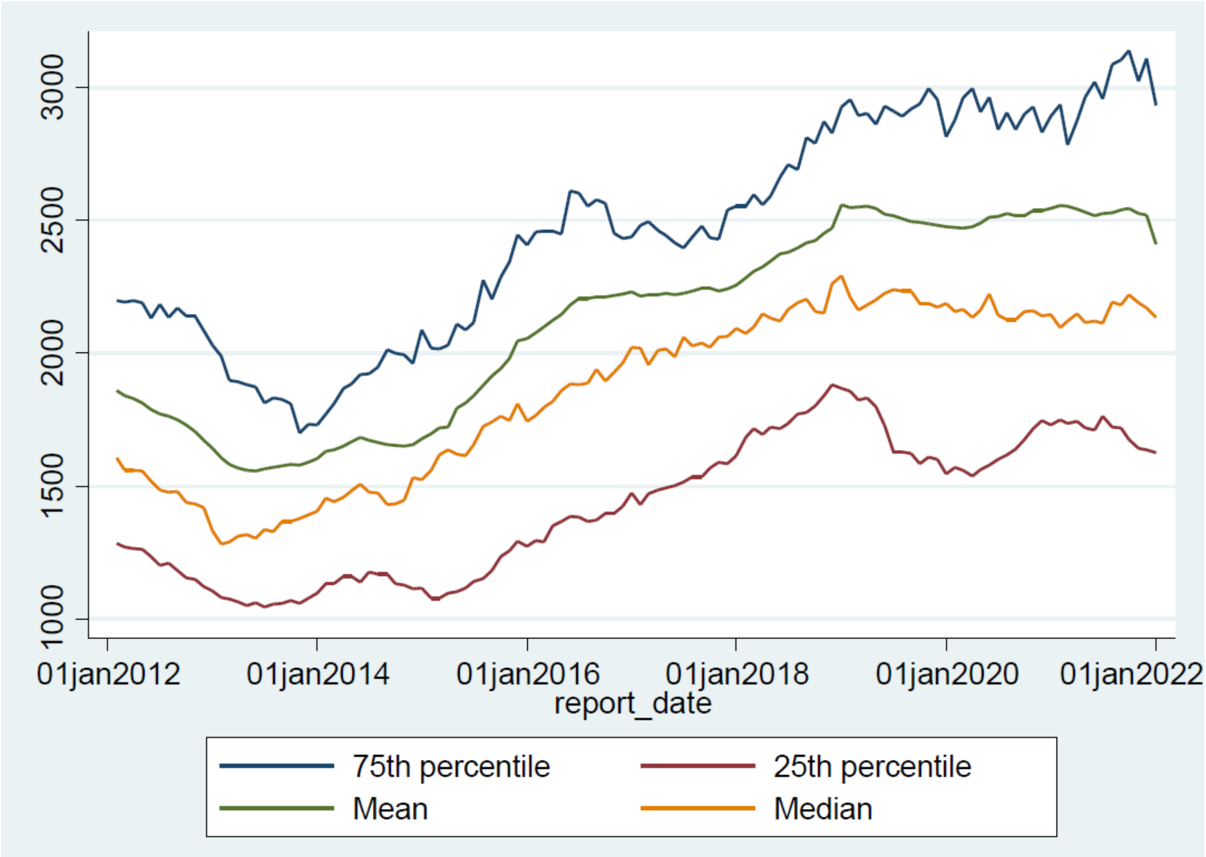


Figure 1: HHI dynamics

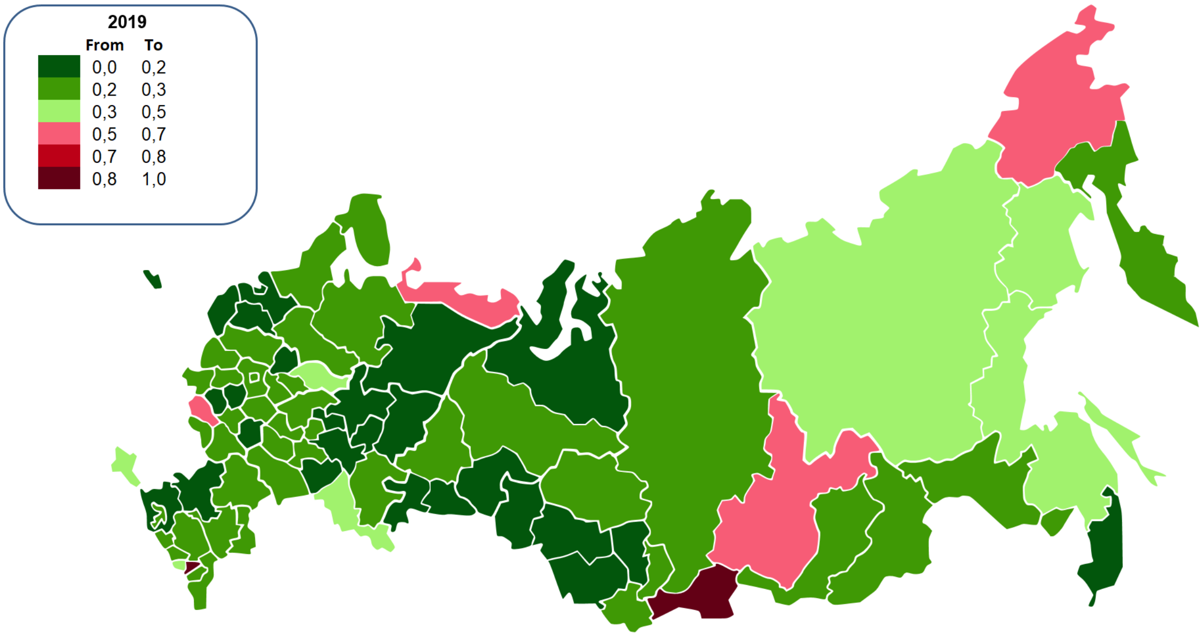


