

# “THE DETERMINANTS OF NET INTEREST MARGINS & NET INTEREST SPREADS IN THE RUSSIAN & JAPANESE COMMERCIAL BANKING SECTORS”

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**ABSTRACT**

This study presents an empirical investigation of the determinants of net interest margins and spreads in the Russian and Japanese banking sectors with a particular focus on commercial banks. Net interest margins and spreads serve as indicators of financial intermediation efficiency. This paper employed a bank-level unbalanced panel dataset prolonging from 2005 to 2014. My main empirical results show that bank characteristics explain the most of the variation in not only net interest margins but also in spreads. Capitalization, liquidity risk, inflation, economic growth, private and government debt are important determinants of margin in Russia. In Japan to the contrary loan and deposit market concentration along with bank size do predominate. Common significant variables in both countries are the substitution effect, cost efficiency and profitability. Turning to net interest spreads, micro- and macro-specific variables are the main significant drivers in Russia. I reach the conclusion that there are no significant determinants of net interest spreads in Japan within the original selection of variables, but operating efficiency and deposits to total funding seem to prevail. In both countries, there are solid differences in the net interest margins as well as spreads once the pre- and the post-crisis periods are considered.

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### ***Motivation***

***Academic Motivation:*** Considering both countries, there are many differences including geography, Japanese historic links to Russia's government-driven economic development, industrial structures marked by large oil companies in Russia and "Keiretsu" business networks in Japan. Both have a bank-based financial system and adopted the so-called "German-Japanese model", however both are at different development stages and clearly the bank market concentration is also distinct, which can be seen thanks to the Lerner Index for both countries found on the Economic Research site of the Federal Reserve Bank of St. Louis. With this topic, I would like to look into whether those general differences in the commercial banking sectors while attaching a precise importance to net interest spreads (the spread between deposit and lending rates) and to net interest margins.

## **1. Introduction**

### ***1.1 Definition: Commercial Banks***

Commercial banks take deposits and lend money to private and corporate clients, including SMEs and organizations. Services cover current, deposit and saving accounts.<sup>1</sup> Commercial banks earn income by taking in small, short-term and liquid deposits and engage in asset and maturity transformation in order to give out larger loans with longer maturity to clients. While retail lending involves high volumes and low value loans, the wholesale lending includes other banks, pension funds and corporations as borrowers, comprising low volumes of loans, but those loans tend to have high values. The separation between commercial and investment banking has been becoming weaker amid the era of financial liberalization and globalization between 1990 and 2007. Banks have been observed to move from low margin deposit-taking and loan business to the higher margin capital market business, as a consequence increasing the risk of commercial banks. Moving to riskier but potentially more profitable loans is an option, but also scooping up bond and equity issues at the expense of bank loans. In the United States, the Gramm-Leach Bliley Act repealed key provisions of the Glass-Steagall Act, known for the separation of commercial and investment banking. After the recent financial crisis, the Volcker Rule disallowed proprietary trading of securities for all deposit-taking institutions.<sup>2</sup>

### ***1.2 History of Commercial Banking***

#### ***1.2.1 Russia***

Wladimir I. Lenin annotated that the control, which commercial banks had reached over individual industrial companies led to the concentration of production. He assigned the banks' capability to execute this control mostly to industry's dependence on them for receiving both additional equity capital and credit. Lenin noticed their “potential for central control and direction of dispersed industries in a country where regional and local units of the government's administrative apparatus were inadequate to deal with economic problems”<sup>3</sup>. He was awed by the technical operative performance by the wide branch networks prevailing the scene in Germany, the United Kingdom, France, and Russia itself, rather than with the opportunity of the use of monetary and credit policy as a tool for economy restructuring and achieving appropriate economic growth and stability. After the October Revolution in 1917, the Soviet government

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<sup>1</sup><http://www.investopedia.com/terms/c/commercialbank.asp>

<sup>2</sup><http://lexicon.ft.com/Term?term=commercial-bank>

<sup>3</sup> <http://www.nber.org/chapters/c4154.pdf>

pushed through with nationalizations of all commercial banks without compensation of domestic or foreign stockholders by suspending all their shares. The commercial banks were joint into the State Bank, whose name was changed to People's Bank (Norodny Bank) of the Russian Socialist Republic. The remarkable side of the Soviet banking system lies, rather, in the whole integration of monetary processes within the central planning system, along with the credit and foreign exchange monopoly of the State Bank that has a wide set of control powers over the performance of the entire state-owned segment. Historians view the position of the State Bank of the U.S.S.R. (Gosbank) today as the definite expression of a relationship between government and banking that originated in Tsarist Russia. In the beginning of 1992, the country initiated its economic reform process, the goal of which was to transform the formerly centrally managed economy into a market economy. In 1988, it was permitted to found commercial and cooperative banks, one of the strong underlying pillars to support the market economy.<sup>4</sup>

### ***1.2.2 Japan***

The significance of zaibatsu dominance in commercial lending activity is emphasized by the relative irrelevance of private saving and security buying transactions by individuals in Japan. Zaibatsu is the Japanese term for industrial and business conglomerates that ruled substantial segments of the economy in the Empire of Japan from the Meiji Period (1868 – 1912) until the end of World War II. The zaibatsu created their own banks that had the task to finance activities of its group member companies. The zaibatsu banks retained the deposits of affiliated companies and ranked at the same time among their principal sources of capital. The zaibatsu system impeded business outside zaibatsu control to obtain investment funds for much worse terms as applied to those within the group.

Pre-War Japanese banks numbered not among institutions that conducted large, long-term investments in companies. Instead, they considered themselves as commercial banks that specialized in assorted payment functions and short-term loans. During the war, the government gradually pushed commercial banks towards supplying long-term funds to munitions firms. M. Ogura, the former Japanese Finance Minister in 1941 presented that the government would want banks to commit themselves in so-called “enterprise finance” to provide long-term funds for expansions in productive capacity.<sup>5</sup> After the zaibatsu era, the new “keiretsu” era began which had the upper hand on the economy in the second half of the 20<sup>th</sup> century, above all during the “Japanese Economic Miracle”. Keiretsu stands for a whole slew of companies with

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<sup>4</sup> [http://www.suomenpankki.fi/fi/julkaisut/selvitykset\\_ja\\_raportit/yleistajuiset\\_selvitykset/Documents/74015.pdf](http://www.suomenpankki.fi/fi/julkaisut/selvitykset_ja_raportit/yleistajuiset_selvitykset/Documents/74015.pdf)

<sup>5</sup> [http://www.law.harvard.edu/programs/olin\\_center/papers/pdf/289.pdf](http://www.law.harvard.edu/programs/olin_center/papers/pdf/289.pdf)

interlocking business relationships and shareholdings, complementing an informal business group. The cross-shareholdings system aids to isolate from takeover endeavors, facilitating long-term planning in order to push forward with innovative projects such as the ones in the electronics and automotive industries.

While in Russia, state-owned banks and large banks, which constitute a small percentage of the entire commercial banking sector are protected by the government, in Japan the interconnectedness and the developed depth of the financial system makes many banks relevant for government safety nets. If a small bank goes bankrupt during the consolidation process as it has been happening in the Russian commercial banking sector, it will not put the entire economy at stake. This is different in Japan, where there are larger, more connected banks within the keiretsu networks linking banks, large corporations, insurance companies, manufacturing entities with each other very closely. The potential danger to the real economy is thus a lot more considerable than in Russia. Keiretsu, the main banking system coupled with close cooperation with the Japanese government, reduces the financial risk. Not only the relationship to the government, but also the inter-company relationships within the keiretsu networks is very important. Banks give out loans to their fellow keiretsu companies, which enables them to reduce information asymmetry and make monitoring more effective, resulting in lower borrowing rates. These keiretsu networks do provide the property of risk-sharing, facilitating therefore more risky, long-term, low margin investments. The Japanese government has been known for enabling funds and necessary capital in the form of financial support and guarantees. The Ministry of Finance (MoF) has developed in the past various formal and informal approaches to prevent bank failures. The implicit blanket protection and the convoy system instead of simply the reliance on the deposit insurance system serve as examples. The convoy system centers upon the MoF's encouragement of stronger, more robust banks to be capable to absorb insolvent banks. Effectively seen, all banks are tied to each other. Financially problematic banks are picked up by stronger banks, giving an incentive to the government not to push through necessary reforms in the financial sector.<sup>6</sup>

### ***1.3 Why Russia?***

First, the Russian banking system has been subject to important structural changes and experienced fast development of its banking sector. Financial deepening has been also a factor to this evolution. Second, the income structure and balance sheet dynamics of Russian commercial banks have seen major shifts, especially when it comes to the transition from margin income to non-interest fee-based income. Third,

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<sup>6</sup> <http://en.apu.ac.jp/rcaps/page/content0073.html/>



even though the financial development in Russia is underway quickly, it remains on low levels compared to developed countries such as Japan.

Most significant progress in the Russian banking sector manifested itself in the era of Russian President Boris Yeltsin. The Russian government announced all branches of all-union banks in Russia to be independent from the Gosbank – which had been the Central Bank of the Soviet Union. The result of this declaration was that almost 1,000 new banks came into existence overnight. After the independence of all banks, another step was taken to ensure the transformation of more than 900 regional branches of specialized banks to independent entities as well. These decisions laid the foundation for a competitive market within the banking sector. By the end of 1996, the total number of banks was about 2,100, while the year after this number decreased rapidly to 1,700 banks and in 2001, there were 1,300 banks. In 1993 the capital requirement to start a bank was about USD100,000. This very low amount led to a strong presence of Russian entrepreneurs starting banks.<sup>7</sup>

Unfortunately, in Russia there seems to be a big difference between the formulation of laws and the execution of those laws by government officials. The cost of regulation and bureaucracy keeps foreign banks far away from entering the Russian market, thus leading to the non-materialization of liberalization reforms. State-support for selected Russian competitors with good political connections does not provide a healthy and fair environment for foreign banks to do business in. Government interventions influence lending decisions, too. The government declared during the crisis in 2009 that additional government capital injections in individual banks would have to be in accordance with the banks` agreement and compliance with specific government-given lending targets. Despite a high number of banks, there is little competition within the banking sector so that it represents a major impediment for efficient capital allocation. The majority of the banking sector is made out of small banks, which lack risk management and control capabilities, cannot benefit from economies of scale and are in desperate need of a greater depositor base. The vulnerability to oil prices in general is another layer of difficulty those banks face. This condition leads those banks to provide only the private sector with small and short-term loans, which in turn also hurt and challenge Russian SMEs. The conclusion on behalf of the Russian banking reforms rest on the government`s reform overpromising, but the reality is that the government considerably underdelivers. What is on paper does not comply with actions and execution.

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<sup>7</sup> <http://fir.nes.ru/~vpopov/documents/FINSYS.pdf>

Despite the underperformance of banking reforms, there has been progress indeed. While Russia was suffering a substantial gap of about 10% between gross savings-to-GDP and domestic private sector investment in the period of 2000-2012, the situation has improved. The mean gap during our sample period from 2005-2014 has shown a much lower number of 5.71%, even though it is twice as high as Japan's. While the gap in Russia was at 11.13% in 2005, in 2014 it had moved below 2%. The Russian problem of recycling savings into investments has been working better than before. Moreover, the adoption of international accounting standards of Russian banks in 2004 and the implementation of deposit insurance to every bank in Russia has helped to create the necessary basic structures to develop the financial sector. Financial intermediation has developed fast over time, whether it is in terms of banking assets, loans or deposits relative to GDP or in terms of M2/GDP, an indicator of financial deepening. Stock market capitalization to GDP has been growing strongly and reached a level of more than 50% in 2014, while in Japan the same figure stands at slightly below 70%. Even outstanding debt securities, including both domestic and international, relative to GDP, accomplished a level of 6% in 2011, however growth has been slow, finding itself in a stable upward trend. In Japan, this figure is much higher at almost 58%. The Russian bond market is not greatly developed, since only a handful of huge Russian conglomerates issue bonds. The role of bank loans though, gives reason to be optimistic. Bank loans as a source of corporate financing of fixed investments has ascended from only 2.9% in 2000 to more than 9.3% in 2013. Even though the absolute percentage level is truly low, growth has proved itself to be firm.

### ***Why Japan?***

Japan has created an alternative financial system model to the Anglo-American market-based system, which is called the bank-based "Japanese-German model". This model has been implemented by Russia during its current transition and development of its banking sector. Due to the significant fixed cost of underwriting securities, the market-based model is much more expensive or even completely inaccessible to SMEs compared to bank loans. The cost of underwriting becomes proportionally larger the smaller the amount of financing needed. Another crucial reason is that big portfolio investors may not want to invest in companies of limited size, as the costs of screening and monitoring are also fixed, and make small investments unprofitable. A bank-based system is, thus backed by economies with large parts of SMEs and highly indebted firms according to Vitols (2002)<sup>8</sup>. Indeed, in Japan private sector debt has been 168% relative to GDP in 2014 with a mean over the sample period from 2005 to 2014 of 171% of GDP, while

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<sup>8</sup> <https://www.wzb.eu/sites/default/files/personen/vitols.sigurt.172/p02-901.pdf>

the mean of Russian private sector debt had reached a considerably lower percentage of only 49% of GDP since it is a developing economy still. SMEs have been becoming more dependent on financing from banks, as more intense competition has eaten up profit margins, which in turn resulted in a weaker positioning of self-financing investments and daily operations. Japan's bank-based system is now slowly shifting towards a more Anglo-American style of market-based finance, and the reasons for this emergence are the following: First, the government bond market might have the potential to become a key competitor to banks, so that a light level of government debt can support bank-based systems rather than a high level of government debt. This competition comes into appearance due the fact that households and investors might prefer bond securities over deposits, since the government has a higher probability of repayment due to its tax revenues. Furthermore, banks might invest in government securities rather than investing in higher risk assets such as loans. Japan's government debt to GDP has had a mean during the aforementioned period of 200%, while Russia's was much lower at slightly above 18%. Secondly, large conglomerates and firms that have had success in bringing their debt levels down turned to markets in order to receive cheaper sources of finance than bank loans. However, the majority of Japanese companies is highly indebted and needs continued financial backing by banks so that they are able to roll over financing. Thirdly, population growth in Japan has turned negative. Japan is found among the countries with the oldest population in the world. Hence, Japanese pension funds have been carrying on to drive the transition towards a more market-based system with domestic and international investment funds and tools to gain different sets of risk-returns in portfolio management to capitalize on them. But, also Russia's population growth is weak and is expected to turn negative in the upcoming years.

Outstanding debt securities issued by banks to GDP in Japan shot up from 33% in 2005 to 58% in 2014, while in Russia this percentage rose from 0.02% to 5.09%. Total Domestic debt securities outstanding from all issuers based in Japan rose from 205% to 260%, whereas the Russian figure more than doubled during the sample period from 6% to 13%, but remains at low levels. To sum up, Japan's bank-based financial system is shifting towards more market-based finance, especially seen among the large companies and the public sector. In contrast, this cannot be said for households and SMEs, where bank finance remains their lifeblood.

#### ***1.4 Contribution***

My main contribution is twofold. When it comes to this topic, many academic papers focus on a large group of countries or specialize in frontier markets, especially those located on the African continent as

elaborated by S.B. Naceur & M. Goaid (2008) with the example of Tunisia<sup>9</sup>. These papers do neither have an explicit comparison of pre- and post-crisis periods of the recent crisis. Furthermore, my work will be more concrete in developing a precise Asian case by comparing Japan with Russia. Clearly, at first glance, the Japanese and Russian economies are different, especially Japan being a fully developed economy while Russia belongs to the BRIC emerging markets. Both economies are ranked among the top 10 largest economies in the world (by GDP size) according to the World Bank 2014 GDP size ranking.<sup>10</sup> Japan is the third largest, while Russia is the tenth largest economy.

According to Vladimir Popov`s academic paper: “Financial System in Russia as compared to other transition economies: Anglo-American versus German-Japanese model”, both Russia and Japan belong to the bank-based German-Japanese financial system model, rather than the market-based Anglo-American model.<sup>11</sup> However, my study will contribute to figure out which differences and similarities exist when taking a look at the commercial banking sectors and the financial intermediation dynamics therein, despite both countries belonging to the same financial system model. My paper will shed light on this issue in a more detailed way than the general descriptions and explanations of Popov`s work. An additional contribution of my paper will be a very specific comparison between both countries, which in the existing literature can be found in an extremely limited range. The available empirical papers concentrate either on the analysis of 20 up to 100 countries or on particular continents or regions such as Latin America, Central & Eastern Europe, the European Union, East Asia, Central Asia & the Caucasus that can be found for example in the analyses composed by L.M. Tin et al. (2011)<sup>12</sup>, M. Dumicic & T. Ridzak (2013)<sup>13</sup>, R. Almarzoqi & S. B. Naceur (2015)<sup>14</sup>, J. Maudos & J.F. Guevara (2004)<sup>15</sup>. Another common focus of literature is the attachment of importance to one country only such as in L.R. Sidabalok & D. Viverita (2012)<sup>16</sup>, P. Sharma & N. Gounder (2012)<sup>17</sup>, D. Estrada, E. Gomez, I. Orozco (2006)<sup>18</sup>, E. Bektas (2014)<sup>19</sup>. My work differs

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<sup>9</sup> [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1538810](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1538810)

<sup>10</sup> <http://databank.worldbank.org/data/download/GDP.pdf>

<sup>11</sup> <http://fir.nes.ru/~vpopov/documents/FINSYS.pdf>

<sup>12</sup> [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1912319](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1912319)

<sup>13</sup> <http://hrcak.srce.hr/97824?lang=en>

<sup>14</sup> <https://www.imf.org/external/pubs/ft/wp/2015/wp1587.pdf>

<sup>15</sup> <http://www.uv.es/maudosj/publicaciones/JBF.pdf>

<sup>16</sup> [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1990175](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1990175)

<sup>17</sup> [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2089091](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2089091)

<sup>18</sup> <http://www.banrep.org/docum/ftp/borra393.pdf>

<sup>19</sup> [http://businessperspectives.org/journals\\_free/bbs/2014/BBS\\_en\\_2014\\_04\\_Bektas.pdf](http://businessperspectives.org/journals_free/bbs/2014/BBS_en_2014_04_Bektas.pdf)

tiates itself from the others by having implemented two countries in a comparison setting along with possible explanations and interpretations for the generated regression outputs, which is clearly an advantage over those papers that compare multiple countries, limiting the ability and the space to elaborate on certain explications. From a practical point of view, my study will be relevant in order to give readers an insight into the commercial banking and financial intermediation dynamics in Asian countries such as Russia and Japan. Furthermore, it will also offer policymakers a foundation for debate, since my study will highlight the significant determinants of margins and spreads. Once those are known, they can advance by thinking further about reforms that make financial intermediation even more efficient. Financial intermediation is the lifeblood of investments, consumption, wealth and growth of economies. This is why profound analyses and studies are crucial in this field.

This study is structured as follows: Section 2 provides a summary of related literature with respect to the main introduced dependent and independent variables. Section 3 deals with the empirical methodology and comments on the data. Section 4 explains the major developments in the Russian and Japanese commercial banking sectors over the last 10 years. Section 5 combines the empirical results with an extensive discussion and presents interpretations of the results. The last section concludes with the major take-away of this study.

### ***1.5 Sub-Questions***

- a.) Is there a pro-cyclicality in the determinants of net interest margins and spreads from before 2008 and afterwards?
- b.) Among bank-specific, market-specific, micro – and macroeconomic variables: Which group explains the variation in net interest margins and spreads better?
- c.) How does inflation and competition influence margins and spreads?
- d.) Which are the common variables being significantly responsive to margins and spreads in both an emerging market like Russia and in a developed economy like Japan?
- e.) Which variables have to be taken into account the most by policymakers in order to increase the effectiveness of their reforms in light of the intended financial development process, including the reduction in spreads for allowing a more efficient financial intermediation?

f.) Russia adopted a decentralized banking system, whereas most economies in transition, including radical reformers, adopted a more conservative Japanese-European type being a highly concentrated model of the banking sector. Is this difference having an economically and statistically significant effect on the determinants of net interest margins and net interest spreads in Russia and Japan?

g.) Russia's banking system has been developing quickly. Does this automatically mean that Russia is becoming more and more similar in its financial intermediation dynamics compared to the developed banking system of Japan? Have they reacted differently in pre- and post-crisis period of 2008 making the relevant implemented dummy significant?