Figure 2: HHI heatmap, January 2019

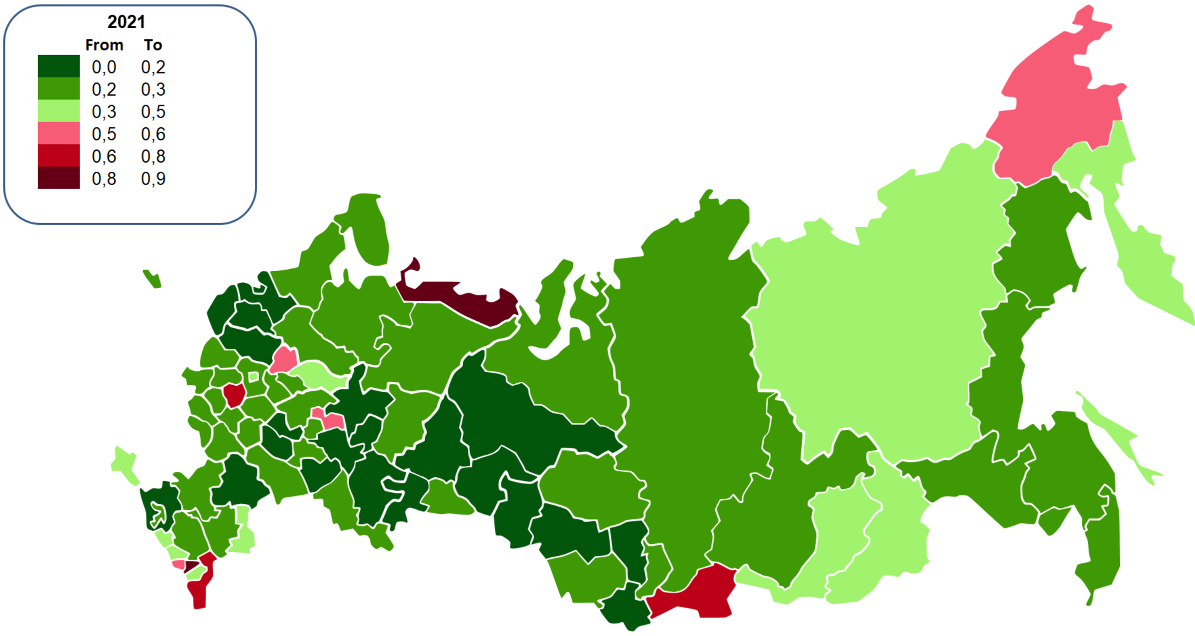


Figure 3: HHI