### 1.6 Hypotheses

In order to be able to answer the aforementioned sub-questions correctly, I set up hypotheses with reference to the individual variables, which I believe to be of great help in understanding the dynamics in financial intermediation and the decisive and more importantly most responsive factors. The relevant null and alternative hypotheses are listed below. The significance level applicable to this statistical hypothesis testing is determined to be  $\alpha=10\%$  which is the critical probability threshold deciding whether to either reject the null hypothesis in favor of the alternative one or not to reject it. The decision rule is based on the null hypothesis being rejected if the observed value of the regression output is located in the critical area, and fails to reject if the null hypothesis is otherwise.

**Table 1**  
**Hypotheses & Significant Level Thresholds**

Null & Alternative Hypotheses for considered dependent variables along with the significance level threshold of 10%

Variable	Null Hypothesis	Alternative Hypothesis	Significance Level Threshold
Size	$H_0: \mu=0$	$H_A: \mu \neq 0$	10%
Profitability	$H_0: \mu=0$	$H_A: \mu \neq 0$	10%
Liquidity Risk	$H_0: \mu=0$	$H_A: \mu \neq 0$	10%
Substitution Effect	$H_0: \mu=0$	$H_A: \mu \neq 0$	10%
Bank Efficiency	$H_0: \mu=0$	$H_A: \mu \neq 0$	10%
Risk Aversion & Capitalization	$H_0: \mu=0$	$H_A: \mu \neq 0$	10%
Herfindahl-Hirschman Index (D)	$H_0: \mu=0$	$H_A: \mu \neq 0$	10%
Herfindahl-Hirschman Index (L)	$H_0: \mu=0$	$H_A: \mu \neq 0$	10%
Private Sector Debt	$H_0: \mu=0$	$H_A: \mu \neq 0$	10%
Government Debt	$H_0: \mu=0$	$H_A: \mu \neq 0$	10%
Economic Growth	$H_0: \mu=0$	$H_A: \mu \neq 0$	10%
Inflation	$H_0: \mu=0$	$H_A: \mu \neq 0$	10%

## 2. Literature Review

Previous literature pointed out factors affecting net interest margins into three components:

The level of market competition and risk (Ho and Saunders, 1981), as well as operating costs (Maudos and Guevara, 2004). The ongoing debate on the driving forces of net interest margins started in a study by Ho and Saunders (1981).<sup>20</sup> The authors modeled a deposit-taking bank as a financial intermediary institution. Conclusions of the study present the behavior of banks as intermediaries between borrowers and lenders. The theoretical model shows the optimal bank interest margin depends on four factors: Risk aversion, market structure, the average transaction size and the variance of deposit and loan interest rates.

### 2.1 Dependent Variables

At first glance, net interest margins and net interest spreads might have similar consequences on financial intermediation efficiency. However, the way they are calculated has to be distinguished:

*Net Interest Margins:* Net interest margins are based on the interest income generated, which includes all interest-earning assets of the bank (outstanding loans, securities, excess reserves) minus all the interest-bearing liabilities of the bank, which it pays out to its lenders (deposits, loans, bonds) relative to the amount of total assets:  $NIM_{i,t} = (Interest\ income_{i,t} - Interest\ expenses_{i,t}) / [(Total\ assets_{i,t-1} + Total\ assets_{i,t})/2]$

*Net Interest Spreads:* The net interest spread will enable me to refine my analysis on intermediation since it is the difference specifically between the deposit rates the bank pays its depositors and the lending rates the bank charges on its outstanding loans. The spread also tends to be more sensitive to competition in the banking sector:  $NIS_{i,t} = \{Interest\ received\ from\ loans_{i,t} / [(Total\ loans_{t-1} + Total\ loans_t) / 2]\} - \{(Interest\ paid\ on\ deposits_t / [(Total\ deposits_{t-1} + Total\ deposits_t) / 2])\}$ , where t is the current year, t-1 the previous year and i an individual bank from the dataset. High interest rate spreads contribute to discouraging savers with low returns on their deposits, while charging high interest rates for loans limits financing for potential borrowers and investors. Financial systems in developing nations have been revealing significantly and persistently greater average financial intermediation spreads in comparison to developed nations according to Hanson and de Rezende Rocha (1986).<sup>21</sup> High spreads are known to originate from inefficiency,

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<sup>20</sup> <https://www.imf.org/external/pubs/ft/wp/2014/wp14163.pdf> (p. 4-6)

<sup>21</sup> <http://documents.worldbank.org/curated/en/1986/10/1558383/high-interest-rates-spreads-costs-intermediation-two-studies>

high risk-taking and lack of competition. High spreads demonstrate advantages and disadvantages. On one side of the coin, high spreads embody the pivotal mechanism through which the banks create profits and by doing this, they shield themselves against credit risk (Barajas, Steiner, Salazar; 1998).<sup>22</sup> This mechanism then leads to a gain in strength and solidifies the banking system. On the flipside, high spreads tend to be a key signal of operating inefficiency. High spreads combined with low concentration have the potential to lay the foundation for the wrong incentive of not having to enhance operating efficiency and above all the quality of loans in the portfolio.

## ***2.2 Independent Variables***

The dependent variables have been compartmentalized into four groups:

- Bank-specific variables: These variables concentrate on the characteristics of individual banks
- Market-specific variables: These variables concentrate on the influence of the commercial banking market structure
- Micro-specific variables: These variables concentrate on the impact of microeconomic conditions
- Macro-specific variables: These variables concentrate on the impact of macroeconomic conditions

### ***2.2.1 Bank-Specific Variables***

*a.) Size:* As a proxy of size, I have taken Total Assets. Berger (1995) states that the benefits of economies of scale and market power allow large banks to remain more stable than their smaller counterparts. O'Hara and Shaw (1990) add that executives of bigger banks might have factored in their access to government safety nets put in place to bail out large financial institutions in times of intense distress given their "too big to fail" status quo.<sup>23</sup> Ex-ante it is very difficult to determine the effect of bank size on interest margins. First, a positive relationship might be possible thanks to the expectation that large banks can strengthen the depositor's perception of its stability and credibility, so that the depositors might agree on accepting lower interest earnings from deposits because of higher perceived safety. This perceived safety may also be linked to large banks having the capability to diversify its activities and lower overall bank risk. As deposit rates are pushed lower, the interest spreads increase (Blaise Pua Tan, 2012).<sup>24</sup> On the other hand, Demirgüç-Kunt, Laeven and Levine (2003) illustrate by considering data from 72 countries in the period from 1995-

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<sup>22</sup> <http://www.palgrave-journals.com/imfsp/journal/v46/n2/pdf/imfsp199912a.pdf> (p.196-197)

<sup>23</sup> [http://www.gla.ac.uk/media/media\\_199406\\_en.pdf](http://www.gla.ac.uk/media/media_199406_en.pdf) p. 11

<sup>24</sup> <https://www.imf.org/external/pubs/ft/wp/2012/wp12123.pdf>



99 an increased probability for large banks to have smaller net interest margins, as they can take advantage of economies of scale.<sup>25</sup>

b.) *Profitability*: As a proxy for profitability, I used the Return on Average Assets, whereby the average assets are not the assets at the end of the year, but the average assets throughout the respective year. The rationale behind this variable is that the more profitable a bank is, the less risky it is perceived to be by depositors. This is why deposit rates are expected to sink widening the net interest margin and spread.

c.) *Liquidity*: Liquidity is proxied by the Liquid Assets to Short-Term Liabilities ratio. The utilization of this ratio is intuitive because the more liquidity the bank has on the side lines, the bigger the opportunity costs of not investing and therefore gaining higher returns on those liquid assets. The comparison of liquid assets to short-term liabilities is relevant because deposits mostly belong to short-term debt. Illiquidity can be caused by the interest mismatch or maturity mismatch. The higher the liquidity ratio, the lower the liquidity risk, but the opportunity cost of holding liquidity rises, resulting in banks charging higher net interest spreads (Nassar, Martinez and Pineda, 2014).<sup>26</sup> Banks are liquidity service providers. Since it is possible to create a Pareto optimal condition, it is not possible to fully cover liquidity risk.<sup>27</sup> In order to minimize the liquidity risk, it is required to have an efficiently working interbank market.<sup>28</sup> However, especially in the case of Russia this is not a given condition and therefore makes liquidity risk a relevancy to deposit holders of individual Russian commercial banks. Liquidity is a potential risk which should not be ignored, above all after the beginning of the financial crisis of 2008/09 when additionally the interbank markets had been under pressure and cost of funding skyrocketed. In pre-crisis periods, interbank markets can serve as a cheap funding source reducing loan rates, but during times of distress, too much of a focus on money market funding can turn out to be very expensive.

d.) *Cross-Subsidization*: The potential of cross-subsidization within the banks is accounted for by the Total Non-interest Income to Total Assets ratio. A crucial contribution has been made by Carbo

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<sup>25</sup> <http://www.nber.org/papers/w9890.pdf>

<sup>26</sup> <https://www.imf.org/external/pubs/ft/wp/2014/wp14163.pdf>

<sup>27</sup> [https://www.macro-economics.tu-berlin.de/fileadmin/fg124/financial\\_crises/literature/Diamon\\_Dybvig\\_Bank\\_Runs\\_\\_Deposit\\_Insurance\\_\\_and\\_Liquidity.pdf](https://www.macro-economics.tu-berlin.de/fileadmin/fg124/financial_crises/literature/Diamon_Dybvig_Bank_Runs__Deposit_Insurance__and_Liquidity.pdf)

<sup>28</sup> <http://www.nyu.edu/econ/user/galed/archive/Preference%20shocks,%20liquidity%20and%20central%20bank%20policy.pdf>

& Rodriguez (2007). They developed a model encompassing both aforementioned income streams testing the European banking system. Their result underlines that diversification in non-interest banking activities cause a decrease in the spread due to a potential cross-subsidization effect.<sup>29</sup> On the other hand, Williams and Rajaguru (2010) used panel vector auto-regressions by including Australian banks. Their finding is based on increases in the banks' non-interest income were utilized to complement declines in the net interest margin. Even so, the degree of the rise in the non-interest income is punier than the fall in the net interest margins. Furthermore they have shown that the growth in non-interest income leapfrog the plummeting in the so-called interest-sensitive margin income, emphasizing the proactivity of Australian banks whilst the process of disintermediation.<sup>30</sup> Increases in non-interest income not only push up the volatility in profits, but also contribute to the worsening of the U.S. banks' risk-return trade-off (DeYoung and Rice, 2004).<sup>31</sup>

*e.) Bank Efficiency:* As a proxy, I use the Cost-to-Income ratio in order to get an insight into the bank's efficiency. The ratio compares personnel expenses and operating costs to operating income before provisions. It is a measure of how costly it is for a commercial bank to create a unit of operating income in terms of costs. Inefficiency causes higher costs and as a result of this, wider net interest margins and net interest spreads. The higher the ratio, the more inefficient the bank and vice versa. The cost-to-income ratio is computed by dividing operating and personnel expenses by the sum of total net interest income and total non-interest income.

*f.) Risk Aversion:* As a proxy for risk aversion, I use the Equity-to-Total Assets ratio, whereby the book value of equity is considered here. The higher this ratio is, the more risk-averse the bank is. A high equity-to-total assets ratio may indeed have different consequences. The higher the ratio the less risky it might be also perceived by depositors who in turn might be satisfied with lower deposit rates, having a positive effect on net interest margins and net interest spreads. At the same time though, the higher risk aversion might lead the bank to invest more of the deposits into less risky loans or even in fixed-income securities with a low risk profile, lowering both net interest margins and net interest spreads. Claeys and Vander Vennet (2008) point out that a higher equity-

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<sup>29</sup> <http://www.ugr.es/~franrod/CarboRodJBF.pdf>

<sup>30</sup> [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1007166](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1007166)

<sup>31</sup> [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=487704](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=487704)

to-total assets ratio indicates a better credit-worthiness, which ensures lower deposit rates. It also provides the banks with the flexibility to invest in riskier assets with higher returns and higher loan rates. In addition, the findings of their study for Central and Eastern European countries for the period from 1994 – 2001 reveal the positive relationship on the Net Interest Margin.<sup>3233</sup> What is more interesting though is that its impact is twice as large for transition economies (to which Russia belongs) than developed countries (to which Japan belongs). Because equity is more costly than deposits, it is likely to be reflected in higher margins.

### 2.2.2 Market-Specific Variables

g.) *Market Concentration:* is captured by the Herfindahl-Hirschman Index (HHI). The HHI is calculated by taking the sum of squares of individual deposit market and loan market shares of all operating commercial banks:  $HHI = (MS_1)^2 + (MS_2)^2 + (MS_3)^2 + (MS_4)^2 + \dots + (MS_t)^2$ , where t refers to the respective year. The HHI ranges between 0 and 10,000, whereby 0 implies perfect competition and 10,000 means that an individual bank having 100% of the market share.<sup>34</sup> The U.S. Department of Justice, for example, avails itself of a benchmark of 1,000. Results below that benchmark indicate a competitive market, whereas results of 1,000 to 1,800 demonstrate a moderately concentrated market as confirmed by Twomey, Green, Neuhoff, Newbery (2005).<sup>35</sup> I applied the HHI on two underlying markets: The deposit and the loan markets. More concentration in either of the markets may increase market power and eventually lead to higher margins and spreads. Turk Ariss (2010) demonstrates that different extents of market power do have implications on bank efficiency and risk in developing countries.<sup>36</sup> The climb in market power tends to result in two outcomes: Firstly, it increases bank risk. Secondly, it increases profit efficiency. Maudos and Guevara (2004) came up with an extension of Ho and Saunder`s theoretical model by considering operational costs as a determinant of net interest income, and based their estimations on the European banking sector over the period of 1992-2000. Moreover, they included market

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<sup>32</sup> [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1260861](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1260861)

<sup>33</sup> <https://www.imf.org/external/pubs/ft/wp/2013/wp1334.pdf>

<sup>34</sup> <http://www.investopedia.com/terms/h/hhi.asp>

<sup>35</sup> [http://web.mit.edu/ceep/www/publications/reprints/Reprint\\_209\\_WC.pdf](http://web.mit.edu/ceep/www/publications/reprints/Reprint_209_WC.pdf) (p. 17-20)

<sup>36</sup> [http://www.researchgate.net/publication/46497233\\_On\\_the\\_Implications\\_of\\_Market\\_Power\\_in\\_Banking\\_Evidence\\_from\\_Developing\\_Countries](http://www.researchgate.net/publication/46497233_On_the_Implications_of_Market_Power_in_Banking_Evidence_from_Developing_Countries)

forces (market power) by using the Lerner Index as a proxy for market concentration. Their result is that an increasing index of market concentration has positive effects on net interest margins.

### **2.2.3 Micro-Specific Variables**

- h.) Private Sector Debt:* The variable is Private Sector Debt to GDP, which takes into account only the debt of non-financials and households, but not of financial corporations. The financial corporations are not included, since a large part of them are commercial banks. The leverage of banks is taken care of by the variable equity-to-total assets ratio on the bank level. They are not included due to a high likelihood of significant correlation between these variables. Companies might be overleveraged, decreasing the flexibility of them to obtain new loans. If loans are provided, interest rates might be too high. Banks might be also risk-averse and not willing to lend at all. The riskier the loans, the higher the lending rates, thus the higher the intermediation spread.
- i.) Government Debt:* As a proxy, I implement Government Debt-to-GDP ratio. Government deficits that have to be financed by domestic resources might be an opportunity for the banking system for a relative safe investment of their deposit base, thereby driving up lending rates and reducing the amount of financial resources channeled to private sector credit. This might crowd out credit to the private sector. Especially, for a country like Japan, which has the highest government debt-to-GDP ratio in the world according to the International Monetary Fund and World Bank<sup>37</sup>, this variable is relevant to check upon. Tennant and Folawewo`s (2009) research on 33 countries validate my assumption of relevancy of this variable.<sup>38</sup>

### **2.2.4 Macro-Specific Variables**

- j.) Real GDP growth per capita:* Usually what is observed in the banking industry is the pro-cyclicality of lending, meaning that banks tend to lend more during economic booms, are very careful and tighten their lending standards once the economy experiences a bust or sluggish growth (Berger & Udell 2003).<sup>39</sup> In order to have a more precise understanding of GDP growth and due to the fact that in both countries Russia and Japan, population growth has been a negative trend, I use

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<sup>37</sup> <http://data.worldbank.org/indicator/GC.DOD.TOTL.GD.ZS>

<sup>38</sup> [https://www.centralbank.org.bz/docs/rsh\\_4.5\\_conferences-working-papers/determinants-of-interest-rate-spreads-in-belize.pdf?sfvrsn=4](https://www.centralbank.org.bz/docs/rsh_4.5_conferences-working-papers/determinants-of-interest-rate-spreads-in-belize.pdf?sfvrsn=4) (p.13-14)

<sup>39</sup> [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=386622](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=386622)

GDP per capita. In Bernanke and Gertler's (1989) study paper, it was highlighted that borrowers' creditworthiness worsens together with their net worth (as asset prices tumble and adversely affect collateral values) during recessions. The outcome is that banks either stop lending or lend at high interest rates.<sup>40</sup>

k.) *Inflation*: Research conducted by Brock and Rojas (2000)<sup>41</sup> suggests that inflation indeed contributes to spreads. Rising inflation is reflected in the high bank intermediation margins consequently. Elevated inflation has the potential to blur decision-making on bank level, deteriorate information asymmetry and drive price volatility. Inflation means economic uncertainty and hence tends to enlarge margins. An important remark, though, is that the rate on the liabilities can also adjust quicker than the interest rate on the asset side of banks (Claeys and Vander Venet, 2008), leading to a negative relationship between inflation and the spread.

### ***2.3 Additional Variables for Robustness Testing Purposes***

l.) *Population growth*: Population growth might not only drive GDP growth, but also deposit growth. The more people there are, the more deposit accounts should be opened. This contribution to a greater deposit supply may have the potential to drive down deposit rates and at the same time increase net interest spreads. Another option could be that the larger the population, the more lending to households and firms there will be, allowing more diversification in the loan portfolios of banks, reducing risk and thus lowering deposit rates. The lending rates are expected to be driven higher as well due to a pick-up in credit demand.

m.) *Money Supply growth*: Real money supply M2 is taken into consideration as a variable, which is indicative of financial development and financial deepening of the country. According to Ciftcioglu & Almasifard (2015)<sup>42</sup> work paper and the World Bank<sup>43</sup>, it is the degree of monetization. A lower degree of monetization implies a lower extent of the financial system's development that may represent a subsequent lower level of efficiency in intermediation services reflecting greater spreads. According to the Money Supply Rule presented in Carlin and Soskice's book

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<sup>40</sup> <http://www.nber.org/papers/w2015.pdf>

<sup>41</sup> <https://jsis.washington.edu/latinam/file/BrockRojasBankSpreadsJDevEcon2000.pdf>

<sup>42</sup> [http://jedsnet.com/journals/jeds/Vol\\_3\\_No\\_2\\_June\\_2015/1.pdf](http://jedsnet.com/journals/jeds/Vol_3_No_2_June_2015/1.pdf)

<sup>43</sup> <http://siteresources.worldbank.org/INTTOPACCFINSER/Resources/Banking.pdf>

(2006)<sup>44</sup>, growth of money supply determines the rate of inflation in the medium-run equilibrium. Since, by definition of the medium-run equilibrium, inflation is constant, the real demand for money is constant, too. The consequence of the requirement that the money market is in equilibrium is that the real supply of money must also be constant. To keep the real money supply constant, the price level must increase at the same rate as the nominal money supply that is under the control of the central bank. The medium-run equilibrium is marked by a constant inflation rate being equal to the constant growth rate of the money supply set by the central bank. When operating a monetary rule, the central bank's operations have to guarantee that the money market is in equilibrium, otherwise the interest rate would not remain at the desired level and start moving up or down.

*n.) Operating Efficiency:* The proxy used is the Operating Expenses-to-Total Assets ratio. The higher the operating costs relative to total assets, the higher the inefficiency, thus the wider the spread in order to cover those costs. Gerlach, Peng and Shu (2005) tested 29 retail banks in Hong Kong during the period between 1994 and 2002 and found out that there is a pass-through effect of operating costs to the interest spread.<sup>45</sup> Furthermore, Doliente (2005)<sup>46</sup> and Demirgüç-Kunt and Huizinga (1999)<sup>47</sup> findings are based on their conclusion that there is at least a part of operating costs transferred to the net interest spread.