heatmap, January 2021

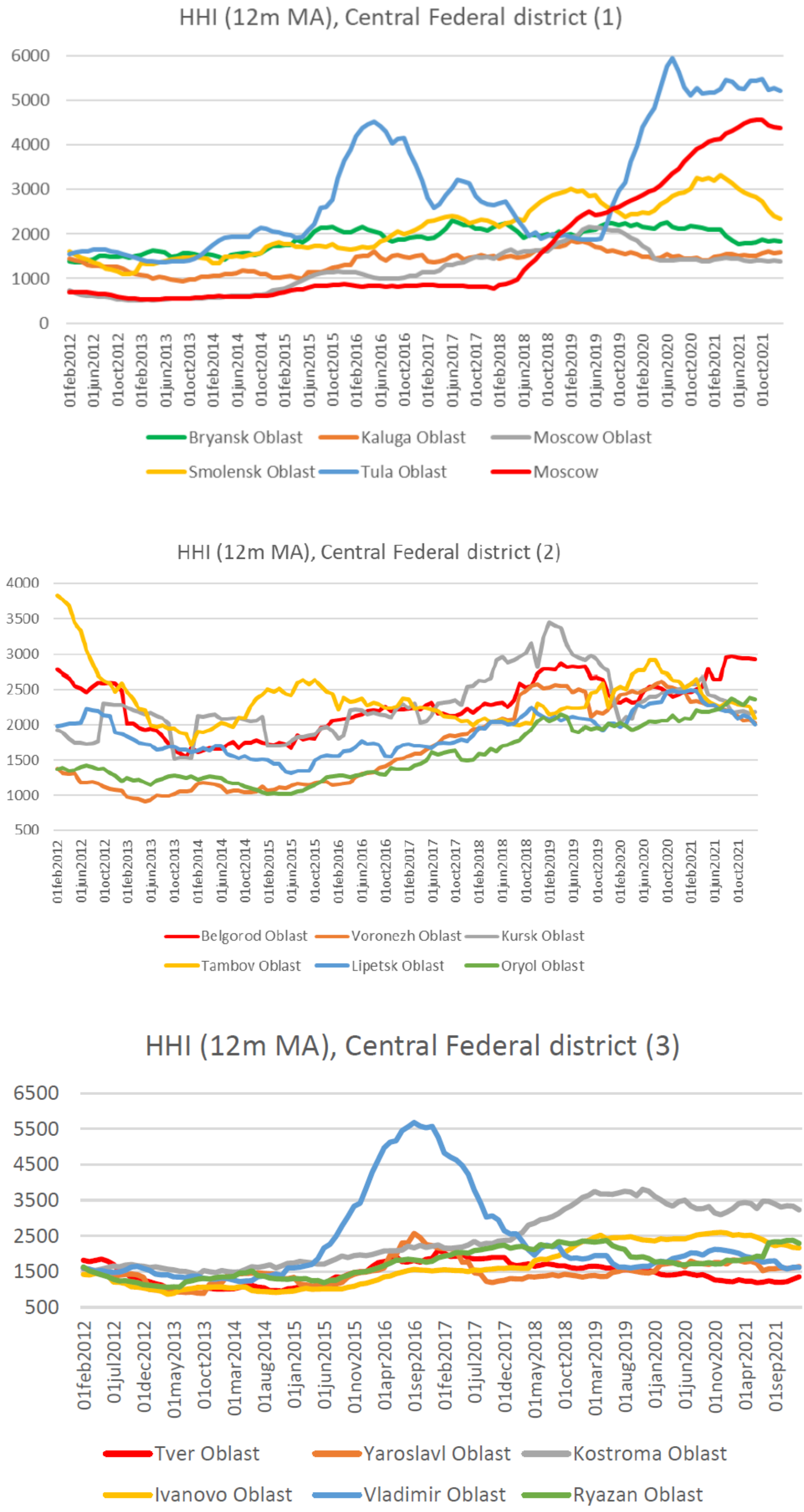
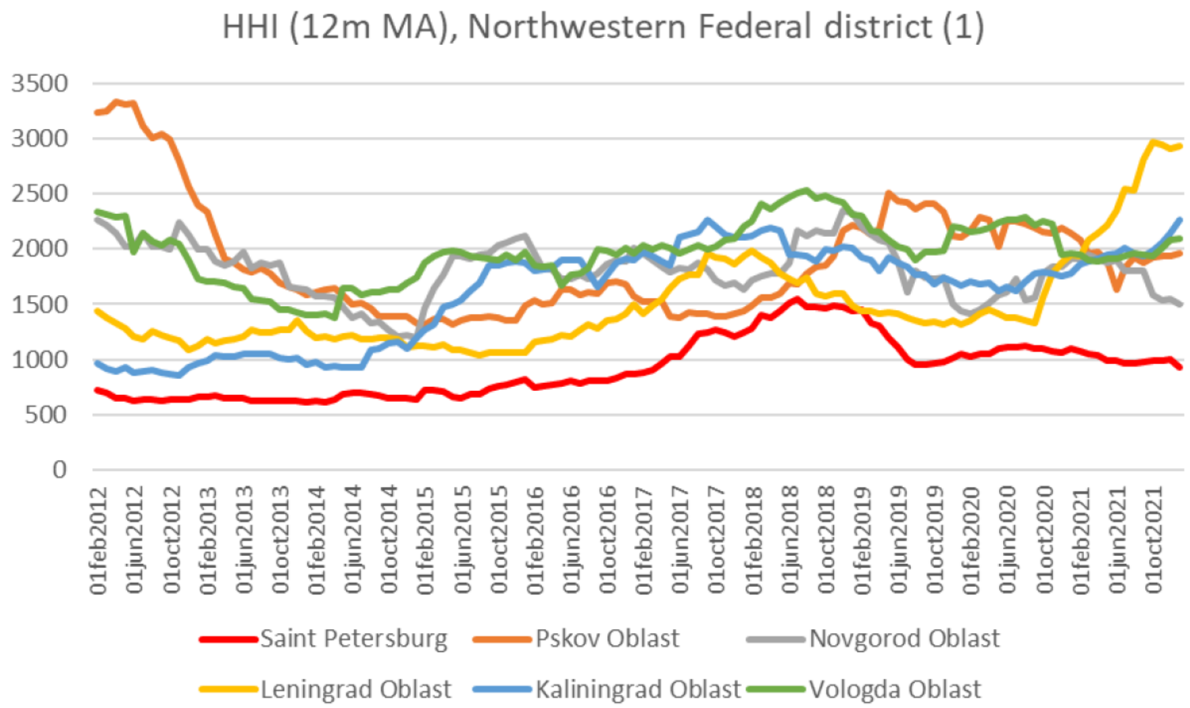