*o.) Credit Risk:* The proxy for credit risk is the Total Credit Reserves-to-Total Loans. The primary proxy used for credit risk in other academic papers is non-performing loans. Owing to the lack of an ample amount of data, I am not able to proxy credit risk by the ratio of non-performing loans to total assets. The rationale behind credit risk is that the more credit reserves relative to loans are held, the more opportunity costs there are which are likely to be, at least partially, forwarded in the form of a wider spread.

*p.) Specialization in Loan Business:* The ratio of Loans-to-Total Assets, implying the specialization in loans, may have a positive relation to bank risk. The intuition behind this is that the greater the exposure to loans is, the higher the likelihood of default risk according to Liu (2010)<sup>48</sup>. In case of

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<sup>44</sup> Macroeconomics: Imperfections, Institutions & Policies (Carlin & Soskice), p. 81-96

<sup>45</sup> <http://www.bis.org/publ/bppdf/bispap22x.pdf>

<sup>46</sup> [http://www.cba.upd.edu.ph/phd/docs/jsd\\_afel.pdf](http://www.cba.upd.edu.ph/phd/docs/jsd_afel.pdf)

<sup>47</sup> [http://www.dnb.nl/binaries/Working%20Paper%20387\\_tcm46-295326.pdf](http://www.dnb.nl/binaries/Working%20Paper%20387_tcm46-295326.pdf) (p.21 – 22)

<sup>48</sup> [http://www.gla.ac.uk/media/media\\_199406\\_en.pdf](http://www.gla.ac.uk/media/media_199406_en.pdf) p. 11

loans as a proportion of assets being small, however, it will have a negative repercussion on profits, while profits are the buffer to default risk. The expectations rely upon the optimal allocation to loans relative to assets. In this field, though, there are few empirical papers with a clear conclusion. Therefore, the effect of loans to assets on bank risk is not evident and has to be seen on an individual country basis. The difficulty here is also to define the optimal allocation of the loan portfolio to each commercial bank.

*q.) Deposit Funding:* The variable used here is the Total Customer Deposits-to-Total Funding ratio, which gives me an insight into the funding structure of the individual bank and tests whether it is a significant economic and statistical determinant of net interest margins and spreads. It attempts to account for the funding risk of the bank. A high and increasing loan-to-deposit ratio in combination with a low total customer deposits-to-total funding ratio might be an indication for a more emphasized funding by foreign capital inflows, which in turn might require the adequate coverage and internalization of the currency risk involved. This variable serves to not only understand the effect of liquidity risk, but also to decompose the spread into many risk segments, including credit risk mentioned above and funding risk here.

### **3. Data**

#### ***3.1 Information about Data***

The necessary data for dependent and independent variables is retrieved from various databases. For the bank-specific variables, I use the Bankscope database of Bureau van Dijk from which I extract detailed information on individual bank balance sheets and income statements. Factset is also used as a supporting database to verify and find additional information on bank-specific variables. Hereby, an unbalanced panel of 139 Japanese and 827 Russian deposit-taking commercial banks is used. For micro- and macro-specific variables, the IMF Financial Statistics, the World Bank and the Economic Research of Federal Reserve of St. Louis databases are utilized.

The data constitutes an unbalanced panel, as there were banks entering and leaving the market due to mergers and failures. I originally cleaned the data first by excluding observations for which the past 3 year average loans to asset ratio is lower than 5%. After receiving the smaller sample of banks, I drop the upper and lower 1% from both tails. Commercial banks with missing data for three or more years were not

considered. Moreover, not only the loans to asset ratio is relevant, but also the total customer deposit to total funding ratio. The same 5% threshold is applied by eliminating those banks, which have been funding themselves with 5% or less by taking on customer deposits in the past 3 years. Once this is completed, I take out the 1% from both tails with respect to the two explanatory variables (NIM & NIS) as well as after calculating the mean over the entire sample period of 2005-2014. These methods serve to account for potential outliers and to have a clean data set to work with. Even though, these restrictions were applied and worked with, this sample was not included in this work. If these restrictions are in place the number of Russian commercial banks is reduced from 829 to 488, meaning that more than 41% of the commercial banks could not be considered. This is an essential percentage and would definitely distort the existing nature of the Russian commercial banking sector. The Russian commercial banking sector is in a developing stage with a lot of banks which are missing data points, which are very small or which have been very unprofitable during the last years and are expected to fail. This however does not mean that we should not consider them, as small and unprofitable banks are a large part of the banking sector when we take into account their total number. This study focuses on the entire commercial banking sector of both countries to give a broad overview of the general circumstances within the commercial banking sectors.

### 3.2 Dependent Variables

**Table 2**  
**Dependent Variables**

The Dependent Variables for this study, which are the Net Interest Margins and the Net Interest Spreads are listed here, covering their notations, descriptions and statistical details such as the means, standard deviations, medians, maximums and minimums.

Variable	Notation	Description	Mean	St. Dev.	Median	Max./Min.
Net Interest Margin (%)	NIM	$= (\text{Interest income}_{i,t} - \text{Interest expenses}_{i,t}) / [(\text{Total assets}_{i,t-1} + \text{Total assets}_{i,t}) / 2]$	1.51 6.62	0.34 2.86	1.50 6.29	2.77/0.00 28.96/-1.50
Net Interest Spread (%)	NIS	$\{ \text{Interest received from loans}_{i,t} / [(\text{Total loans}_{t-1} + \text{Total loans}_t) / 2] \} - \{ (\text{Interest paid on deposits}_t / [(\text{Total deposits}_{t-1} + \text{Total deposits}_t) / 2]) \}$	0.45 -5.19	0.11 19.72	0.45 -1.31	1.03/-0.07 36.13/-395.01

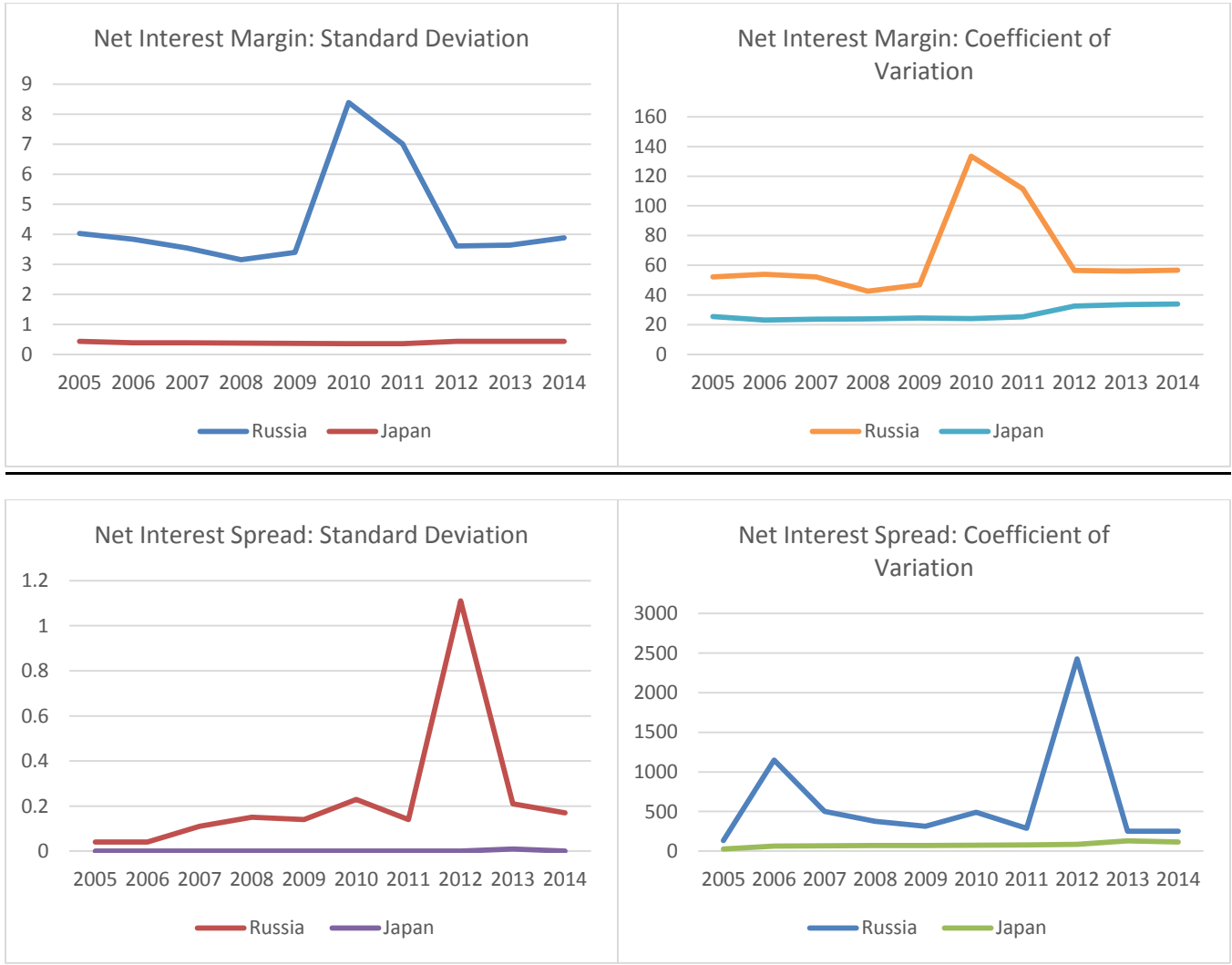
\*Net Interest Spread: Own calculations by usage of Bankscope data



**Figure 1**

**Net Interest Margins & Net Interest Spreads**

Here the standard deviations and coefficients of variation of Net Interest Margins & Net Interest Spreads (2005-2014) for the entire commercial banking sectors in Russia and Japan are illustrated. The coefficients of variation serve as the interpretation of relative dispersion. The standard deviation is hereby measured in terms of its proportion to the mean. The standard deviations and coefficients of variations are both presented as percentages



### 3.3 Independent Variables

**Table 3**  
**Bank-Specific Variables**

Among the independent variables, more precisely the bank-specific variables' notations and descriptions are included in this table, together with their statistical details such as the means, standard deviations, medians, maximums and minimums.

Variable	Notation	Description	Mean	St. Dev.	Median	Max/Min.
Size	TA	Total Assets	70,837,700	213,110,533	24,798,134	2,005,370.659/996,740
			1,237,579	9,080,927	90,645	267,910,612/440
Profitability	ROAA	Return on Average Assets (%)	0.15	0.67	0.22	6.17/-9.70
			1.53	3.26	1.17	55.73/-109.12
Liquidity Risk	LIQ	Liquid Assets to Short-Term Liabilities (%)	7.50	7.99	5.66	91.73/1.49
			66.27	58.34	54.41	967.98/2.22
Substitution Effect	SUB	Total Non-Interest Income to Total Assets (%)	0.27	0.26	0.26	1.81 / -2.65
			17.90	22.31	11.06	339.57/-11.32
Cost Efficiency	CTP	Cost-to-Income Ratio (%)	70.83	32.45	69.65	784.62/38.26
			81.92	21.80	88.80	759.41/8.86
Risk Aversion & Capitalization	EQT	Equity to Total Assets Ratio (%)	5.20	2.99	5.08	84.95/-14.43
			19.47	13.65	15.02	99.83/-64.54

\*Liquid Assets to Short-Term Liabilities along with Total Non-Interest Income to Total Assets: Own calculations by usage of Bankscope data

**Table 4**  
**Market-Specific Variables**

Among the independent variables, more precisely the market-specific variables' notations and descriptions are included in this table, together with their statistical details such as the means, standard deviations, medians, maximums and minimums

Variable	Notation	Description	Mean	St. Dev.	Median	Max./Min.
Herfindahl-Hirschman Index	HHD	Market Concentration for Deposits	3.94	28.24	0.09	505.37/0.00
			1.65	23.90	0.00	632.76/0.00
Herfindahl-Hirschman Index	HHL	Market Concentration for Loans	6.04	37.46	0.12	400.21/0.00
			1.65	27.51	0.00	724.37/0.00

\*Herfindahl-Hirschman Indexes for Deposits and Loans: Own calculations by usage of Bankscope data

**Table 5**  
**Microeconomic-Specific Variables**

Among the independent variables, more precisely the microeconomic-specific variables' notations and descriptions are included in this table, together with their statistical details such as the means, standard deviations, medians, maximums and minimums

Variable	Notation	Description	Mean	St. Dev.	Median	Max./Min.
Private Sector Debt	PSD	Private Sector Debt to GDP – takes into account only the debt of non-financials and households, but not of financial corporations	170.33 55.81	4.00 11.28	169.40 55.93	179.63/166.20 70.83/33.16
Government Debt	GD	Government Debt to GDP	212.89 11.72	24.98 2.47	213.10 11.49	245.05/183.01 15.91/7.98

\*Private Sector Debt: Own calculations by usage of Russian Central Bank (CBR), Federal Reserve Bank of St. Louis and World Bank data

**Table 6**

### Macroeconomic-Specific Variables

Among the independent variables, more precisely the macroeconomic-specific variables' notations and descriptions are included in this table, together with their statistical details such as the means, standard deviations, medians, maximums and minimums.

Variable	Notation	Description	Mean	St. Dev.	Median	Max./Min.
Economic Growth	GDP	Real GDP per capita growth	0.66 3.33	2.68 4.98	1.46 4.32	4.63/-5.52 8.72/-7.85
Inflation	INFL	Inflation	0.21 9.21	1.14 2.86	0.01 8.72	2.74/-1.35 14.11/ 5.07

### 3.4 Expected Impacts

**Table 7**

### Expected Impacts

The independent variables are listed in the table with the expected impacts they are likely to have on the net interest margins and the net interest spread. Moreover, the number of observations are indicated. The first figure shows the number of observations for Japan, whereas the second one stands for Russia. The third number is the total sum of observations sorted out in the dataset

Variable	Expected Impact NIM	Expected Impact NIS	Observations
Net Interest Margin	-	-	1,106/4,674=5,780
Net Interest Spread	-	-	1,110/4,870=5,980
Size	Positive/Negative	Positive/Negative	1,106/4,716=5,822
Profitability	Negative	Negative	1,106/4,705=5,811
Liquidity Risk	Negative	Negative	1,105/4,583=5,688
Substitution Effect	Negative	Negative	1,110/4,850=5,960
Bank Efficiency	Positive	Positive	1,103/4,711=5,814
Risk Aversion & Capitalization	Positive	Positive	1,106/4,648=5,754
Herfindahl-Hirschman Index (D)	Positive	Positive	1,108/4,687=5,795
Herfindahl-Hirschman Index (L)	Positive	Positive	1,108/4,736=5,844
Private Sector Debt	Positive	Positive	10/10=20

Government Debt	Positive	Positive	10/10=20
Economic Growth	Positive	Positive	10/10=20
Inflation	Positive	Positive	10/10=20

### 3.5 Methodology

The five core components of my methodology part are the following:

Correlation Matrix: Before running the panel fixed effects regression (OLS), I will create a correlation matrix in order to check whether there is a significant positive correlation between independent variables and get an insight into possible multi-collinearity. Those variables correlating strongly with each other will be taken out from the panel regression, mainly those having significant correlations at the 1% and 5% levels. If I have two variables explaining the same aspect in a regression they ought to be removed. High correlations among the variables produce “unreliable and unstable estimates of regression coefficients”<sup>49</sup>. The Variance Inflation Factor (VIF) serves a support tool to decide on which one of the significantly correlated variables should be dropped. The VIF is computed for each predictor by conducting a linear regression of that predictor on all the other predictors, and afterwards receiving the  $R^2$  from that regression. The VIF is complemented by  $1/(1-R^2)$ . It is an estimation of how much the variance of a coefficient is inflated due to linear dependence with other variables. A VIF of 1.7 tells that the variance - being the square of the standard error of a particular coefficient - is 70% larger than it would be if that predictor was entirely uncorrelated with all the other predictors. Bank-specific, market-specific, micro- and macroeconomic-specific variables will be all considered together for possible significantly positive correlations.

Augmented Dickey-Fuller Test: This test serves to make sure the order of integration and the order of differencing necessary to make each time series stationary. This test is relevant when you have small N (few banks) observed over many years, meaning with a large T. However, since I have an annual dataset for 10 years with up to 139 banks in the full dataset for the Japanese and 827 banks for the Russian commercial banking sector, I opted to drop the testing of unit roots within the framework of the Augmented Dickey-Fuller Test. On the other hand, it is consensually considered that GDP growth (though not GDP levels!), inflation and other growth rates included in this study are stationary, so this justifies not to be particularly concerned with the issue.

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<sup>49</sup> <http://statisticalhorizons.com/multicollinearity>

Autocorrelation: As the EViews package does not automatically use t-statistics (or z-statistics) with autocorrelation - consistent standard errors, the standard errors will underestimate the actual estimation uncertainty, so that I would find a larger number of significant regressors than there is in reality. Thus, I implemented the White Period method, which handles clustering by cross-section. This method assumes that the errors for a cross-section are heteroskedastic and serially correlated. The resulting t-statistics are thus autocorrelation and heteroscedasticity-consistent.

OLS panel regression: This dated panel regression will define which the significant driving factors of Japanese and Russian net interest margins and spreads are. Moreover, I will look into fixed and random effect models and explain which one is more appropriate for my study.

$$\begin{aligned}
 NIM_{i,t} &= \beta_0 + \beta_1*TA_{i,t} + \beta_2*ROAA_{i,t} + \beta_3*LIQ_{i,t} + \beta_4*SUB_{i,t} + \beta_5*CTP_{i,t} + \beta_6*EQT_{i,t} + \beta_7*HHD_t \\
 &\quad + \beta_8*HHL_t + \beta_9*PSD_t + \beta_{10}*GD_t + \beta_{11}*GDP_t + \beta_{12}*INFL_t + \beta_{13}D + \varepsilon_{i,t} \\
 NIS_{i,t} &= \beta_0 + \beta_1*TA_{i,t} + \beta_2*ROAA_{i,t} + \beta_3*LIQ_{i,t} + \beta_4*SUB_{i,t} + \beta_5*CTP_{i,t} + \beta_6*EQT_{i,t} + \beta_7*HHD_t \\
 &\quad + \beta_8*HHL_t + \beta_9*PSD_t + \beta_{10}*GD_t + \beta_{11}*GDP_t + \beta_{12}*INFL_t + \beta_{13}D + \varepsilon_{i,t}
 \end{aligned}$$

where  $i$  represents the individual bank,  $t$  equals the respective year,  $\alpha_i$  the fixed effects intercept and  $\varepsilon_{it}$  the i.i.d. error term. To prevent direct effects of the 1998 Asian financial crisis and the Internet bubble in 2001, I concentrate on the sample period of 2005 to 2014, which helps me to direct my attention to the period before and after the 2008/09 crisis. The majority of the panel data models are estimated by the use of either random effects or fixed effects assumptions. Marno Verbeek's book "A Guide to Modern Econometrics"<sup>50</sup> supports me to identify the model, which is more suitable to my study. A fixed effects model is a linear model in which intercept terms vary over individual commercial banks, but not over time. More specifically, the model can be laid out as:  $y_{it} = \alpha_i + x'_{it}\beta + \varepsilon_{it}$ ,  $\varepsilon_{it} \sim I.I.D (0, \sigma^2_\varepsilon)$  where  $y_{it}$  stands for the dependent variable for commercial bank  $i$  at time  $t$ ,  $\alpha_i$  consider the characteristics that are one of a kind to commercial bank  $i$  and do not alter over time,  $x'_{it}$  is a vector of explanatory variables and  $\varepsilon_{it}$  refers to the disturbance term. This equation can also be put within the framework of a normal regression by including a dummy variable for each commercial bank  $i$  in the model as:  $y_{it} = \sum_{j=1}^N \alpha_j d_{ij} + x'_{it}\beta + \varepsilon_{it}$ , where  $d_{ij} = 1$  if  $i = j$  and 0 elsewhere. The parameters  $\alpha_1, \alpha_2, \dots, \alpha_N$  and  $\beta$  can be estimated by OLS and the estimator for  $\beta$  in that case is generally denoted as Least Squares Dummy Variables (LSDV) estimator. To reduce the

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<sup>50</sup> "A Guide to Modern Econometrics", M. Verbeek (p. 345-358)

inconvenience of working with numerous dummy variables, the data can be changed into a much easier form through the implementation of a procedure named “within transformation”.

Hence, the OLS estimator of  $\beta$  of the moderated model is generally called fixed effects estimator. On the flipside, a random effects model presumes that all the sample observations are taken from the same distribution with the same mean and variance. To put differently, it assumes that  $\alpha_i$ 's are random factors that are identically and independently distributed over every bank individually. This model can be shown in the following simple form:  $y_{it} = \mu + x'_{it}\beta + \alpha_i + \varepsilon_{it}$ ,  $\varepsilon_{it} \sim I.I.D(0, \sigma^2_\varepsilon)$ ;  $\alpha_i \sim I.I.D(0, \sigma^2_\alpha)$ , where  $\mu$  is the intercept term,  $\alpha_i$  is the bank specific component of the error term, which does not change over time and  $\varepsilon_{it}$  is the time-variant component. This model anticipates that as long as  $\alpha_i$  and  $\varepsilon_{it}$  are mutually independent and independent of  $x_{js}$  (for all  $j$  and  $s$ ), the OLS estimator is non-biased and proves to function under a high degree of consistency. If the assumptions of random effects model are true, I can ensure with strong confidence that it is more efficient than a fixed effects model, thus it should be favored. In contrast, due to the dataset comprising recurrent observations over the same commercial banks, it may not make sense to anticipate that different observations are independent from each other. For example, net interest margins and spreads of individual commercial banks may be under the influence of unobservable bank characteristics that modify themselves sparsely over time. For that reason, a non-compliance of the independently and identically distributed error terms assumption may cause the computed standard errors for the OLS estimator in random effects model to be plainly wrong. Considering these facts, a fixed effects model has a heightened potential to be more efficient than a random effects model. The implementation of the unbalanced panel regression gives enough sample observations to create statistical conclusions. A dummy variable (D) is implemented to consider the time effects, where dummy  $D = 1$  if post-crisis period (2005-2008), and otherwise dummy = 0 if pre-crisis period (2009-2014).

Robustness Tests: Here I excluded banks with major foreign and state ownership structure. Furthermore, I would like to replace the following variables in order to see the effects they have on spreads and margins:

- Exclude banks with foreign ownership, then exclude state banks. The third step involves including both foreign banks & state banks
- Replacement of GDP per capita growth with population growth
- Replacement of inflation with real money supply growth M2
- Replacement of cost-to-income with operating expenses to total assets

- Replacement of equity to total assets with credit risk reserves to loans
- Replacement of HHI loans with loans to total assets
- Replacement HHI deposits with deposits to total funding

**Table 8**

**Additional Variables for Robustness Testing Purposes**

Among the independent variables, more precisely the additional variables' notations and descriptions are included in this table, together with their statistical details such as the means, standard deviations, medians, maximums and minimums. These variables are implemented solely for my robustness testing purposes.

Variable	Notation	Description	Mean	St. Dev.	Median	Max./Min.
Population Growth	POP	Population	-0.05	0.12	0.00	0.11/-0.20
		Growth (%)	-0.02	0.21	0.04	0.22/-0.38
Money Supply	MS	Money Supply	225.39	18.77	226.54	251.24/202.80
		(M2) to GDP (%)	47.36	8.67	50.29	60.26/33.38
Operating Costs (Cost Efficiency)	OPA	Operating Ex-	1.32	0.68	1.20	10.09/-1.26
		penses to Total Assets (%)	43.70	57.79	28.34	935.21/-16.18
Credit Reserves	CR	Credit Reserves to	1.72	1.71	1.37	27.18/0.00
		Total Loans (%)	9.77	24.33	6.35	441.45/-1,227.39
Specialization on Loans	LF	Total Loans to To-	63.47	9.81	64.98	85.66/0.09
		tal Assets (%)	55.28	16.63	57.57	97.30/-1.03
Deposit Funding	DF	Total Customer	93.83	9.24	96.35	100.00/25.56
		Deposits to Total Funding (%)	26.12	20.61	20.57	99.83/0.00

\*Operating Expenses to Total Assets, Credit Reserves to Total Loans, Total Loans to Total Assets along with Total Customer Deposits to Total Funding: Own calculation by the usage of Bankscope data

**Table 9**

**Expected Impact: Additional Variables for Robustness Testing Purposes**

The additional independent variables are listed in the table with the expected impacts they are likely to have on the net interest margins and the net interest spread. Moreover, the number of observations are indicated. The first figure shows the number of observations for Japan, whereas the second one stands for Russia. The third number is the total sum of observations sorted out in the dataset.

Variable	Expected Impact NIM	Expected Impact NIS	Observations
Population Growth	Positive	Positive	10/10=20
Money Supply	Positive	Positive	10/10=20
Operating Costs	Positive	Positive	1,100/4,790=5,890
Credit Reserves	Positive	Positive	1,100/4,760=5,860
Specialization on Loans	Positive	Positive	1,100/4,820=5,920
Deposit Funding	Positive	Positive	1,100/4,870=5,970

#### 4. Overview of the Russian & Japanese Commercial Banking Sectors

The Russian commercial banking sector currently consists of 827 banks, of which 68 are foreign and 9 state-owned. The sector is consolidating slowly. Russia's banking sector is still underdeveloped, but is quickly improving.

##### Net Interest Margins

The Russian commercial banks' net interest margin has been declining with a CAGR of -1.21%. While in 2005 the net interest margin stood at 7.72%, it was only 6.83% in 2014. The previous years leading to the year of 2005, the net interest margin could be found between 7-8%, from 2005 until 2014, this level dropped to 6-7%. In contrast, the Japanese commercial banking net interest margin has been seeing a clean and constant downward trend from 1.71% in 2005 to 1.30% in 2014, declining at a rate of CAGR 2.71%. This observation means that the Japanese commercial banking net interest margins are not only significantly lower than Russian ones, but they are also declining much faster. After the stock and property market bubbles burst in 1990, the discount rate was cut from 6% in 1991 to 0.1% in 2001 by the Bank of Japan. This interest rate cut had two major implications: It pushed market prices of securities higher leading to the realization of capital gains and steepened the yield curve, so that short-term funding rates adjusted quicker than long-term rates, widening net interest margins. This meant also that bond yields fell and despite low levels of nominal interest rates, the deflationary environment has laid the foundation for disincentives with respect to private investors in terms of taking out loans. Real rates based on declining inflation stayed well above positive levels throughout the decade. The real value of the repayment of those loans increased so much that it generally surpassed the loan amount initially granted.<sup>51</sup> Even collateral-based lending and loans for property market investments saw themselves confronted by severe disinflation and deflation. Asset values decline while the real loan repayment values rise. This means that while investors and borrowers would suffer a capital loss, they would face an even higher servicing burden on top of it. These are the drivers of low credit demand. Nonetheless, in a deflationary environment it makes sense to save money since the real value of cash increases over time. Savings have jumped up in Japan and plowed into deposits. Japanese commercial banks, thus faced, shrinking credit demand, but an increase in deposits. This structural overhang of deposits over loans pushed the banks to invest in Japanese government bonds (JGBs). Public lending growth got larger than private lending growth. It also enabled

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<sup>51</sup> [https://www.dbresearch.com/PROD/DBR\\_INTERNET\\_EN-PROD/PROD000000000315257/Ultra-low\\_interest\\_rates%3A\\_How\\_Japanese\\_banks\\_have\\_.pdf](https://www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD000000000315257/Ultra-low_interest_rates%3A_How_Japanese_banks_have_.pdf)



them to de-risk, while keeping the sheer size of their balance sheets constant. Another benefit was that they had to assign zero risk weights to government bond holdings. The narrow spreads between JGBs and deposits could only cushion, but not compensate for the total loss in profitability in lending activities.

### Net Interest Spreads

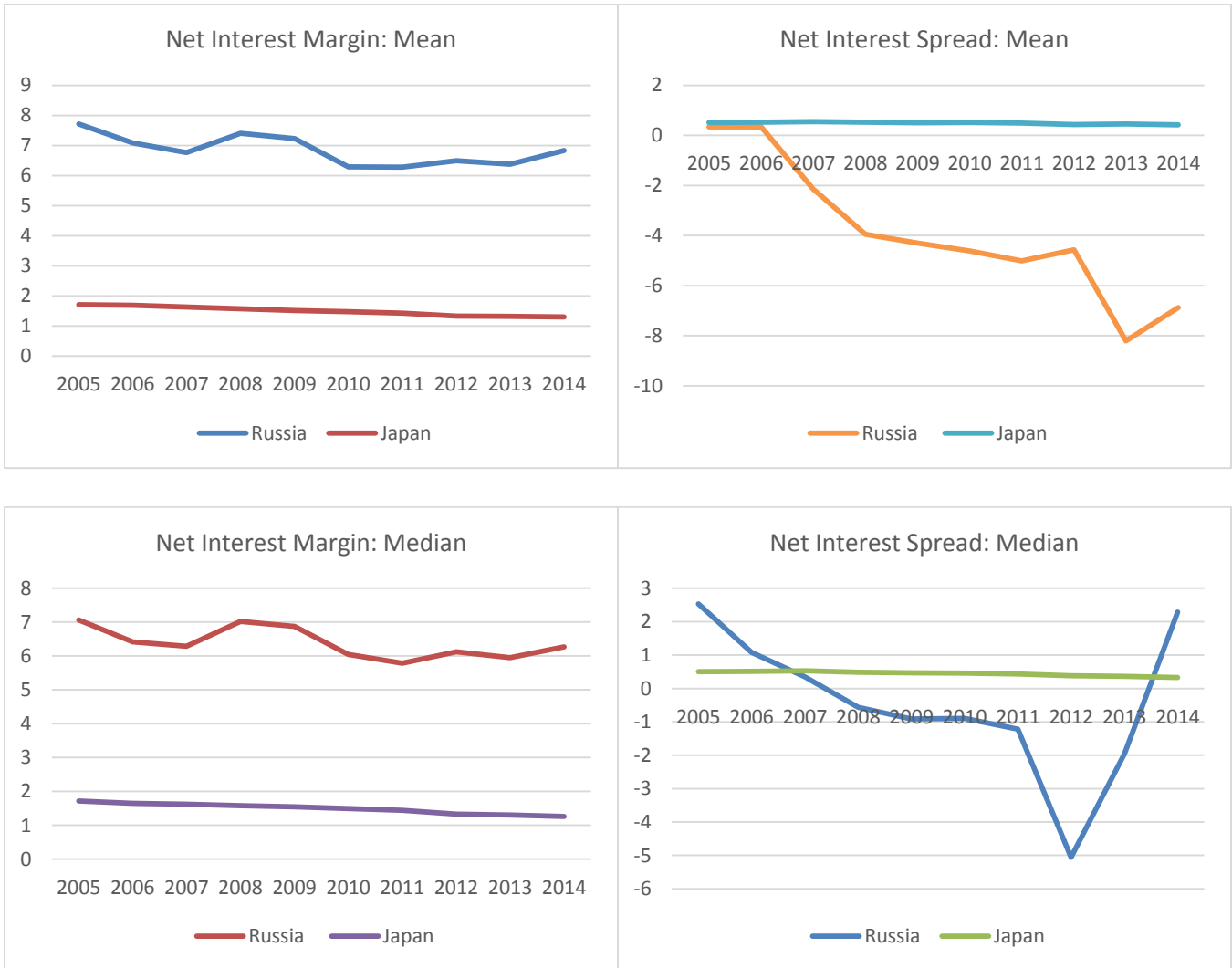
In Russia, mean net interest rate spreads have been negative. I can observe that both are at negative levels revealing remarkable inefficiencies and unprofitability in lending activities. Compared to Russian commercial banks' relatively high net interest margins, the lending activities of banks seem to be disrupted and underdeveloped, however it has been improving slowly. The banks with relatively high market shares do have net interest spreads ranging from 1–4%, but the majority of banks, which are small to very small in terms of balance sheet size and market share have been suffering from very low or even significantly negative net interest spreads. This indication is shown by the fact that the mean is distinctly more negative than the calculated median. When taking a look at the entire commercial banking sector in Russia, I can even detect a deteriorating trend, above in the post-crisis period. The net interest spreads dropped from -4.61% in 2009 to -6.88% in 2014, having reached a negative low of -8.20%. This observation makes clear that there are many very small banks being highly inefficient and that more aggressive consolidation in the commercial banking sector is definitely needed.

In Japan, loan demand has been stagnating during the past decade, so that banks were not capable of compensating falling net interest spreads by boosting volumes of loans. The whole Japanese commercial bank sector's net interest spread has declined at a rate of CAGR-1.81%, but overall stayed resilient during the sample period in a bandwidth of 0.55% to 0.43%. Commercial banks showcased a decrease of CAGR -4.15%, moving in a range of 0.34% and 0.52%.

**Figure 2**

**Net Interest Margins & Net Interest Spreads (Means & Medians)**

Average Net Interest Margins & Net Interest Spreads (2005-2014) for the entire commercial banking sectors in Russia and Japan in comparison. Moreover, the same comparison was applied not only to the average (mean), but also to the median Net Interest Margins & Net Interest Spreads



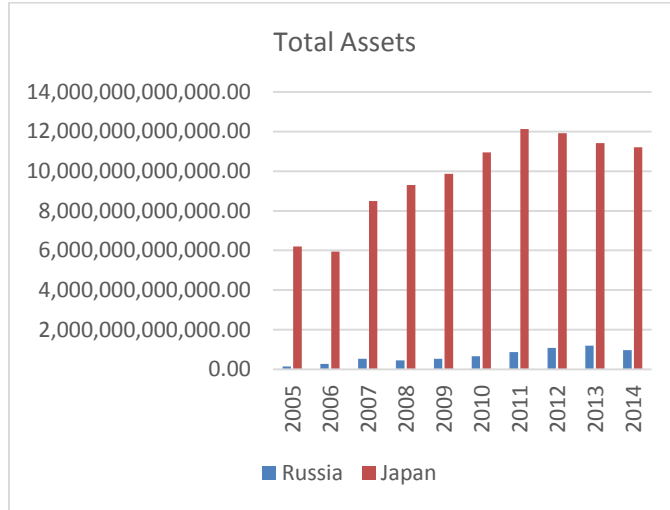
**Total Assets**

Russian total assets have been on the rise with a CAGR of 20.34% compared to Japanese total assets with a CAGR of 9.38%. While Russian total commercial bank assets to GDP stood at 20.06% in 2005, it now presents itself at 52.47%. In comparison, Japanese total commercial bank assets to GDP was at 135.60% in 2005 and ascended to 243.48%, also because of a very slow Japanese economic acceleration.

**Figure 3**

**Total Assets**

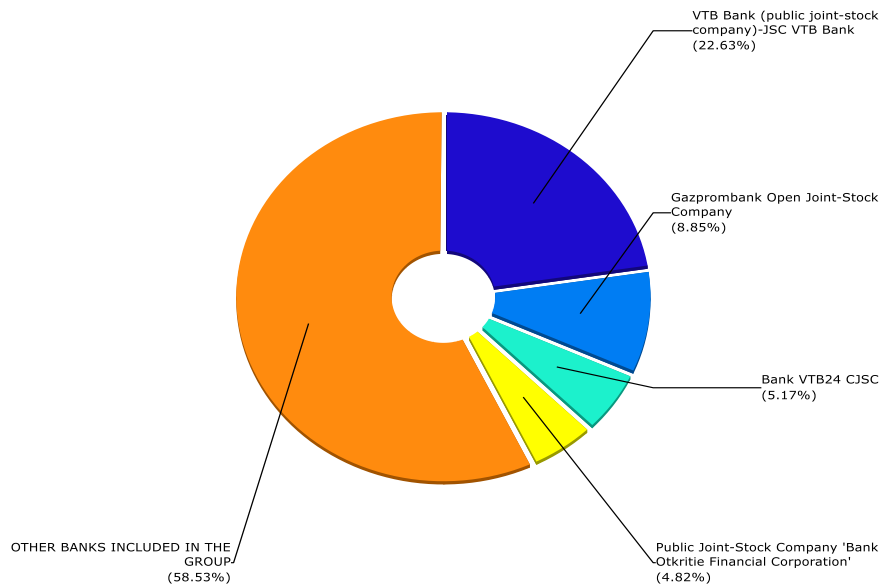
Amount of Total Assets in USD and the development of Total Asset accumulation during the sample period between 2005 and 2014

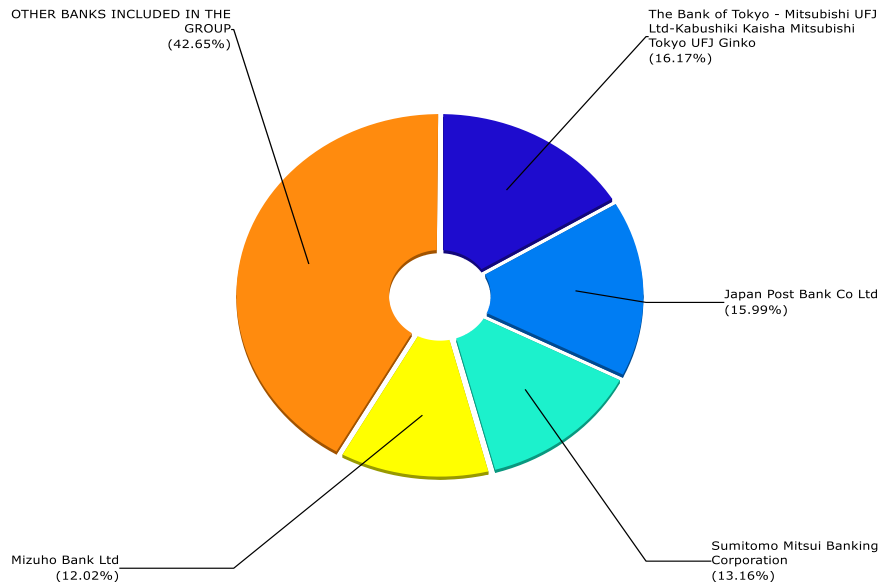


**Figure 4**

**Total Assets Shares of 4 largest commercial banks in 2014**

Total Asset Shares of the four largest commercial banks in the commercial banking sector of each country Russia (upper) & Japan (lower). Russia`s entire commercial banking sector measured in total assets in 2014 was \$957.5 billion, whereas Japan`s was \$10.8 trillion, much larger than Russia`s. The total number of commercial banks in Russia are 827 and in Japan 139.





### Total Customer Deposits

Russian Total customer deposits have been growing strongly and constantly over the years. Within the last 10 years, customer deposits picked up from USD62.5 bn and reached a high in 2013 with an amount of almost USD600 bn. This represents a compound annual growth rate (CAGR) of 21.86%. Japanese Total customer deposits have also gone up from \$4,382.4 bn to \$8,253.7 bn with a CAGR of 6.54%. The CAGRs of both commercial banking sectors show that Russia is clearly outperforming which definitely makes sense as the Japanese banking sector can be described as developed and mature. Japan`s banking sector doubled its size within 10 years, whereas Russia`s banking system managed to enlarge itself tenfold. Japan`s pure size of the commercial banking sector was 14 times larger than Russia`s in 2014. Even after looking at the Total Customer Deposits/GDP figure, growth remains resilient with a CAGR of 11.48% over the period of 2005-2014 in Russia, and in Japan with a CAGR of 6.47%, still evidently smaller even though Japanese GDP growth was lagging tremendously. In contrast, Russian Total Customer Deposits/Total Assets within the commercial banking sector has seen a comparatively weak CAGR of only 1.26%, however it is the result of high growth of commercial banks` total assets as well. In contrast, this figure demonstrated a CAGR of only 0.41% even a poorer development than in Russia. Not only customer deposits are growing remarkably, but also total assets. Customer Deposits have been occupying a share of 8.18% relative to the Russian GDP and more than 95% relative to the Japanese GDP. Meanwhile this share tripled to 24.27% in Russia and almost doubled in Japan to more than 179%. Russian Customer

Deposits/Total Assets have also seen a rise from 40.79% to 46.25% during the same period and Japanese ones slinked from 70.69% to 73.67%.