Figure 4: HHI, 12-month moving average: Central Federal District



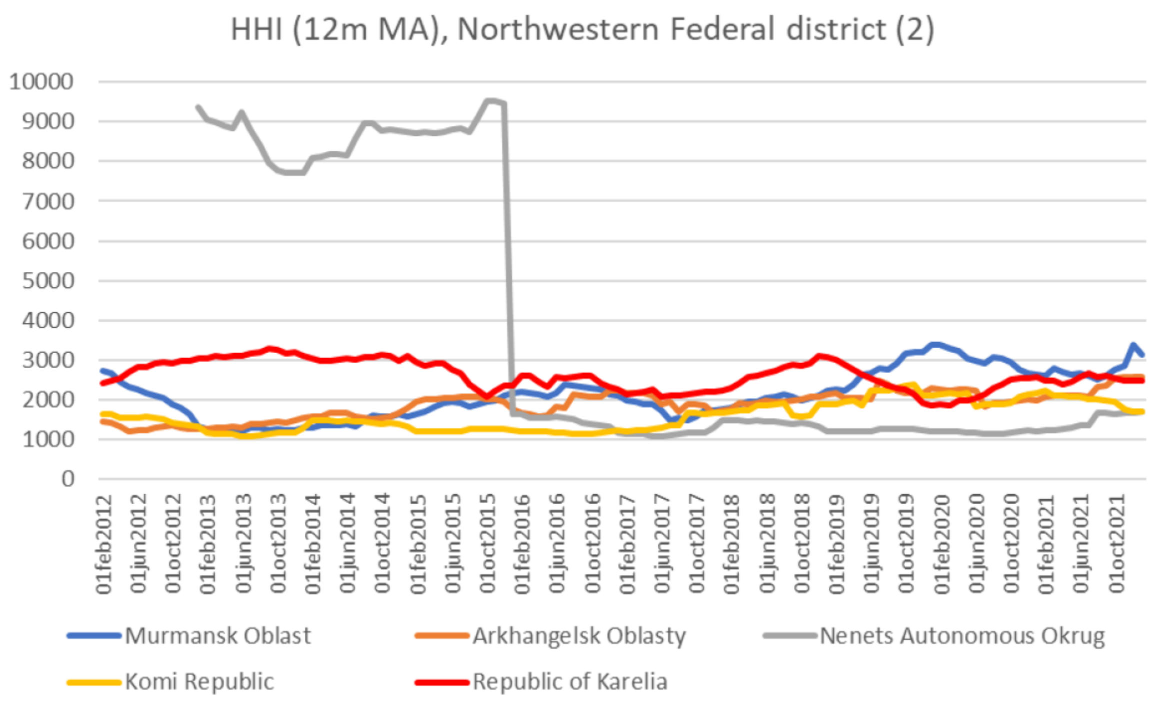


Figure 5: HHI, 12-month moving average: Northwestern Federal District