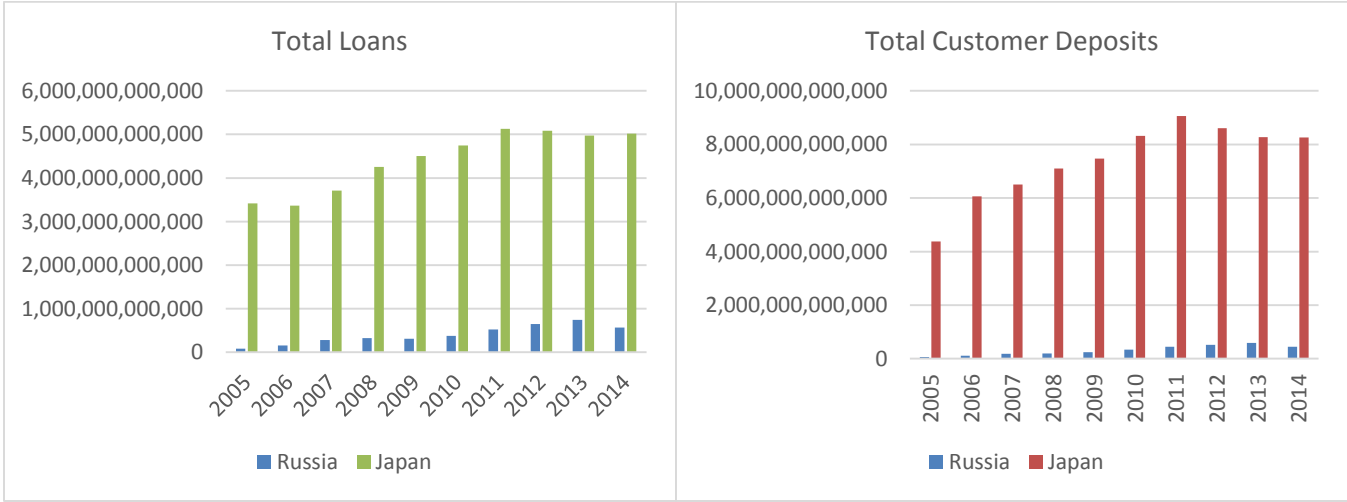
Total Loans

On the asset-side, loans are relevant for my work, since I am interested in the net interest spreads between loans and deposits. Russian total loans have had an upward trend just like the deposits, but somewhat weaker, with a CAGR of 20.80% compared to Japanese total loans mounting up by only 3.91%. Compared to GDP, Russian total loans have increased with a CAGR of 10.51% leading to a rise of the total loans/GDP ratio from 11.15% in 2005 to more than 30%. In Japan, the total loans to GDP jumped 3.85% of CAGR leading to an increase in the total loans to GDP ratio from about 75% to above 109%. Total loans to total assets managed to grow at a CAGR pace of 0.38%, implying that total loans growth outperformed total assets growth by a very small margin. Despite this acceleration in Russia, the respective Japanese figure declined by 2.06%. This is an implication of total asset growth going up faster than total loans. Overall, Russian total loans growth has been slowing within the recent years, even being negative recently due to geopolitical challenges involving Ukraine and sharply lower oil and commodity prices having severely adverse effects on the Russian economy.

**Figure 5**

**Total Loans & Total Customer Deposits**

Amount of Total Loans & Total Customer Deposits in USD, including the accumulation of them during the sample period between 2005 and 2014



As Russian deposits grew on average more than loans, the loan-deposit ratio of the commercial banking sector has been under pressure, but managed to clearly support a CAGR rise of 2.93%. This has been not possible in the Japanese banking sector, since the loan-deposit ratio diminished CAGR 0.97%.

### Competition

Russia's commercial banking system is characterized by high assets, deposit and capital concentration with a small number of state-owned or controlled banks and a very large percentage of small banks. This composition of the banking sector and the dominance of a few and mostly state-owned banks undermines competition. Small banks are unable to bring economies of scale into being. The impairment of competition might hurt financial intermediation dynamics within the Russian banking sector. I will showcase later whether competition is truly a significantly negative variable when it comes to its effects on net interest margins and spreads. The Russian commercial banking sector encompasses more than 800 banks, which in absolute terms is very large compared to other nations with the same bank-based financial system model such as Japan (139), Germany (136), China (174) and other identically sized emerging countries like Brazil (133) and the BRIC member India (67)<sup>52</sup>. This current number of Russian commercial banks became present, after the government had taken action by introducing 180 million roubles as minimum capital requirement in 2012 and reduced the total number of commercial banks by 200 (Anzoategui, Martinez Peria, Melecky, 2010)<sup>53</sup>. Competition can be measured and analyzed with a structural approach by implementing concentration ratios or indices like the Herfindahl-Hirschman Index. However, the study by Cetorelli (1999) has demonstrated that concentration is not a reliable measure of competition.<sup>54</sup> In place of concentration, non-structural measures concentrate on receiving estimates of market power from observed behavior of banks. Panzar and Rosse (1987) illustrate that the sum of elasticities of a bank's revenue with regard to its input prices can be made use of in order to find out the dimension of completion within a market.<sup>55</sup> The H-Statistic is a good measurement, whereby perfect competition corresponds to 1. The intuition behind this is that any boost in input prices should implicate a 1 in increases in overall revenues. Those banks, which are not capable of covering this rise in input prices will be compelled to leave the market. 0 in turn visualizes the existence of a monopoly. The H-Statistic for the banking market in Russia

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<sup>52</sup> Bankscope

<sup>53</sup> [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1694928](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1694928)

<sup>54</sup> [http://www.chicagofed.org/digital\\_assets/publications/economic\\_perspectives/1999/ep1Q99\\_1.pdf](http://www.chicagofed.org/digital_assets/publications/economic_perspectives/1999/ep1Q99_1.pdf)

<sup>55</sup> [http://www.dnb.nl/en/binaries/Assessing%20Competition%20with%20the%20Panzar-Rosse%20Model\\_tcm47-224137.pdf](http://www.dnb.nl/en/binaries/Assessing%20Competition%20with%20the%20Panzar-Rosse%20Model_tcm47-224137.pdf)

in 2010 was 0.673 and in Japan 0.506, implying that Russian competition is more developed than Japan's. Unfortunately, data is only available for the year of 2010.

In order to get more profound and precise insights into not only the general market power, but also the market power specifically in the loan and deposit markets, I made adequate calculations for defining the Herfindahl-Hirschman Index (HHI) for both markets within the Russian commercial banking sector. The Herfindahl-Hirschman Index as the measurement for especially deposit market conditions have been identified to determine retail deposit rates (Hannan & Berger, 1992; Park & Pennacchi 2008)<sup>56</sup>. The HHI is calculated by taking the sum of squares of individual deposit market shares of all operating commercial banks. The Russian commercial banking deposit market has been ranging between 712 and 901, inferring that it has been a relatively competitive market over the past 10 years. The deposit market's HHI Index has been developing over the years with a CAGR of -0.39% displaying that Russia's commercial banking competition is becoming better. However, the improvement is extremely sluggish and the yearly HHI Index outcomes turn out to be volatile.

The Russian loan market has been ranging between 625 and 905, while being currently at 819. The loan market's HHI Index has been evolving with a positive CAGR of 0.57% over the years, meaning that it has been becoming more uncompetitive. While the increase in competitiveness in the deposit market is weak, the situation in the loan market is even worse. Higher competition in the deposit market usually tends to increase deposit rates, while a lower competition in the loan market should increase loan rates, thereby increasing net interest spreads. The Russian banking sector will continue to be dominated by state-owned banks. During times of financial and economic distress, the government usually steps in to stabilize the economy, as it has been the case during the latest oil price rout, through state-owned banks like VTB and Sberbank, which capture more market share for them. At the same time, the closures of numerous smaller and inefficient banks have the potential to create a more stable, efficient and competitive banking sector. The banking sector is desperately in need of aggressive consolidation. Foreign banks consider it to be a huge challenge to get into competition with large, state-owned institutions, since they are the ones which get better access to low-cost funding and high-quality, profitable clients and borrowers.

The Japanese deposit market has undergone a continuous trend to more competition and a subsequent lower HHI Index from 1,263 in 2002, which is classified as a moderately concentrated market to 830 and

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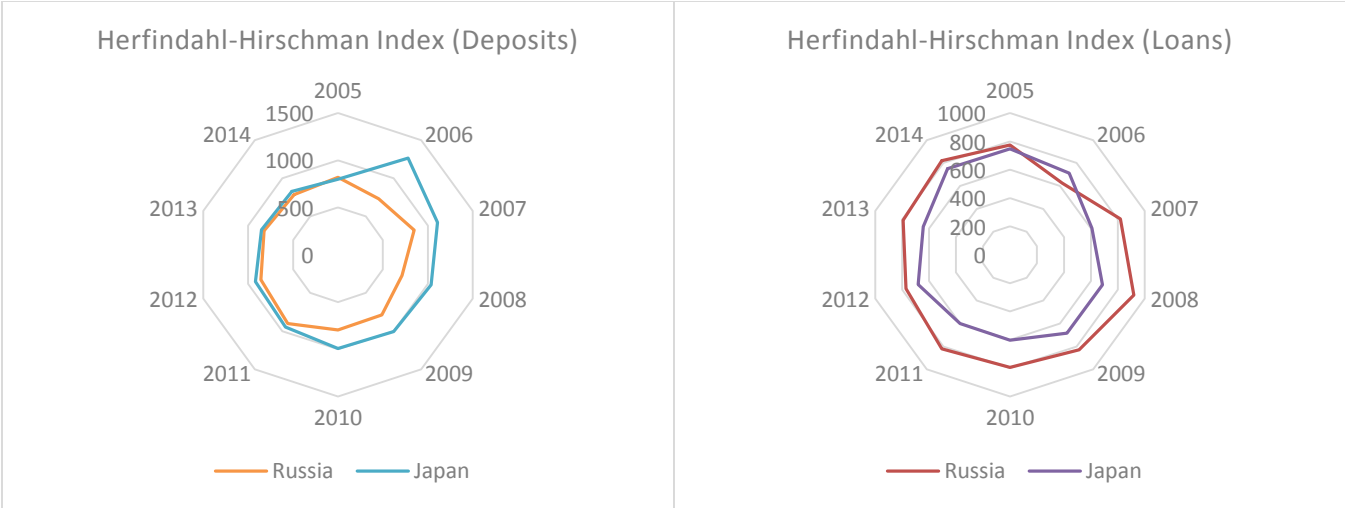
<sup>56</sup> [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=649464](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=649464)

thus a competitive market. This progression translates into a CAGR of -4.55% in the HHI deposit index. The Japanese commercial banking sector is, hence developing faster towards more competition in the deposits market than Russian banks, as the Russian CAGR revolves around -0.39%. The Japanese deposit market HHI found itself at 830 whilst the Russian one at 787 in 2014. The Japanese loan market HHI, on the other hand, is at 749 compared to Russian one at 819. The Japanese loan market is more competitive than Russia`s, however, competition has exacerbated in recent years as the HHI was to be found at 599 in 2011. The CAGR of 0.04% over the sample period underlines that there was no improvement in competition, and in the short-term of the past 5 years, the CAGR even turned positive lying at CAGR 4.43% compared to Russia`s firmer CAGR of 0.60%. Smaller Japanese banks have been expanding into metropolitan areas due to decreasing net interest margins, thus increasing competitive pressures and squeezing margins even further. Margin diminution and more consolidation have been the results.

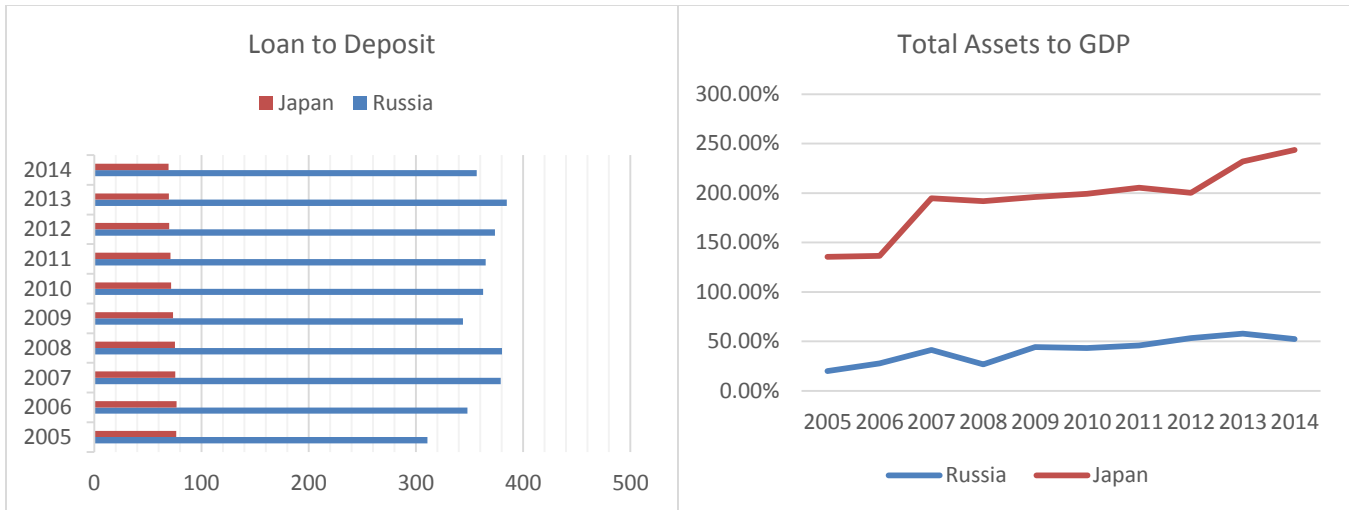
**Figure 6**

**Banking Sector Development (2005-2014)**

This figure exhibits the development of the Russian and Japanese commercial banking sectors over the sample period between 2005 and 2014. The upper graphs demonstrate the evolution of market concentration in the sector measured by the Herfindahl-Hirschman Index for deposits and loans. The diagram located in the bottom on the left hand side illustrates the alterations in depth of both countries` commercial banking sectors by employing the loan to asset ratio over, whereas lastly on the right the development of the commercial banking sector size in terms of total commercial bank assets relative to nominal GDP.







### Profitability

Russian commercial banking profitability has been under pressure showing a CAGR of -1.95%. In 2005, I could see an average ROAA of 2.02%, reaching a peak of 2.33% in 2007. During the crisis, returns were significantly lower, marking a low of 1.18%. Currently, ROAA in the Russian banking sector has been able to recover to 1.66%. Two major forces have been challenging returns. First, there is a slow consolidation under way, which in turn means more competition. Secondly, total assets have been surging with a CAGR of more than 20%, which makes it quite hard to sustain returns relative to total assets at the same level. Considering these facts, one can say that profitability has been stable. Earnings and profitability indicators were high, especially before the crisis, however this was mainly due to elevated net interest spreads which frequently highlight structural inefficiencies including insufficient competition. Clearly, the Russian banking sector is still influenced by those realities and improvement is lagging. Coming to the Japanese commercial banking return on average assets, they are at much lower levels since it is a developed and mature market. The ROAA has seen a CAGR of 5.37%, even though the CAGR was much higher at above 12% in the most recent five years, while the Russian banks experienced CAGR of -1.95%. These ROAA surge rates indeed have been drawing a contrast picture in both countries. There is a pick-up in profitability even though the absolute levels of ROAA remain very low. Furthermore, what is encouraging is that ROAA has reached 0.32% in 2014 and thereby marking a 10-year high in profitability. Japanese commercial banks` ability to digest bad loans which accumulated due to the so-called “Two Lost Decades”, has been one of the most important drivers in determining limited bank profitability and providing an explanation for the relatively high volatility in bank returns.

### Business Substitution

Russian banks' total non-interest income to total assets has seen an increase of CAGR 15.46%, while growth has been slowing down considerably within the past 5 years in which CAGR was slightly below 4%. Non-interest income is on the rise. Interest income on loans to total assets at the same time went up CAGR 1.74%, whereas in the past years it has even declined by CAGR 0.90%. This means that total non-interest income has been increasing faster during the past 10 years. In terms of size, total non-interest income to total assets has constituted about 18% after the crisis, having taken off from 6% in 2005. Total interest income to total assets, in contrast, stayed very stable by going up from 6% in 2005 to about 7% just last year. Even though the loan-to-asset ratio is growing slowly, net interest margins and spreads have been on the decline, hurting interest income to total asset growth. Furthermore, increasing credit reserves and loss provisions, along with an increasing amount of NPL has had negative implications on profitability. Japanese banks' ratio has seen a decrease of only CAGR -0.10% and an increase of CAGR 0.61% during the last five years. Total non-interest income to total assets ratio is not as volatile as Russia's and is characterized by firmness. Interestingly, despite the shift towards non-interest income, the data reveals that there is no notable trend in absolute terms. The share of non-interest income has gone up in consequence of falling interest income. Slager (2006) underscores the tendency of banks' net interest income to decline while non-interest income gaining in strength across developed countries.<sup>57</sup> This transition from traditional margin income by providing intermediation services to less traditional non-interest, fee-based income is according to Slager becoming stronger in the aforementioned countries, as net interest margins and spreads decline. As a consequence, Slager too identifies an increased rate of volatility in earnings and pinpoints not only the volatility of non-interest income, but also the volatility due to the leverage effect to be the main drivers. Stiroh (2002) on the other hand states that correlation between interest income and non-interest income rises over time, and thus pushes down any of the banks' portfolio diversification benefits and thus makes the banks riskier.<sup>58</sup>

In the Russian commercial banking sector, the total non-interest income to total income from loans ratio has developed within an upward trend during the past years at a CAGR 12.46%, having risen from 80.70% to 261%, even though within the past five years growth has stalled and these ratios stayed stable. Along with this surge toward total non-interest income, the volatility of operating income has indeed gone up

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<sup>57</sup> <http://www.e-library.esut.edu.ng/uploads/pdf/8931093019-the-internationalization-of-banks.pdf>, p. 5-13

<sup>58</sup> [https://www.newyorkfed.org/medialibrary/media/research/staff\\_reports/sr154.pdf](https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr154.pdf)

from an annual volatility of 30.79% in the past ten years to 56.66% in the past five years. Even between 2005 and 2009, annual volatility was lower at 34.88%. The main driver of volatility is unlikely to be the leverage effect, since the total equity to total assets ratio, my proxy for leverage, has indeed remained quite stable over the past years. While the average annual volatility of total income from loans has been 13.55% during the years of 2005-2014, volatility was higher in the post-crisis period at 20.01%. On the contrary, annual volatility in total non-interest income was much higher at 25.15% during the years of 2005-2014, but lower than total loan income volatility with 14.95% after the crisis. Nonetheless, the pre-crisis period volatility was high at 39.54% compared to 14.66% in total loan income. The main driver has been the volatility of total non-interest income especially before the crisis, however I am detecting the trend that total loan income became more volatile, while total non-interest income is becoming more and more resilient in terms of annual volatility. In addition, correlation has also demonstrated more dominance by increasing from an average annual correlation between total non-interest income and total income from loans of 0.55 to 0.65 and thereby diluting the diversification benefits amid the disintermediation process. However, disintermediation has been observed across developed countries, but Russia was classified by the International Monetary Fund (IMF) as a developing and emerging market. Nevertheless, net interest margins and spreads have come down significantly over the years, implying that financial development is underway.

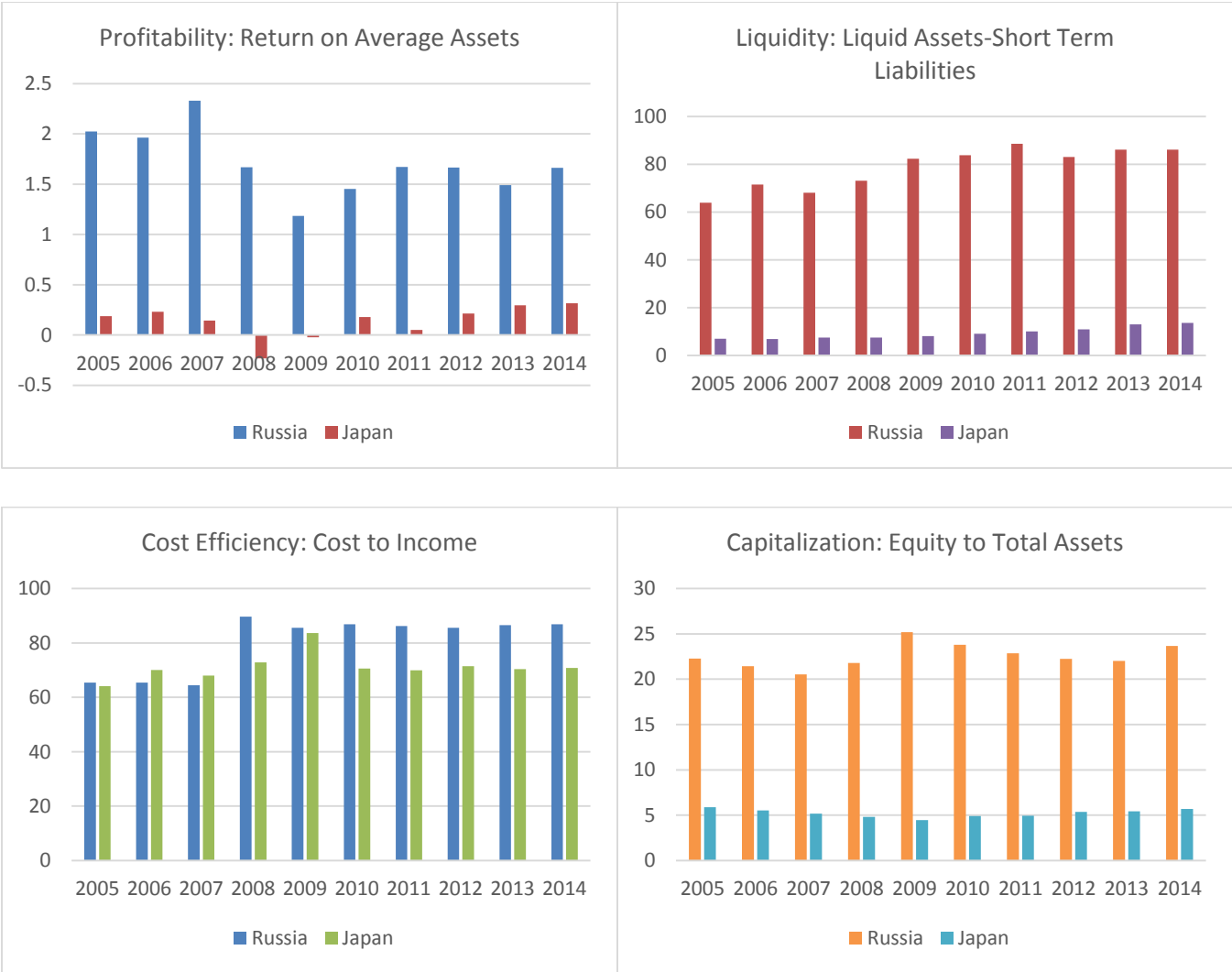
In Japan, the total non-interest income to total income from loans has experienced a minor surge within the previous ten years, rising from 31.34% in 2005 to 34.81% with a CAGR of 1.05% and in the most recent five years, the CAGR went negative to -2.47%. The clear indication is that in the Japanese commercial banking sector not only growth towards total non-interest income has been languishing, but also the absolute levels of the ratio are much lower than Russia's. While in Japan, the loan business in terms of income is almost three times bigger than the non-interest income, in Russia it is the other way around. In Japan, the trend is also going towards disintermediation, but it is currently not on the same level and scope, compared to Russian commercial banks. Does this slow disintermediation imply more volatility in operating income as well? The result of my analysis is that while during these ten years the annualized operating income volatility was 49.20%, it diminished to 30.34% in the period of 2010-2014. Despite of an increased volatility, there has been no correlation changes in this time period. The decreased volatility in operating income comes from a reduction in leverage, since the total equity to total assets ratio had been advancing, especially throughout the recent years of the sample period with a CAGR of 3.07%. Moreover, interest income from loans' volatility rose in the last years. While the volatility for the entire sample period

was 5.01%, it was 7.09% during the last five years. The absolute level of volatility is thereby much lower in Japan compared to Russia. The total non-interest income has been developing in the following way: Annualized volatility for the whole sample period amounted to 6.18%, but the shorter term annualized volatility of five years was higher at 8.33%. This concludes that not the income sources, but actually the reduced leverage ratio was the main catalyst in driving down volatility in operating income.

**Figure 7**

**Key Financial Ratios**

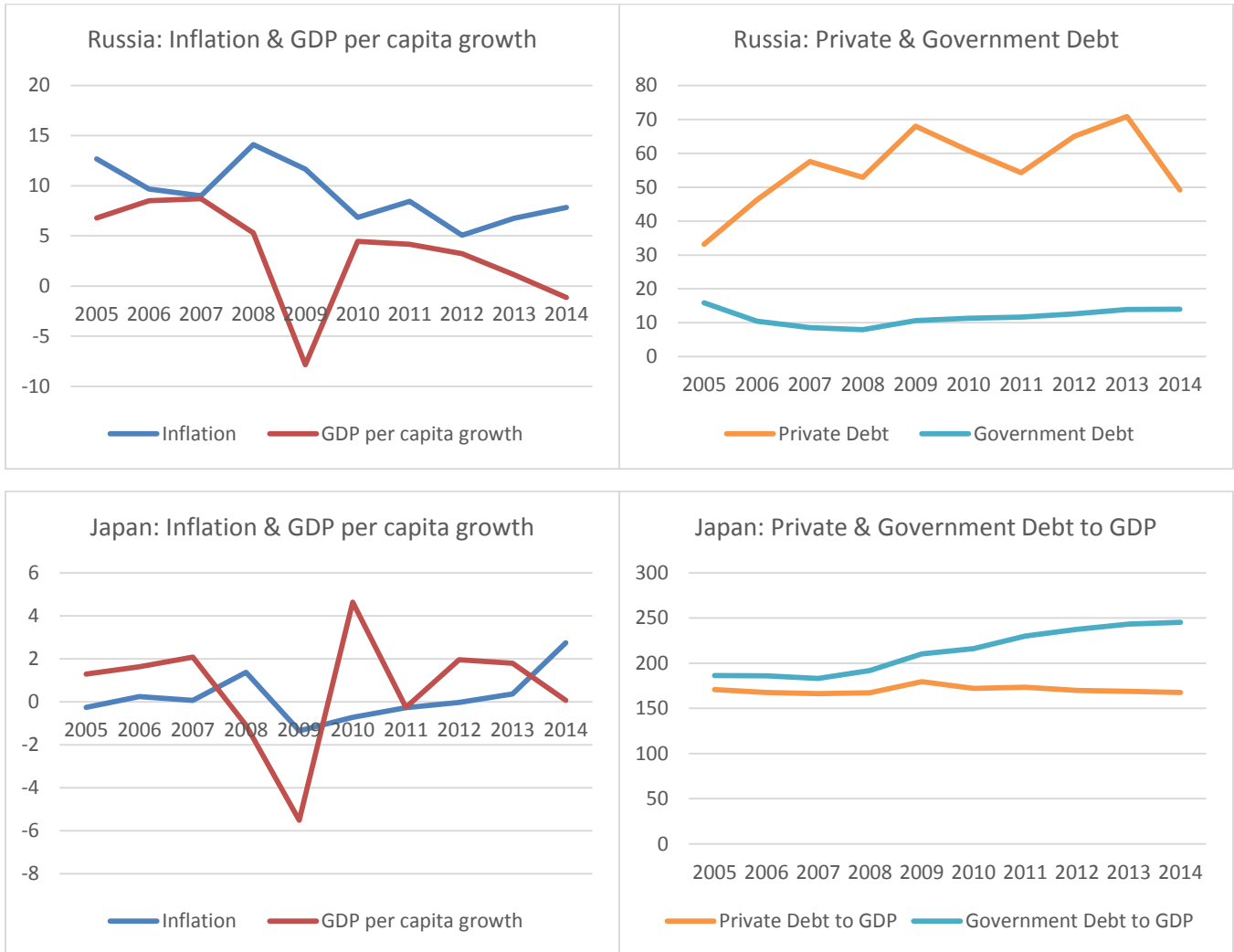
The graph on the upper left hand side depicts the profitability evolution of the commercial banking sectors in Russia & Japan in terms of the return on average assets (ROAA), whereas the graph on the upper right hand side visualizes the banks` liquidity situation by presenting the liquid assets to short-term liabilities ratio. The diagram on the bottom left hand side demonstrates the cost efficiency of the commercial bank sectors by employing the cost to income ratio while on the bottom right hand side capitalization and risk aversion gives an overview via the equity to total assets ratio.



**Figure 8**

**Overview on Macro- and Microeconomic Conditions**

The charts illustrate the general macro- and microeconomic conditions of both countries, Russia (upper) and Japan (lower) by integrating GDP per capita growth & inflation on the macroeconomic side. The microeconomic side, on the other hand, is represented by private debt to GDP & government debt to GDP



**5. Empirical Results**

In the first section, the unbalanced panel regressions of dependent variables such as the net interest margins and spreads are presented. This section is then followed by a second section, which analyzes the effects of bank-specific and market-specific variable groups, then considers micro- and macroeconomic variables as well. The third section concentrates on robustness tests, where two independent variables from the bank-specific, market-specific and macro-specific groups are replaced successively in order to see possible effects on possible significance levels and regression outputs.

The tables show the relationship between independent and dependent variables - net interest margins and spreads - across banks within the unbalanced panel regression. The following regressions will employ first net interest margins and then net interest spreads. For each of the dependent variables, the first model is estimated by a fixed effects panel regression model, as it has been determined to be the preferred model in this specific case thanks to the performed Hausman tests. Hereby, first the fixed effects model is fixed for banks. Further on, the fixed effects regression is fixed not only for banks, but also for years. For the sake of completeness and comparability, the EGLS random effects model is also implemented. The panel regressions will be addressed to each country's full dataset with regard to the entire commercial banking sector and thus the total number of commercial banks in each country retrieved from Bankscope in order to give a broad and general overview.

### 5.1 Panel Regression Results for Russia

**Table 10**

**Russia Full Dataset: Panel Regressions**

The table presents the results of fixed and random effects panel regressions of the dependent variables net interest margin & net interest spread. The full dataset retrieved from Bankscope consists of 827 Russian commercial banks over the period 2005 – 2014. The dependent variable net interest margin is shown in specifications (1) to (3), whereas the other dependent variable net interest spread is presented in detail in specifications (4) to (6). Columns (1) to (2) and (4) to (5) specialize on fixed effects regressions controlled first for banks, then controlled for banks and years. Even though the conducted Hausman Test suggests the use of fixed effects regressions, random effects were also included in order to guarantee completeness of the analysis, which can be found in columns (3) and (6). Robust standard errors are in parentheses. \*\*\*, \*\*, \* denote significance at 1%, 5% and 10% levels respectively.

Variable	Net Interest Margin			Net Interest Spread		
	(1)	(2)	(3)	(4)	(5)	(6)
TA						
ROAA						
LIQ						
SUB						
CTP						
EQT	5.1498*** (0.014595)	5.0582*** (0.014983)	8.0174*** (0.009137)	0.4426 (0.041008)	0.4458 (0.040813)	0.5593 (0.024192)
HHD	1.7875* (0.004645)	1.8833* (0.004571)	-1.6241 (0.001421)	1.0812 (0.006894)	0.2583 (0.018172)	2.9258*** (0.005490)
HHL						
PSD						
GD						
GDP						
INFL	7.6185*** (0.019503)	-0.0090 (1.333627)	7.8042*** (0.019046)	1.8506* (0.242994)	0.0034 (14.79241)	1.7812* (0.237498)
DUMMY						
Constant	8.6476*** (0.434047)	0.4304 (12.0160)	10.0549*** (0.379060)	-2.8125*** (2.926808)	-0.0347 (132.0660)	-2.8243*** (2.753296)
Obs.	7144	7144	7144	7145	7145	7145

R-Sq.	0.4896	0.4919	0.0644	0.1498	0.1532	0.0010
No. Banks	827	827	827	827	827	827
Bank Fixed	YES	YES	NO	YES	YES	NO
Year Fixed	NO	YES	NO	NO	YES	NO

As it can be seen from Table 10, when it comes to the net interest margin, while considering the full dataset of commercial banks for Russia including 827 institutions, then one can recognize that *equity to total assets (EQT)* is highly significant at the 1% level in column (1). It remains highly significant once year-fixed effects are integrated as well in column (2). *Inflation (INFL)* on the other hand is only highly significant at 1% level when bank-fixed effects are considered, but not for year-fixed effects. Due to significant negative cross-correlations with *inflation (INFL)*, *private debt to GDP (PSD)*, *government debt to GDP (GD)* and *cost to income (CTP)* are also significant. Besides *equity to total assets (EQT)*, *non-interest income (SUB)*, *liquid assets to short-term liabilities (LIQ)*, *return on average assets (ROAA)* are highly positively significant, while *economic growth per capita (GDP)* is negatively significant. *Total assets (TA)*, *loan market concentration (HHL)* and *deposit market concentration (HHD)* are less significant at 10% level. All of them have a positive impact on net interest margins, which means that the increase of these variables is associated with an increase in the net interest margin. When it comes to net interest spreads, columns (4) and (5) show that while *inflation (INFL)* and the significantly negatively correlated variables *government debt (GD)*, *private debt (PSD)*, *cost to income (CTP)* are significant and robust at the 10% level.

*Inflation (INFL)*: Perry (1992) states that the effect of inflation on bank performance is positive if the rate of inflation is fully anticipated.<sup>59</sup> The inflation expectations allow the banks to adjust their loan rates accordingly, so that they consequently earn higher profits. Interest rates tend to correlate with cyclical economic changes, however interest rates can also rise due to inflation and above all expected inflation as explained in the book “The Economics of Money, Banking and Financial Markets” written by Frederic S. Mishkin (2009) through the Fisher effect.<sup>60</sup> However, inflation might not be dependent on expectations, but on past inflation called inflation inertia. Hereby, the role of monetary policy comes into play. The time inconsistency problem in monetary policy takes the form of an inflation bias. The willingness of the government to coerce the central bank to create huge amounts of money or implement policies, which result in bringing up inflation rates over time has been termed the inflation bias. The government could curb the

<sup>59</sup> [http://www.researchgate.net/profile/Ali\\_Nasserinia/publication/276206455\\_Key\\_Determinants\\_of\\_Japanese\\_Commercial\\_Banks\\_Performance/links/5552600708ae6943a86d72ba.pdf](http://www.researchgate.net/profile/Ali_Nasserinia/publication/276206455_Key_Determinants_of_Japanese_Commercial_Banks_Performance/links/5552600708ae6943a86d72ba.pdf) (p. 24-25)

<sup>60</sup> “The Economics of Money, Banking and Financial Markets”, Frederic S. Mishkin, p.102-104, 184-85

inflation bias by forwarding the control of monetary policy to a central bank. A central bank usually has an output target, which is closer to equilibrium and has a higher degree of inflation aversion compared to governments according to Carlin and Soskice (2010). The cutback in the inflation bias originates from a flatter slope of the central bank's Monetary Rule line. The flatter Monetary Rule line comes from the central bank attaching more importance to its inflation target than output target having a direct effect on its utility function. Aside from that, the reputation of a central bank plays a vital role. The central bank has to develop a reputation of being aggressive towards inflation by setting up monetary rules instead of complete discretion. It has to ensure credibility and act independently. Without these characteristics and above all central bank independence, inflation expectations might stay high and persistent.<sup>61</sup> Inflation inertia may become omnipresent. Central banks in emerging markets such as Turkey and Russia in this case are not at the same stages of central bank independence than most of the developed countries such as the Eurozone, the United States and Japan. Alesina and Summers (1993) spotted that developed countries with high levels of central bank independence, as it is the case currently for Japan, have also seen lower average inflation levels from 1955-1988, the period analyzed by them.<sup>62</sup> The trend of lower inflation rates has been recently the subject to emerging markets. The very same trend began in developed countries much earlier in the 1980s: Much more pronounced commitment to price stability, increased competition and central bank independence along with greater productivity growth had pushed inflation levels lower. Inflation, even though lowered in Russia over the years, has been relatively high over 6% so that uncertainty in decision-making especially on the bank-levels along with increased price volatility enlarges net interest margins. As inflation goes up, the rates curve steepens, so that liabilities, which are mostly rather short-term and longer term assets such as bonds have higher interest rates. However, this is not given for net interest spreads in the same extent and explains the lower significance, as the Russian deposit holders have been very wary of their country's inflation history and feel insecure in putting their money into deposits and prefer instead real assets. As loan rates go up, the banks try harder to remain attractive for depositors and hike deposit rates, so that the net effect on the net interest spreads has lower significance for net interest spreads than for net interest margins. Investors want to preserve their purchasing power, so if inflation is high and risks are going higher, banks will need higher interest rates to consider lending their money to the economy.

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<sup>61</sup> "Macroeconomics: Imperfections, Institutions & Policies" (Carlin & Soskice, 2010, p. 132-170)

<sup>62</sup> <http://www.deu.edu.tr/userweb/yesim.kustepeli/dosyalar/alesinasummers1993.pdf>



Government deficits in the form of *government debt to GDP (GD)* that have to be financed by domestic resources might be an opportunity for the commercial banks for a relatively safe investment of their deposit base, thereby reducing the credit supply to the private sector driving up lending rates. This might crowd out credit to private sector. This is due to the fact, that as government debt to GDP increases, at the same time the balance sheets of the Russian commercial banks have been on the rise. Even though more supply of government bonds might increase interest rates, the demand for those bonds outweighs the supply, pushing interest rates lower. As these bonds as a relatively safe investment are taken on by commercial banks, they are attractive. At the same time, government bonds are safer investments than the loans commercial banks give to the private sector and consumers, so that the more they invest of their financial resources into safer investments, the less overall risk the bank has. However, diversification benefits are reduced on the asset-side of the banks and profitability as well tumbles due to lower bond rates so that the risk of the bank eventually picks up. The risk-adjusted return of the bank gets less appealing. This situation gives lenders of banks and depositors the reason to charge higher rates. The net interest margins and spreads are hence reduced, however for net interest spreads less since deposit rates tend to be stickier than lending rates. Moreover, the overall government debt to GDP in Russia has been quite low and it is likely that additional demand for government bonds from the Russian central bank to conduct monetary policy might have pushed down interest rates as well.

When it comes to *private debt to GDP (PSD)* companies might be too indebted, tightening the capacity of them to receive new loans. If the banks decide to provide loans, they might charge very high interest rates. Commercial banks might be also risk-averse and not willing to lend at all. The riskier the loans, the higher the lending rates, the higher the net interest spread. However, this is not the case for Russian commercial banks, as *private debt to GDP (PSD)* has a significantly negative impact on net interest spreads. As private debt ratios are much lower than in Japan, it is likely that the Russian commercial banking system is in the developing stage of providing access to credit to more and more households and companies. As financing opportunities and access to credit improves, liquidity and growth of borrowers are ensured and makes it more likely that borrowers pay back their loans. However, there has been also a factor playing into this, which contradicts that theory, having increased lending rates. As private debt to GDP has been on the rise over the past 10 years, credit risk as well got more meaningful due to a higher non-performing loan ratio and a higher z-score. While increasing lending rates to loan takers may have been difficult due to competition with other banks in the loan market, a higher risk in the loan portfolio of banks may have pushed up deposit rates. There has been a large rise of uncollateralized retail credit, in a

time when private debt increases and economic growth decreases, resulting in more risk in the loan portfolios. The private debt to GDP ratio might be relatively low compared to other countries, but the average cost of debt as a share of household incomes went up to 20% in 2012 due to high interest rates.<sup>63</sup> Loan growth has been outpacing deposit growth, making it more difficult for banks to deal with unanticipated loan losses. Nonetheless, this negative effect on net interest spreads is less significant than for net interest margins, meaning that other lenders to the banks might charge higher funding rates than the more “sticky” deposit rates.

*Cost-to-income (CTP)* is a measure of how costly it is for a commercial bank to create a unit of operating income. Inefficiency causes higher costs. Wider net interest spreads are expected as these higher costs are passed on. However, this is not the case for the commercial banking sector in Russia. The regression outputs show that as *cost to income (CTP)* rises, net interest spread falls. The answer for this might lay in the fact that Russian deposit holders charge higher deposit rates, because of the *cost to income (CTP)* increase leading to higher bankruptcy risk especially for many of the small and mid-sized banks. Deposit rates may increase to a greater scale than loan rates, as increasing the loan rates significantly would forbid the bank to get engaged in lending activities and decrease business volume especially for small banks which have a limited amount of potential borrowers and customers in general. However, it looks like that here too deposit rates are more “sticky” than other rates related to the lenders who lend to banks as well, as the negative impact of *cost to income (CTP)* is more significant for net interest margins than for net interest spreads. Russian banks’ cost efficiency has suffered over the past 10 years, since the cost-to-income ratio has been on the rise by a CAGR of 2.89%. However, this CAGR figure originates on grounds of an increase of the cost-to-income ratio of 39% in 2008 because of the crisis. The problem was not based on the costs taking off, but due to profits tumbling. If we consider the past five years (2010-2014) of the sample period, we can see an extreme stability of cost efficiency. The cost-to-income revealed neither increases nor decreases with a CAGR of 0.00%. However, efficiency could be improved by further consolidation and competition in the commercial banking sector indeed.