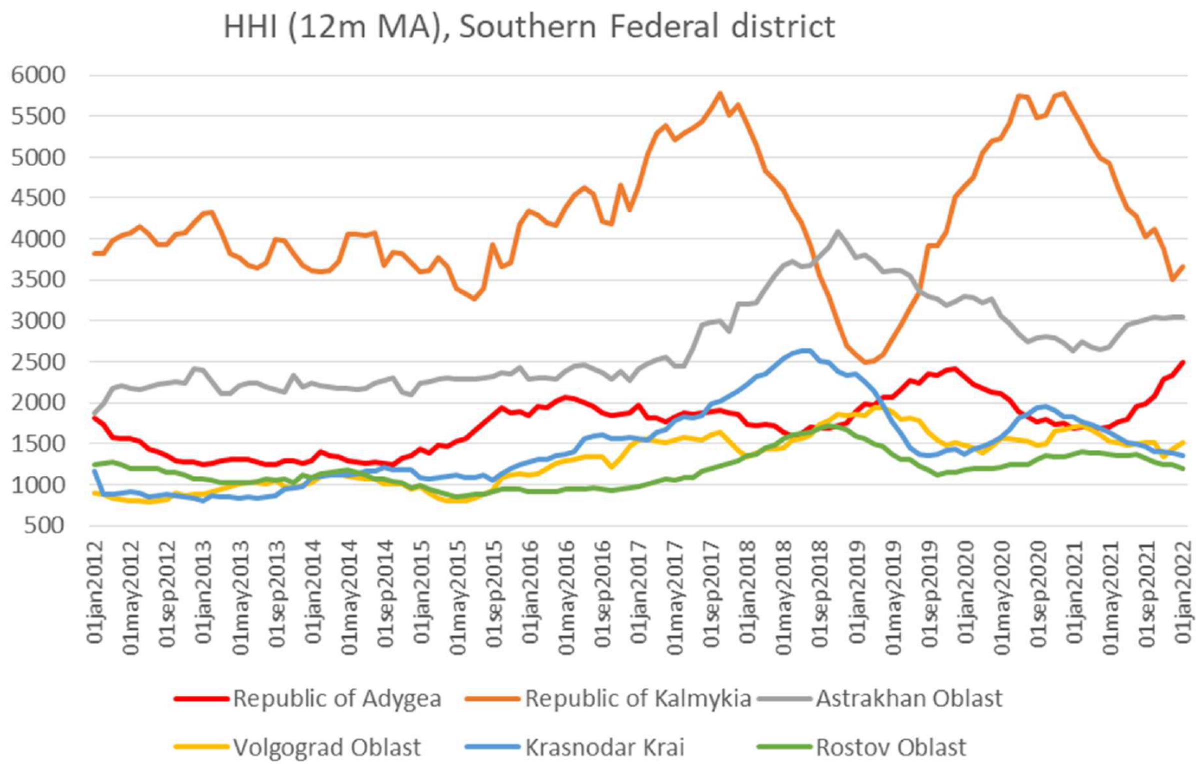


Figure 6: HHI, 12-month moving average: Southern Federal District

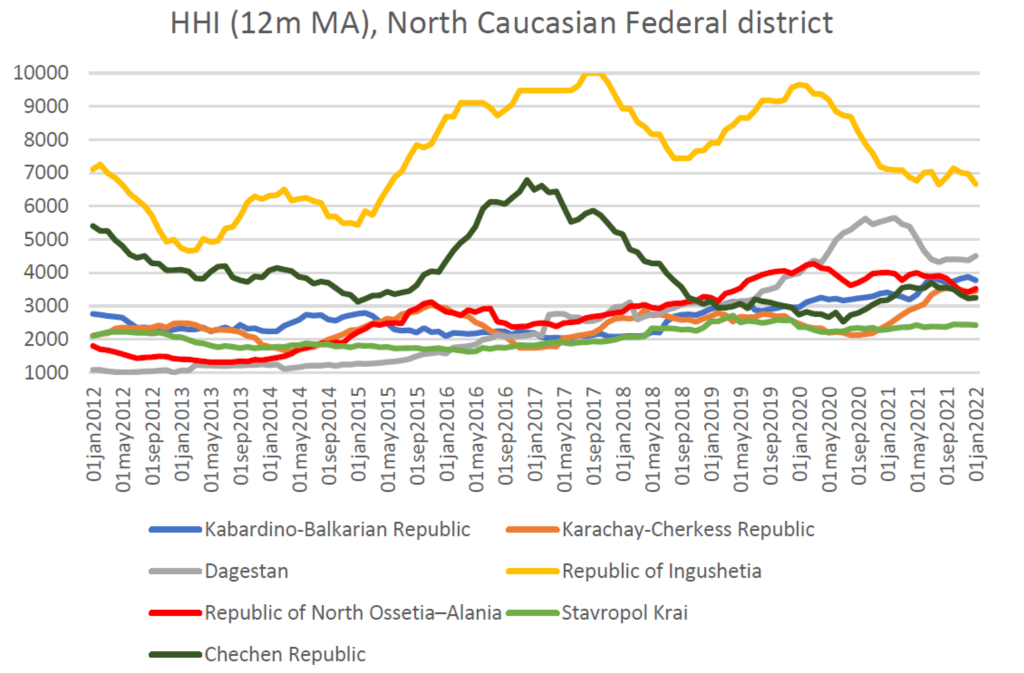