*Equity to total assets (EQT)* has a significant positive relationship with net interest margins, which was also observed by Claeys, Vander and Vennet (2008) for a various range of countries, whereby the impact

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<sup>63</sup> <http://www.reuters.com/article/2013/10/22/russia-imf-banking-idUSL5N0IC2GB20131022#e7clgLOvouf6Dv3e.97>

was twice as large for transitional economies than for developed ones. This can be confirmed for my specific case with regard to Russia. More equity to total assets means an opportunity cost for not being able to use more leverage and potentially increase profits and ROE. Equity is also more expensive than deposits and other debt funding. Moreover, more equity to total assets reduces the risk of the bank, so that funding from borrowers can be cheaper. Equity is very expensive as Russia is well-known for its high inflation and thus high risk-free interest rate. The country risk adds to the equity risk premium and clearly a highly levered beta as well. The combination of high equity cost and the banks being obligated to hold high percentages of equity are having an effect on net interest margins and spreads. The high beta comes from the fact that the economy is very dependent on oil and other raw materials, there is not much economic diversification which adds to the economy's volatility, affecting business activity and investments. State banks were the first active entities on the Russian IPO market, as they are the largest Russian banks measured relative to assets, whose credit ratings can be found to be close to the sovereign rating of the Russian government. However, the majority of the commercial banking sector is made up of small and mid-sized banks, which are utterly unable to fulfill the restrictive factors, making the IPOs of private banks very complex. Mandatory existence of high credit ratings given by international rating agencies as well as the requirement of a developed retail chain of a bank including regional coverage are high barriers for these kind of banks which add tremendous additional costs and time for the implementation of floatation.<sup>64</sup> In general, the public equity market is not developed, thus there are no economies of scale in the banks' capital markets and advisory services in order to make other banks or companies public. Hence, fees for these kind of services tend to be very high and make up a considerable percentage of the equity amounts to be raised. Russian corporations are required to list domestically at least 30% of their equity, even though the Moscow Stock Exchange offers restricted liquidity, an untransparent pricing system, weak market infrastructure, complex listing process and obsolete trading systems. The preferred way for large Russian companies to raise equity is to list a Global Depository Receipt, also known as GDR issue in London with a combination of the Moscow listing.<sup>65</sup> This approach attempts to appeal to local and international investors, but international investors above all are worried about the equivocation of Russian regulations in the fields of taxes, financial statements and legal restructuring. Corruption is a big issue as well in Russia. Russia was ranked 154<sup>th</sup> out of 178 countries in the 2010 Corruption Perceptions Index released by Trans-

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<sup>64</sup> [http://ijbssnet.com/journals/Vol\\_3\\_No\\_1\\_January\\_2012/7.pdf](http://ijbssnet.com/journals/Vol_3_No_1_January_2012/7.pdf)

<sup>65</sup> "An Introduction to Investment Banks, Hedge Funds, and Private Equity" (Stowell, 2010), p. 148-149

parency International, cementing Russia's standing in ranks worse than Libya, Ivory Coast or Haiti. Elevated levels of political risk, weak property rights, rule of law and practically non-existing frameworks of corporate governance make foreign investors shy away from Russian equities.<sup>66</sup> While the public equity market looks murky for them, the private equity market looks even gloomier. Stock market development, for example, can have not only a positive effect on financial intermediation efficiency, but at the same time the potential to increase profitability at banks as it is the case with Tunisia.<sup>67</sup> Private equity is even more expensive as there are liquidity constraints and hurdles for exit opportunities. The private equity and the venture capital sectors are both underdeveloped. While the classical intermediaries in the private equity sector have these issues, also institutional investors are clearly underdeveloped as well. Pension funds are being newly created, so the amount of total capital available stays small. Pension funds at the same time are required by law to publish annual performance results, which puts pressure on them to report strong returns constraining their ability to invest in longer-term asset classes, pushing them to focus on short-term investments. Asset management companies and financial institutions see themselves confronted by similar roadblocks as pension funds. When raising capital, the imposed regulations by the Russian Central Bank and the Russian Federal Financial Markets Service do also hamper them to invest in offshore vehicles. This status-quo results in the use of derivatives included in the structuring of private equity investments, which add another layer of additional costs. This reality makes equity investors scarce or equity too costly for banks and firms to tap in public and private equity markets, so that cost of equity is very high, but necessary due to capital regulations in Russia. It looks like these costs are, at least partially, passed on by doing investments in riskier securities. However, surprisingly Russian banks do not pass on additional costs in their lending activities to their customers as the equity to total assets variable is not significant at all regarding the net interest spread.<sup>68</sup>

Even though Russian equity-to-total assets ratio has been between 21% and 24%, but the Japanese one having been much lower between 5% and 6%, the Japanese ROAE has been on levels between 4% and 6.5%, while the Russian one moved between 7% and 10% and thereby had higher profitability in nominal terms. When considering both countries' inflation levels though in order to figure out the real ROAEs, I enable myself to have a more profound insight into profitability dynamics. The real ROAEs give us a different picture: Japanese real ROAE has ranged on levels of 3% to 7% in Japan, but only 2% to 4% in

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<sup>66</sup> [http://www.bloomberg.com/bw/magazine/content/11\\_19/b4227037709131.htm](http://www.bloomberg.com/bw/magazine/content/11_19/b4227037709131.htm)

<sup>67</sup> [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1538810](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1538810)

<sup>68</sup> [http://lib.ieie.nsc.ru/docs/EMPEA\\_QR\\_Q1\\_Russia.pdf](http://lib.ieie.nsc.ru/docs/EMPEA_QR_Q1_Russia.pdf)

Russia during the post-crisis period. Even though real ROAEs show Japanese banks` comparative strength relative to Russia, growth in real ROAE has been negative CAGR -8.26% in the past five years, but an impressive CAGR of almost 60% in Russia, as returns increased and inflation fell at the same time. Mean real ROAE for 2005-2014 was at only 0.23%, whereas Japan`s mean real ROAE was to be found at 1.53%. Accounting for the most recent five years, the Russian mean real ROAE was at 1.60%, but Japan was able to convince by much more with a real ROAE of more than 4.60%. There is a profitability underperformance in real terms, when I compare Russia with Japan. Nonetheless, by just considering the real absolute levels of ROAEs would not be enough to understand what is truly going on. The further step includes taking notice of the volatility in real ROAEs. By introducing a basic Sharpe ratio, which consists of the real mean ROAE divided by the volatility, I am capable to compare the relative performance in both countries` commercial banking sectors. While during the period of the last ten years, the Russian commercial banking sector was able to achieve a Sharpe Ratio of 0.00 and 0.02 in the past five years respectively compared to the Japanese banks reaching 0.01 and 0.10, it is simple to see Russian banks` profitability underperformance not only on absolute, but also on a relative basis. By having to hold a lot more equity to total assets, the risk is lowered for the banks, but also the opportunity cost is high.

Stiroh (2010) explains that there are internal diversification benefits within a bank by combing interest and *non-interest income (SUB)* portfolios. However, the increase in non-interest income and thus the banks` expansion into fee-based financial activities have proven to be revenue streams, which are more volatile. The conclusion is this volatility outweighs the diversification benefits according to various papers (Demsetz and Strahan 1997; Stiroh 2004; Demirgüç and Huizinga 2010, Liu and Wilson 2013).<sup>6970</sup> Moreover, an increasing non-interest income was associated with a negative impact to net interest margins. I cannot agree with both points for the Russian case, as there is a positively significant relationship. Internal diversification benefits within the bank by combining interest and non-interest revenues might exist. Volatility of non-interest based income does not appear to outweigh the diversification benefits, so that overall the banks are perceived to be less risky. In the period of 2005 to 2009, the volatility of interest income of commercial banks was at 14.66%, while in the same period non-interest income had volatility of 39.54% per year. This condition changed dramatically, when in the period of 2010 to 2014, volatility reached 20.01% per year for interest income, but non-interest income`s volatility was lower at 14.95%. While interest income was growing at a rate of 22.43% CAGR, non-interest income was growing 25.43% CAGR

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<sup>69</sup> [https://www.newyorkfed.org/medialibrary/media/research/staff\\_reports/research\\_papers/9506.pdf](https://www.newyorkfed.org/medialibrary/media/research/staff_reports/research_papers/9506.pdf)

<sup>70</sup> "Performance, Risk, Competition in the Chinese Banking Industry" (Tan, 2014) p.152-154

in the entire sample period. A lot of volatility comes from that growth in non-interest income. It is not harmful volatility. Therefore, through those diversification benefits from different revenue streams, they reach less riskiness leading to lower borrowing costs and net interest margin expands. At the same time, the diversification benefits, which may reduce the risk of the bank can enable the bank to invest in riskier securities with higher interest rates. Neither *equity to total assets (EQT)* nor *non-interest income to total assets (SUB)* are significant for net interest spreads.

*Real GDP growth per capita (GDP)* has a significantly negative correlation with *equity to total assets (EQT)*, hence influences margins in a negative way. In theory, real GDP growth can influence spreads in very different ways. On the one hand, economic growth makes firms and individuals less risky, as incomes rise and collateral values go up. Thereby, lending rates might be lowered at the very same time when the bank's demand for deposits increases. The higher demand for deposits by the bank comes into play through an increased set of profitable lending opportunities. Thus, as lending rates diminish and deposit rates shoot up, the net interest spreads tighten. While there is broad consensus on the positive effect of inflation on net interest margins and spreads, real GDP growth remains quite ambiguous. Excluding foreign-owned banks in Table 11 shows that *real GDP growth per capita (GDP)* does also affect net interest spreads in a negative way. The reason is borrowers' creditworthiness and net worth worsens during recessions, pushing up loan rates. The risk premiums on loans are pushed up once the probabilities of default rise during slowdowns, increasing the net interest spreads. Developing countries with more elevated GDP growth are more probable to demonstrate higher default probabilities relative to developed countries such as Japan. This difference is supported when I compare Table 11 for Russia with Table 15 for Japan and by the empirical studies conducted by Sinkey & Greenawalt (1991)<sup>71</sup>. Low economic growth deteriorates the debt servicing ability of borrowers and is the contribution to higher credit risks translating to higher net interest margins and spreads. Demirgüç-Kunt et al. (2003) Liu and Wilson (2013), and Tan (2012)<sup>72</sup> found a negative effect between net interest margins and economic growth. Another scenario is that the demand for credit is high during an economic boom, so that lending rates climb. At the same time, as the bank can lend more to different companies and households, it is able to diversify, which in turn decreases the bank's risk of its lending activities and thus pushes down deposit rates. The outcome is that the net interest spread extends itself. However, we do not see this theory to apply for the Russian case with regard to net interest spreads.

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<sup>71</sup> <http://link.springer.com/article/10.1007%2FBF00127083>

<sup>72</sup> <https://www.imf.org/external/pubs/ft/wp/2012/wp12123.pdf>

*Liquid assets to short-term liabilities (LIQ)* impacts net interest margins positively. It stands for liquidity risk. In order to minimize the liquidity risk, it is required to have an efficiently working interbank market. However, especially in Russia, it is still underdeveloped and thus makes liquidity risk a relevancy to deposit holders and other lenders to individual Russian commercial banks. The Russian interbank market is behind in contrast to the Japanese one due to characteristics such as uneven allocation of liquidity (relatively small number of large banks compared to a huge amount of small to very small banks), insufficient functioning of the interbank market and limitations of monetary policy due to consistently elevated inflation rates.<sup>73</sup> Besides these aspects, the degree of Russian banks' exposure to the stock market in the form of repo stock loan transactions (in which the banks pledge corporate stocks as collateral) is high and has led to quick margin calls during the last financial crisis in 2008/09. These mentioned weaknesses of the Russian interbank market have been sketched out in the financial stability research report by S. Barisitz, G. Ebner, M. Lahnsteiner and J. Pann in 2009.<sup>74</sup> Since Russia's interbank market is underdeveloped, weak and very concentrated along with the restrictions in which the Russian central bank can get active, implies that depositors partially will have to bear the liquidity risk of their bank. Liquidity risk became even more relevant after the start of the financial crisis in 2008/09 when additionally the interbank markets had been under pressure and cost of funding skyrocketed. This liquidity risk is usually emphasized by maturity and interest rate mismatches. I see that as liquid assets to short-term liabilities increase, the liquidity risk of the banks goes down, so that the banks' borrowing costs decrease, pushing up the net interest margin. Liquidity risk does however not play a major role when I refer to net interest spreads, meaning that deposit rates may be more sticky than other borrowing rates especially those in the interbank market. The small and mid-sized banks, which do not have access to the interbank market may even see larger liquidity constraints, pushing up borrowing costs more for them. An interesting observation is that, once foreign-owned banks are excluded as in Table 11, the *liquid assets to short-term liabilities (LIQ)* become significant for net interest spreads as well, underlining that liquidity is clearly very relevant for domestically owned banks above all. The more liquid assets are held, the more opportunity costs there are as lower interest is earned on cash or low-risk securities. This opportunity cost is charged as a premium on loan rates. The 2014 liquid assets to short-term liabilities ratio in Japan lies at above 12% compared to 28.65% in Russia. Just 10 years ago, this very same ratio reflected a percentage of 7% in Japan compared to 33.44% in Russia.

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<sup>73</sup> <http://www.suomenpankki.fi/pdf/170174.pdf> (p. 6-10)

<sup>74</sup> [https://www.oenb.at/dms/oenb/Publikationen/Finanzmarkt/Financial-Stability-Report/2009/Financial-Stability-Report-17/chapters/fsr\\_17\\_special\\_topics05\\_tcm16-140535.pdf](https://www.oenb.at/dms/oenb/Publikationen/Finanzmarkt/Financial-Stability-Report/2009/Financial-Stability-Report-17/chapters/fsr_17_special_topics05_tcm16-140535.pdf) (p.135-136)

*Return on average assets (ROAA)*: The more profitable a Russian commercial bank is, the less risky it is perceived to be by its lenders and hence the bank's borrowing rates sink, so that the net interest margin is expected to widen. However, this seems not to apply to lower deposit rates after all, as net interest spreads are unaffected by *return on average assets (ROAA)*. Nonetheless, once foreign-owned banks are excluded from the dataset as in Table 11, *return on average assets (ROAA)* becomes significant, confirming this theory. However, it is also very likely that the more profitable the bank gets, the more it takes on risk by investing in riskier securities, but not riskier loans. This can be also the outcome of the combination of both mentioned effects.

*Deposit market concentration (HHD)* and *loan market concentration (HHL)* do surprisingly not affect net interest spreads at all, but the net interest margins instead. While the perception of lenders to the bank may be that the higher the deposit market concentration, the lower the deposit rates. At the same time, the perception with the loan market concentration is that the higher the loan market concentration, the higher the loan rates charged to consumers and firms. The efficient-structure theory states that market concentration is not the case, but simply is the attribution of higher profitability to a higher level of efficiency enabling efficient banks to capture market share, which then manifests itself in higher profitability. Molyneux & Thornton (1992) did find a statistically significant link between market concentration and bank profitability.<sup>75</sup>

*Total Assets (TA)* benefits may come from lenders perceiving less risk for larger banks as they have access to government safety nets to bail out in difficult times because they are seen as "too big to fail". The reason is especially that some of the largest banks in Russia are state-owned. As borrowing rates go down, the net interest margin increases. Large banks benefit from the positive relationship, meaning that as *total assets (TA)* increase, net interest margin rises as well. However, this is not significant for deposit holders, since total assets are not significant concerning net interest spreads. Aside from that it could be that the "too big to fail" notion may lead some banks to invest in riskier securities with higher interest rates due to moral hazard, but not necessarily to invest in riskier loans.

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<sup>75</sup> [https://eclass.teicrete.gr/modules/document/file.php/DA171/Assignment%20Examples/Banks%20Profitability/Molyneux\\_Thornton\\_1992.pdf](https://eclass.teicrete.gr/modules/document/file.php/DA171/Assignment%20Examples/Banks%20Profitability/Molyneux_Thornton_1992.pdf)



**Table 11****Russia Full Dataset: Panel Regressions Excluding Foreign Banks**

The table presents the results of fixed and random effects panel regressions of the dependent variables net interest margin & net interest spread. The full dataset retrieved from Bankscope consists of 827 Russian commercial banks over the period 2005 – 2014, however the regressions in this section refer to the full dataset excluding the foreign commercial banks operating in Russia, which reduces the total number of commercial banks considered from 827 to 759, meaning that there are 68 foreign commercial banks. A foreign commercial bank has been identified through the implementation of two main criteria on Bankscope: The banks considered have to be owned by another bank or corporation with headquarters in another country, different from Russia (including those in unidentified or unknown countries). Moreover, the percentage of ownership has to be at least 50.01%. The dependent variable net interest margin is shown in specifications (1) to (3), whereas the other dependent variable net interest spread is presented in detail in specifications (4) to (6). Columns (1) to (2) and (4) to (5) specialize on fixed effects regressions controlled first for banks, then controlled for banks and years. Even though the conducted Hausman Test suggests the use of fixed effects regressions, random effects were also included in order to guarantee completeness of the analysis, which can be found in columns (3) and (6). Robust standard errors are in parentheses. \*\*\*, \*\*, \* denote significance at 1%, 5% and 10% levels respectively.

Variable	Net Interest Margin			Net Interest Spread		
	(1)	(2)	(3)	(4)	(5)	(6)
TA						
ROAA						
LIQ						
SUB						
CTP						
EQT	7.9128*** (0.008239)	7.8540*** (0.008325)	10.3906*** (0.006576)	1.7237* (0.028608)	1.8534* (0.028080)	1.5952 (0.024060)
HHD	1.6789* (0.004838)	1.8288* (0.004802)	-1.8260* (0.001423)	1.4766 (0.008759)	0.8304 (0.01893)	3.2592*** (0.005224)
HHL						
PSD						
GD						
GDP						
INFL	8.8294*** (0.016556)	0.0425 (3.096080)	9.3836*** (0.015510)	8.2898*** (0.082392)	0.0249 (25.36787)	8.7921*** (0.075466)
DUMMY						
Constant	18.2095*** (0.227717)	0.1545 (27.65688)	20.4290*** (0.200323)	-12.7873*** (0.894513)	-0.0487 (226.9103)	-12.1500*** (0.887600)
Obs.	6632	6632	6632	6633	6633	6633
R-Sq.	0.5699	0.5732	0.1219	0.2860	0.3080	0.01797
No. Banks	759	759	759	759	759	759
Bank Fixed	YES	YES	NO	YES	YES	NO
Year Fixed	NO	YES	NO	NO	YES	NO

**Net Interest Margin**

In Table 11, excluding the foreign banks which reduces the dataset from 827 to 759 Russian commercial banks, *equity to total assets (EQT)* and *inflation (INFL)* are highly significant, but inflation loses that statistical significance once year-fixed effects are considered.

As foreign banks are excluded from the dataset, *equity to total assets (EQT)* stays statistically significant and at the same time increases its economic significance, which indicates what I had written about the challenging and costly equity raising situation in Russia above. The more the dataset is focused on purely Russian banks, the more significant the equity raising issue becomes. Foreign banks usually can raise capital in their home countries and some of those countries have developed financial markets or are in further stages in the implementation of crucial reforms and legal frameworks, making the access to equity less complicated and cheaper. I cannot see a bigger difference in the significance of this particular variable between the full dataset and the dataset without the foreign banks, as foreign banks only make up around 8.5% of the entire commercial banking sector in Russia. If that percentage would have been higher, I am sure that the difference in significance would have been larger. For purely Russian-owned banks *non-interest income to total assets (SUB)*, *return on average assets (ROAA)*, *liquid assets to short-term liabilities (LIQ)* do all have a positive impact on the net interest margin, while *economic growth per capita (GDP)* has a significantly negative association with the net interest margin.

The *pre-post-crisis dummy* variable becomes economically much more significant, once foreign-owned commercial banks are taken out of the dataset. This might originate from the fact that the Russian commercial banking system has a lot of small and midsized banks, underdeveloped capital and interbank markets, a higher country risk and more volatility in bank earnings due to the economy's dependence on the oil industry and Russia's status as an emerging market. *Inflation (INFL)* increases its significance from 10% level to 1% level and is therefore more impactful when foreign banks are excluded. While *inflation (INFL)* has a positive association with the net interest margin, *private debt to GDP (PSD)*, *government debt to GDP (GD)* and *cost to income (CTP)* all become more significant as well, but have a negative relationship.