Figure 7: HHI, 12-month moving average: North Caucasian Federal District

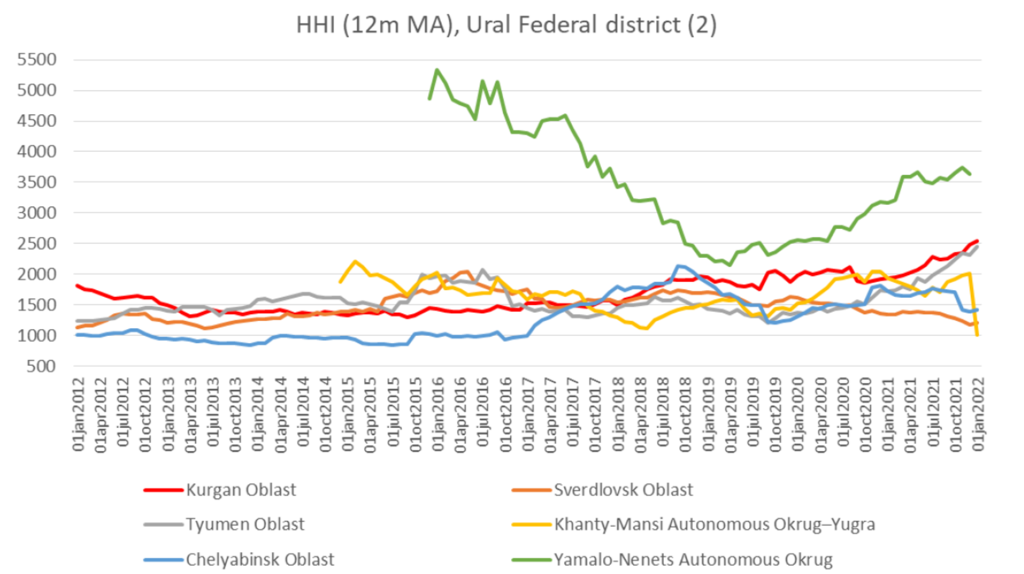


Figure 8: HHI, 12-month moving average: Ural Federal District

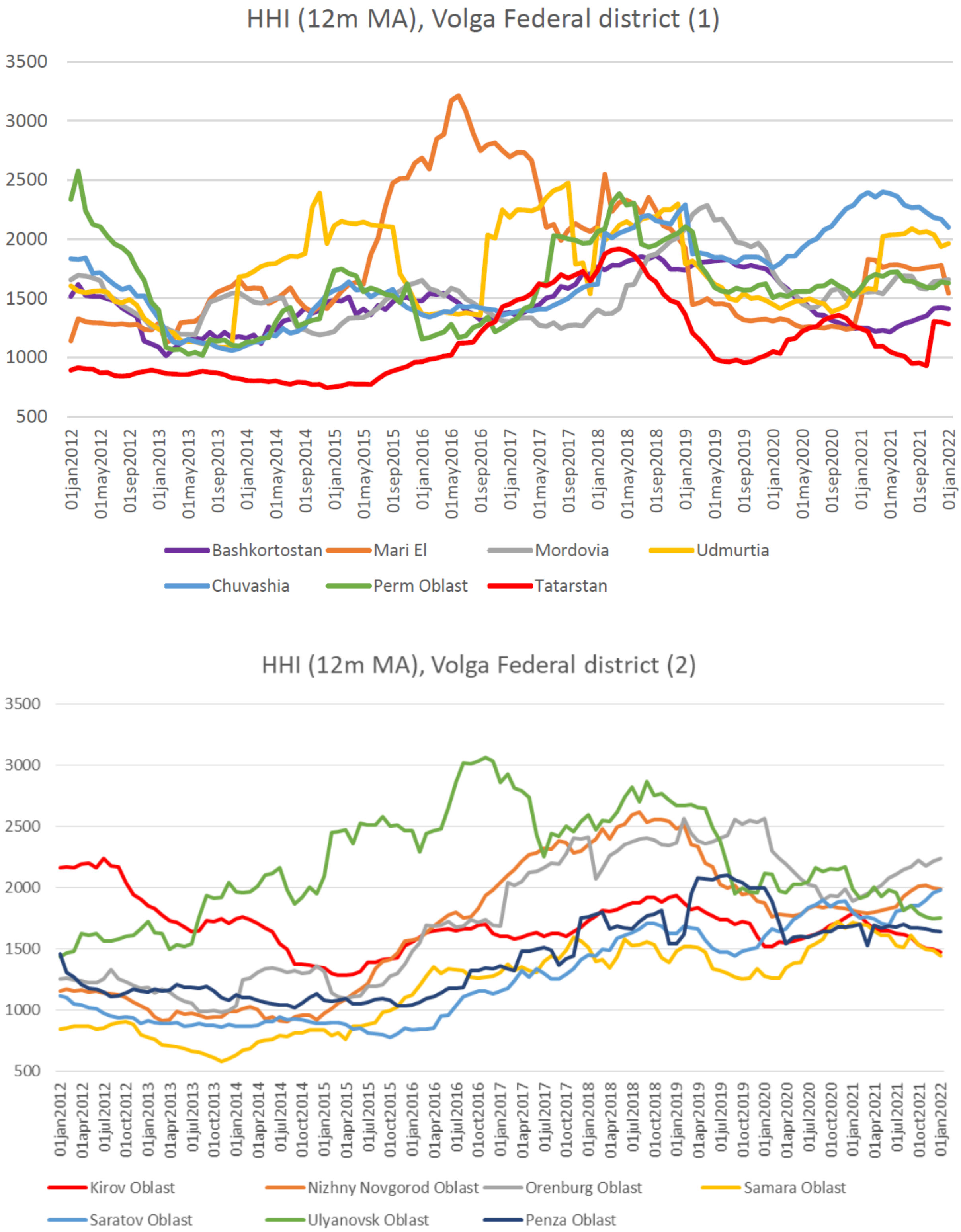


Figure 9: HHI, 12-month moving average: Volga Federal District

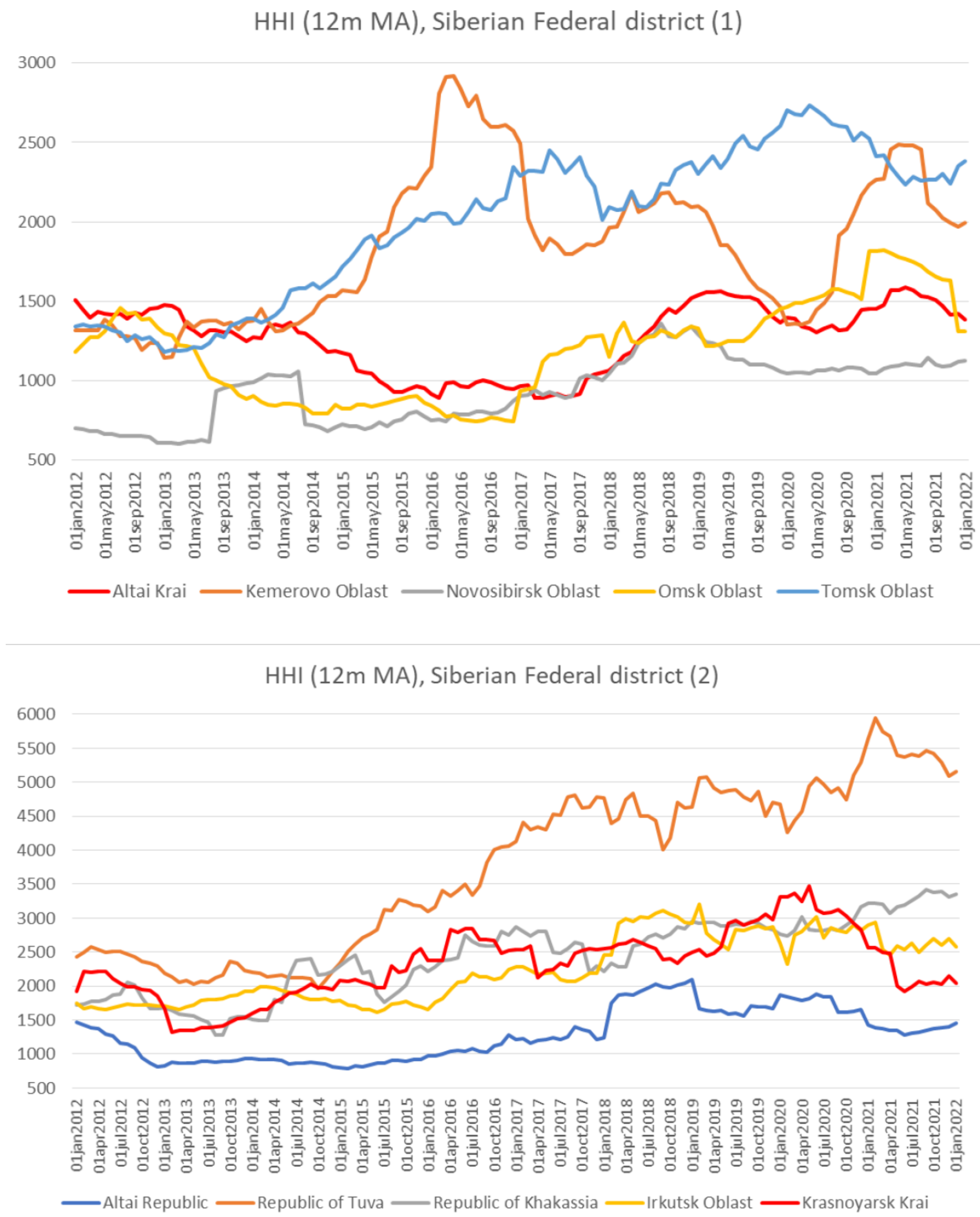
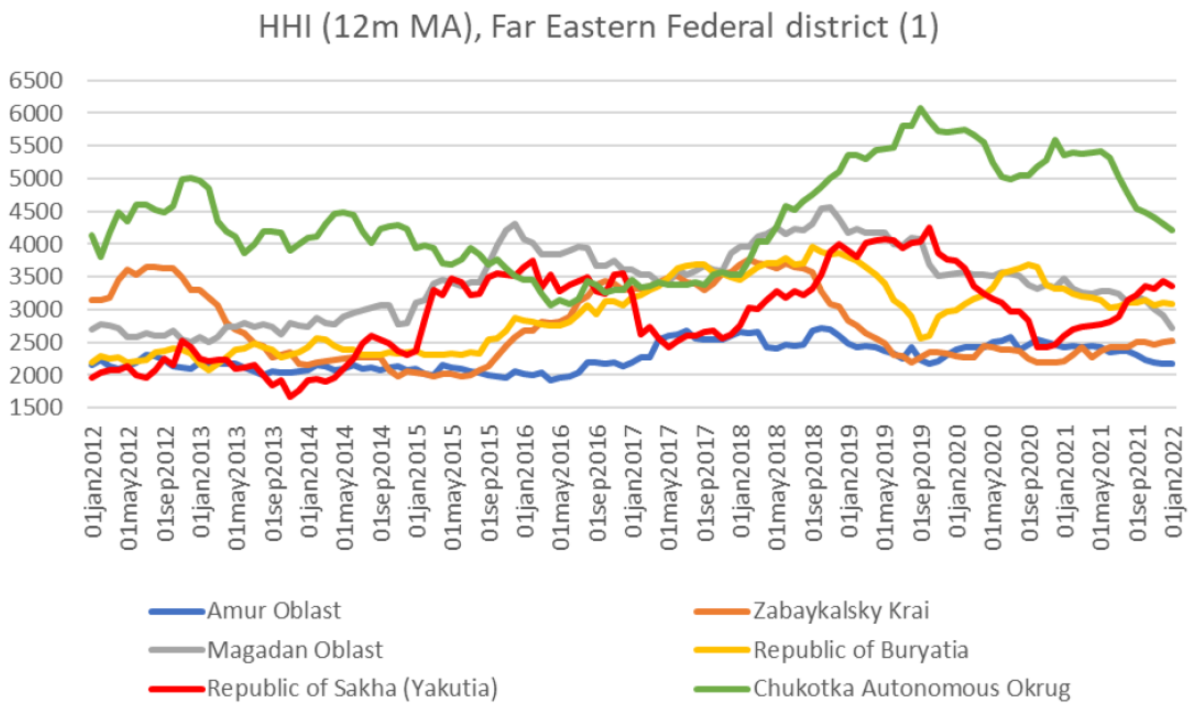


Figure 10: HHI, 12-month moving average: Siberian Federal District



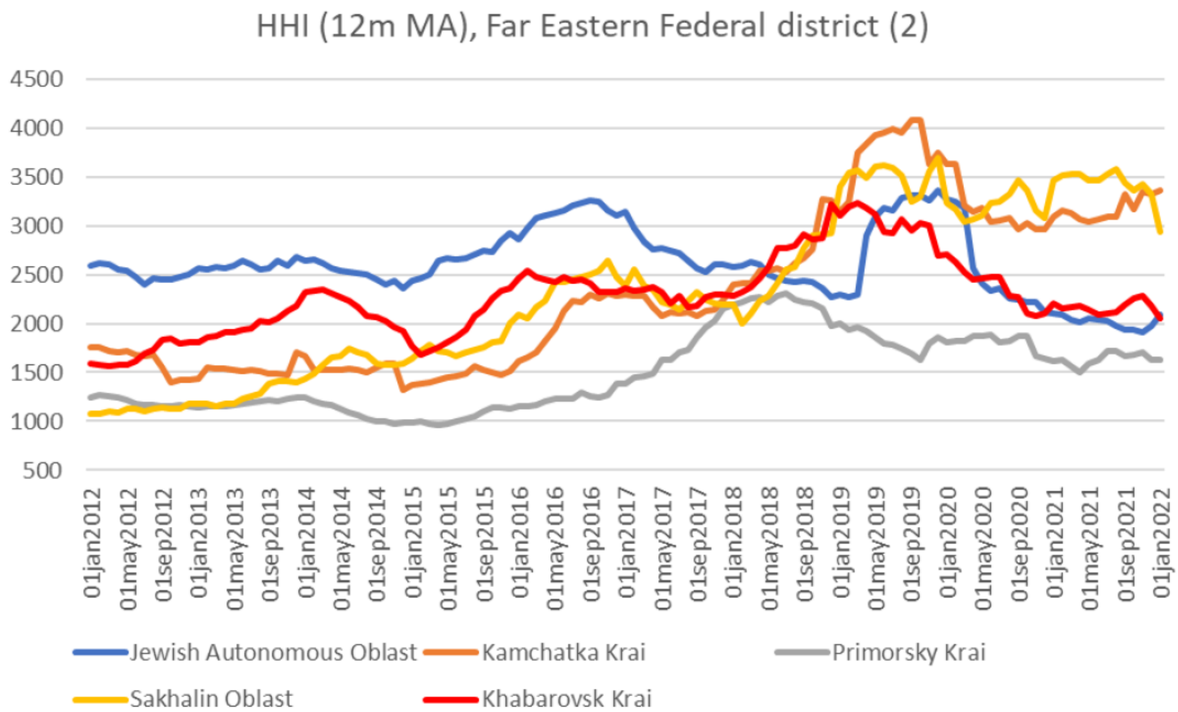


Figure 11: HHI, 12-month moving average: Far Eastern Federal District

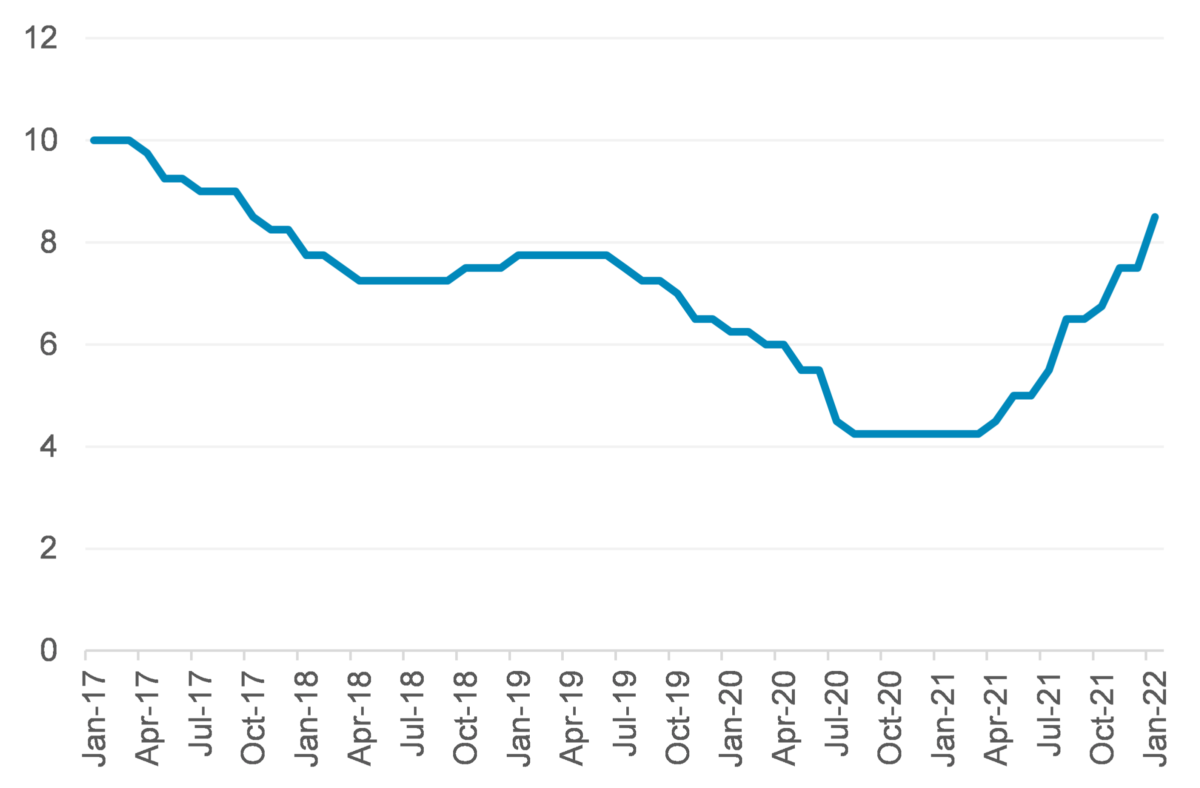


Figure 12: Bank of Russia's key rate

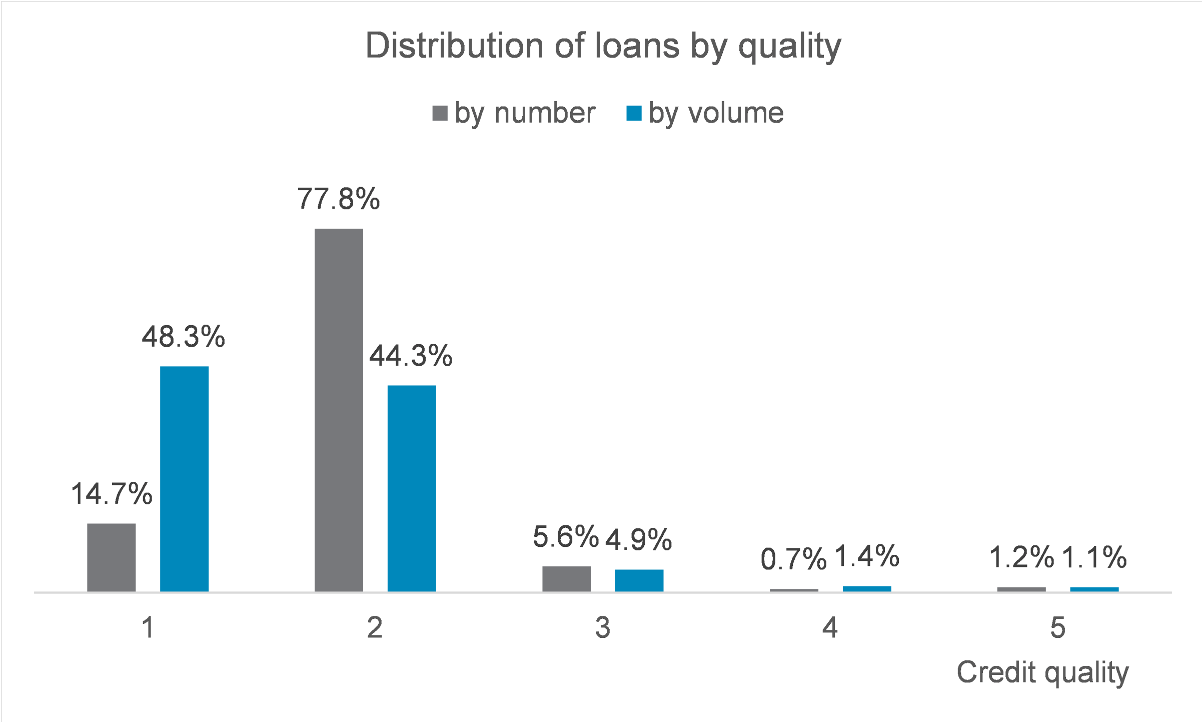


Figure 13: Loan distribution by quality in 2020