*Deposit market concentration (HHD)* and thanks to their significant correlations *loan market concentration (HHL)* and *total assets (TA)* too do remain robust at the same significance level.

### Net Interest Spread

In Table 11 column (4), which stands for the full dataset excluding foreign-owned commercial banks operating in Russia, *equity to total assets (EQT)* becomes significant. With it, also *return to average assets (ROAA)*, *liquid asset to short-term liabilities (LIQ)* and *non-interest income to total assets (SUB)* become relevant as well, while *economic growth per capita (GDP)* becomes significant with a negative relationship. *Equity to total assets (EQT)* surges from insignificance to 10% significance level, underlining again

that this variable does not only affect net interest margins but also net interest spreads, especially without foreign banks highlighting that reforms are in urgent need in Russia in the area of equity markets and capital related regulations. Excluding the foreign banks, the explanatory power for both net interest margins, but more for net interest spreads are increased, as especially purely Russian commercial banks seem to be more dependent on bank-specific variables when it comes to giving out loans and financing themselves via deposits within the Russian market. Foreign-owned banks might operate in other markets than the Russian one, cutting their dependence on Russia. Furthermore, they might also finance themselves cheaper in other foreign markets via deposits and through a broader investor base.

The *pre-post-crisis dummy variable* becomes significant at 10%. There are no changes to *deposit market concentration (HHD)* and *loan market concentration (HHL)*, which ultimately remain insignificant. Another big change, once foreign-owned banks are excluded from the full dataset is that *inflation (INFL)* rises very much in significance, meaning that *private debt (PSD)* and *government debt (GD)* do affect net interest spreads in a more negative way than when foreign-owned banks are included. *Government debt (GD)* increases from a 10% significance to 1%, once foreign banks are ignored, with a negative impact. Adding to my explanation for Table 10, is that the increase in significance can be explained by Russian commercial banks focusing more on Russian government securities in their investments than a more diversified foreign commercial bank which might have less experience and more risk-aversion than their Russian counterparts.

**Table 12**

**Russia Full Dataset: Panel Regressions Excluding Foreign Banks & State Banks**

The table presents the results of fixed and random effects panel regressions of the dependent variables net interest margin & net interest spread. The full dataset retrieved from Bankscope consists of 827 Russian commercial banks over the period 2005 – 2014, however the regressions in this section refer to the full dataset excluding the foreign & state-owned commercial banks operating in Russia, which reduces the total number of commercial banks considered from 827 to 750, meaning that there are 68 foreign and 9 state-owned commercial banks. A foreign commercial bank has been identified through the implementation of two main criteria on Bankscope: The banks considered have to be owned by another bank or corporation with headquarters in another country, different from Russia (including those in unidentified or unknown countries). Moreover, the percentage of ownership has to be at least 50.01%. The criteria established for identifying a state-owned bank is that the bank is owned by the Russian state, meaning that it can be the Russian government, public agencies or authorities or any other public entity. The state's ownership has to exceed at least 50.01%. The dependent variable net interest margin is shown in specifications (1) to (3), whereas the other dependent variable net interest spread is presented in detail in specifications (4) to (6). Columns (1) to (2) and (4) to (5) specialize on fixed effects regressions controlled first for banks, then controlled for banks and years. Even though the conducted Hausman Test suggests the use of fixed effects regressions, random effects were also included in order to guarantee completeness of the analysis, which can be found in columns (3) and (6). Robust standard errors are in parentheses. \*\*\*, \*\*, \* denote significance at 1%, 5% and 10% levels respectively.

Variable	Net Interest Margin			Net Interest Spread		
	(1)	(2)	(3)	(4)	(5)	(6)
TA						
ROAA						
LIQ						
SUB						
CTP						
EQT	7.8733*** (0.008285)	7.8123*** (0.008371)	10.3397*** (0.006615)	1.7559* (0.028728)	1.8903* (0.02819)	1.4111 (0.024022)
HHD	1.7918* (0.011482)	1.5825 (0.012538)	-0.2076 (0.012493)	0.0253 (0.029034)	-0.0029 (0.064940)	3.9787*** (0.016187)
HHL						
PSD						
GD						
GDP						
INFL	8.7468*** (0.016702)	0.0019 (3.002402)	9.3276*** (0.015649)	8.1776*** (0.028728)	0.0202 (8.591627)	8.6632*** (0.076315)
DUMMY						
Constant	18.1361*** (0.228847)	0.2012 (26.84967)	20.2549*** (0.201802)	-12.7336*** (0.900455)	-0.0911 (76.740704)	-12.090*** (0.895967)
Obs.	6552	6552	6552	6553	6553	6553
R-Sq.	0.5695	0.5728	0.1219	0.2854	0.3076	0.0179
No. Banks	750	750	750	750	750	750
Bank Fixed	YES	YES	NO	YES	YES	NO
Year Fixed	NO	YES	NO	NO	YES	NO

In this dataset, I have excluded not only foreign-owned banks, but also state owned banks. Table 12 does not show any large differences compared to Table 11 concerning net interest margins. Nevertheless, there are differences to be noted in the net interest spread. Once the state banks are excluded as well, the deposit and loan market concentrations do fall to almost 0, meaning that it loses a lot of economic relevance within the regression output in column (4) with regard to net interest spreads. More concentration in either of the markets does not increase market power and eventually spreads. According to de Haan & Poghosyan (2011) high market concentration can also imply simply the survival of banks, which have performed most efficiently and incur relatively lower intermediation costs and therefore charge lower spreads.<sup>76</sup> According to Zhao, Casu, Ferrari (2009), competition encourages banks to take on risk.<sup>77</sup> Martinez-Miera and Repullo (2008) find that more intense competition brings down the probability of loan defaults and simultaneously the interest income from existing loans. They even come upon evidence of a U-shaped relationship between competition and bank risk. In markets characterized by concentration, more compe-

<sup>76</sup> [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1950576](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1950576)

<sup>77</sup> [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1492262](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1492262)

tition slashes bank risk. On the flipside, markets marked by stiff competition, an intensification of competition ramps up bank risk.<sup>78</sup> Berger, Turk, Klapper (2009) illustrate by integrating a dataset of banks from 23 countries that market power increases credit risk, although banks with a heightened market power are subject to less overall risk.<sup>79</sup> Increased credit risk at the bank is likely to result in the deposit holders to require higher deposit rates in order to discipline the banks. These theories do not to play a role in Russia as it can be seen in Table 11 and Table 12 in columns (4).

## 5.2 Characteristic Groups for Russia

**Table 13**

**Russia Full Dataset: Net Interest Margin & Net Interest Spread (Characteristic Groups)**

The table presents the results of fixed panel regressions of the dependent variables - the net interest margin & net interest spread. The full dataset retrieved from Bankscope consists of 827 Russian commercial banks over the period 2005 – 2014. Columns (1) and (5) focus on bank-specific characteristics, which do not correlate significantly with other bank-specific independent variables within the correlation matrix. Columns (2) and (6) focus on bank-specific & market-specific variables, which are not significantly correlated with each other. Columns (3) and (7) represent non-correlated micro- & macro-specific variables. Columns (4) and (8) go for non-correlated macro-, micro- and market specific variables altogether. Robust standard errors are in parentheses. \*\*\*, \*\*, \* denote significance at 1%, 5% and 10% levels respectively.

Variable	Net Interest Margin				Net Interest Spread			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TA								
ROAA								
LIQ								
SUB								
CTP	-2.2716** (0.03222)	-2.2961** (0.003226)			-10.364*** (0.010769)	-10.360*** (0.010793)		
EQT	5.0730*** (0.015652)	5.0662*** (0.015659)			0.5771 (0.045211)	0.5743 (0.045242)		
HHD		1.2720 (0.005497)		1.6462 (0.003839)		-0.4977 (0.008631)		0.5551 (0.011667)
HHL								
PSD								
GD								
GDP			0.2758 (0.009878)	0.2310 (0.009874)			10.8137*** (0.024966)	8.9647*** (0.033960)
INFL			7.3896*** (0.022061)	7.4124*** (0.022062)			2.0109** (0.226679)	1.9587* (0.248944)
DUMMY								
Constant	15.2797*** (0.266299)	15.2239*** (0.367561)	26.2058*** (0.203335)	26.1336*** (0.203461)	4.6272*** (1.0605)	3.1913*** (1.507061)	-3.9812*** (2.0862)	-4.1020*** (2.186659)
Obs.	7134	7130	7150	7144	7134	7130	8280	7173

<sup>78</sup> <http://www.cemfi.es/ftp/wp/0801.pdf>

<sup>79</sup> [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1243102](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1243102)

R-Sq.	0.4844	0.4840	0.4637	0.4637	0.1510	0.1510	0.1272	0.1510
No. Banks	827	827	828	827	827	827	828	827
Bank Fixed	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed	NO	NO	NO	NO	NO	NO	NO	NO

### Net Interest Margin

Considering the bank-specific variables in Table 13 column (1), *cost to income (CTP)* and *equity to total assets (EQT)* which is positively correlated to *return on average assets (ROAA)*, *non-interest income to total assets (SUB)*, *liquid assets to short-term liabilities (LIQ)* and *total assets (TA)* are significant. When taking a look at macro- and microeconomic-specific variables in columns (3) and (4), only *inflation (INFL)* is highly positively significant, but not *economic growth per capita (GDP)*. Including the market-specific variables to these groups does not change much, *inflation (INFL)* continues to stay highly significant. The variation in the net interest margin is mostly explained by bank-specific variables. As seen in Table 13 column (2), the R-squared of the regression does not significantly change after the addition of market-specific variables. Even when putting micro-, macroeconomic-specific variables and market-specific variables together, they explain less than the bank-specific variables alone. However, the bank-specific variables in Russia explain much less the variation in the net interest margin than in Japan. As already evaluated in Table 10, within the bank-specific variables group only, it is again *equity to total assets (EQT)*, which stands out with its robustness and positive impact. Micro- and macro-specific variables explain the variation of net interest margin together almost as good as bank-specific variables. Market-specific variables do not add any explanatory power. However, if micro- and macro-specific variables are added to bank-specific variables as done in Table 10, they just add very slightly in marginal explanatory power.

### Net Interest Spread

Bank-specific variables explain the variation the most not only for net interest margins, but also for net interest spreads, even though the explanatory power is much less for net interest spreads.

*Cost to income (CTP)* within the entire bank-specific variables group is the most significant with a negative impact and is the most robust, even when market-specific variables are added. Market-specific variables do not add additional explanatory power either, as it was the case with the net interest margins before. When considering micro- and macroeconomic variables, *inflation (INFL)* and thus due to the high correlations *private debt (PSD)* and *government debt (GD)* are all highly significant. The most significant one is *economic growth per capita (GDP)*, which remains robust even after adding market-specific variables.

### 5.3 Robustness Tests for Russia

**Table 14**

**Russia Full Dataset: Net Interest Margin & Net Interest Spread (Robustness Tests)**

The table presents the results of fixed panel regressions of the dependent variables - the net interest margin and the net interest spread. The full dataset retrieved from Bankscope consists of 827 Russian commercial banks over the period 2005 – 2014.

Columns (1) and (2) are robustness tests for the fixed panel regression with respect to independent variables including the replacement of equity to total assets (EQT) with credit reserves (CR) & cost-to-income (CTP) with operation expenses to total assets (OPA). Columns (3) and (4) are robustness tests for the fixed panel regression with respect to independent variables including the GDP per capita growth (GDP) with population growth (POP) & inflation (INFL) with money supply growth (MS). Columns (5) and (6) are robustness tests for the fixed panel regression with respect to independent variables including the deposits HHI (HHD) with deposits to total funding (DF) & loans HHI (HHL) with loans to total assets (LF).

Columns (1), (3), (5) do all refer to the net interest margin. Columns (2), (4) and (6) have a reference to the net interest spread. Robust standard errors are in parentheses. \*\*\*, \*\*, \* denote significance at 1%, 5% and 10% levels respectively.

Variable	(1)	(2)	Variable	(3)	(4)	Variable	(5)	(6)
TA			TA			TA		
ROAA			ROAA			ROAA		
LIQ			LIQ			LIQ		
SUB			SUB			SUB		
OPA			CTP			CTP		
CR	2.6562*** (0.013451)	-1.4138 (0.111874)	EQT	5.2232*** (0.014633)	0.4926 (0.043052)	EQT	5.8174*** (0.012647)	0.2762 (0.042336)
HHD	1.0638 (0.006694)	-0.2430 (0.008892)	HHD	1.6353 (0.005008)	0.6316 (0.012699)	DF	2.6088*** (0.004913)	8.0800*** (0.016231)
HHL			HHL			LF		
PSD			PSD			PSD		
GD			GD			GD		
GDP			POP	-4.6197*** (0.313867)	-7.9152*** (0.844939)	GDP		
INFL			MS			INFL	7.5305*** (0.018509)	1.5514 (0.255137)
DUMMY			DUMMY			DUMMY		
Constant	45.5806*** (0.140638)	-1.7746* (0.163466)	Constant	15.4174*** (0.328872)	-4.2290*** (0.973041)	Constant	9.5889*** (0.376525)	-3.6971*** (2.856484)
Obs.	7144	7173	Obs.	7144	7145	Obs.	7064	7065
R-Sq.	0.4636	0.1511	R-Sq.	0.4898	0.1511	R-Sq.	0.5012	0.1513
No. Banks	827	827	No. Banks	827	827	No. Banks	827	827
Bank Fixed	YES	YES	Bank Fixed	YES	YES	Bank Fixed	YES	YES
Year Fixed	NO	NO	Year Fixed	NO	NO	Year Fixed	NO	NO

In Table 14, robustness tests are conducted, whereby in columns (1) and (2) *equity to total assets (EQT)* is replaced with *credit reserves (CR)* and *cost to income (CTP)* is substituted by *operating costs to total assets (OPA)*. Including the bank-fixed effects, *credit reserves (CR)* shows a very positive and significant relationship. *Deposit market concentration (HHD)* does not demonstrate significance and thanks to its significant cross-correlations with *loan market concentration (HHL)* and *total assets (TA)* do not have a significant impact on net interest margins in contrast to Table 10 marking the low robustness of *deposit*

*market concentration (HHD)*. However, *credit reserves (CR)* which turned out to correlate significantly with *operating expenses to total assets (OPA)* have both a very significant and positive effect on net interest margins. Furthermore, *liquid assets to short-term liabilities (LIQ)* and *non-interest income to total assets (SUB)* have a significant positive relationship to net interest margins as well. As *credit reserves (CR)* has a significant, negative correlation to *economic growth per capita (GDP)*, when economic growth increases, net interest margins decrease – which is in line with which I found out by considering Table 10. In columns (3) and (4), *inflation (INFL)* is replaced with *money supply (MS)* and *economic growth per capita (GDP)* with *population growth (POP)*. Once these replacements are integrated, one can see that *deposit market concentration (HHD)* as well as *loan market concentration (HHL)* remain insignificant, while *equity to total assets (EQT)* stays robust and very significant. This observation at the same time means that *return on average assets (ROAA)*, *liquid assets to short-term liabilities (LIQ)* as well as *non-interest income to total assets (SUB)* have a significant positive effect and *economic growth per capita (GDP)* a negative effect on net interest margins. *Population growth (POP)* is very significant with a negative impact on net interest margins, meaning that due to its significant correlations *government debt to GDP (GD)*, *private debt to GDP (PSD)* and *cost to income (CTP)* are also significantly associated with a negative impact on net interest margins. As *population growth (POP)* has a significant, negative correlation with *money supply (MS)*, it translates to the fact that as *money supply (MS)* grows, net interest margins expand.

In columns (5) and (6) *deposit market concentration (HHD)* and *loan market concentration (HHL)* are replaced with *deposits to total funding (DF)* and *loans to total assets (LF)* respectively. Compared to Table 10, clearly *inflation (INFL)* and *equity to total assets (EQT)*, including all the significantly correlated variables stay highly significant and prove to be very robust. *Loans to total assets (LF)* is highly correlated with *inflation (INFL)* and *equity to total assets (EQT)*, so that as the variable climbs, the net interest margin is increased. The only change which can be seen is that *deposits to total funding (DF)* is significant at the 1% level, while the *deposit market concentration (HHD)* was only significant at the 10% level. Overall, after the implementation of all robustness tests via different replacements of variables, one aspect clearly sticks out: *Equity to total assets (EQT)*, *liquid assets to short-term liabilities (LIQ)*, *return on average assets (ROAA)*, *non-interest income to total assets (SUB)*, *inflation (INFL)* with a positive impact and the following with a negative impact proved their sophisticated robustness: *Economic growth per capita (GDP)*, *government debt to GDP (GD)*, *private debt to GDP (PSD)*, *cost to income (CTP)*.



*Population growth (POP)* might lead to the fact that more people start to learn about investments and start investing their money into for example Russian government bonds driving down interest rates. The commercial banks, which invest in government bonds have to be satisfied with lower net interest margins. What seems surprising is that there is no positive impact on the net interest margin, this might be that as the financial system develops in Russia, people will but might not have yet put money into deposits. This might need some more time until the trust into the banking system, the volatile economy and usually high inflation is created and results in more deposit flows, which have the power to reduce deposit rates. However, during the last years, population has been decreasing in Russia, so that according to the regression results it should have a positive impact on net interest margins. Another point is: As less population means less deposits available, the lending rates of commercial banks will increase even more to make up for the higher deposit funding costs, increasing the net interest margin, this is especially applicable for net interest spreads where *population growth (POP)* is also even more significantly negative.

*Money supply growth (MS)* contributes to higher net interest margins, but it has a more economically significant positive impact on net interest spreads. Since *money supply growth (MS)* has a positive correlation with *inflation (INFL)*, longer-term rates go up and this benefits the bank through the loans it gives out. This is also why the net interest spread rises more than the net interest margin, when money supply growth increases in a country with a history of high inflation, inflation expectations are likely to increase. According to Gambacorta (2004) changes in monetary policy can have implications on the deposit rates.<sup>80</sup> Deposit rates are coupled to the benchmark interest rates of the central bank to conduct monetary policy. As money supply is raised, central banks typically set the benchmark rates down, so that the deposit funding and short-term financing costs of the banks head downwards. A rise in the money supply can result in the overall price level in the economy to increase. The price-level effect from money supply growth will originate in higher interest rates in response to the rise in the price level. At the same time, the expected-inflation effect may play a role, especially in Russia, as money supply growth may make people expect a more elevated price level in the future. The expected inflation rate climbs, pushing up interest rates.<sup>81</sup>

The rationale behind *credit reserves (CR)* is that the more credit reserves relative to loans are held, the more opportunity costs there are which are likely to be passed on to lending rates, creating a wider net interest spread. This is however not the case, since *credit reserves (CR)* is not significant in determining

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<sup>80</sup>[http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=499320](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=499320)

<sup>81</sup> "The Economics of Money, Banking and Financial Markets", Frederic S. Mishkin, 9<sup>th</sup> edition, p. 114-118

the net interest spreads as seen in Table 14 column (2). This is in fact an indication that Russian commercial banks might prefer not to increase lending rates to make up for higher opportunity costs, but invest in riskier securities with higher interest rates. *Credit reserves (CR)* are highly significant in determining net interest margins.

The higher the *operating costs to total assets (OPA)*, the higher the inefficiency, the larger the net interest spread usually in order to cover those costs. Gerlach, Peng and Shu (2005) tested 29 retail banks in Hong Kong during the period between 1994 and 2002 and found out that there is a pass-through effect of operating costs to the net interest spread. The operating costs are not only referring to inefficiency, but also to banks incurring these costs for purposes such as screening loan applicants and monitoring projects for which loans are forwarded. This explanation as well would result in higher loan rates and depress deposit rates due to lower risk as loan applicants are thoroughly screened and monitored. While it has a positive significant effect on net interest margins, it does not have one for net interest spreads in Russia contradicting with academic papers. This might imply as well, that instead of passing on those costs in the lending rates, riskier securities are preferred to invest in to make up for higher operating costs.

The ratio of *loans to total assets (LF)* has a positive relation to bank risk. The intuition behind this statement is that the greater the banks' exposure to loans is, the higher the probability of default risk according to Liu (2011). In case of loans as a proportion of assets being small, however, it will have a negative implication on profits, because profits are the buffer to default risk. As bank risk increases, borrowing for the bank will be more expensive. However, in Russian commercial banks it is the more they specialize on loans, the higher net interest margins they have. Most of the small and mid-sized banks have low loans to total assets, so this has a negativity on bank profits. As the financial system develops, and they give out more loans relative to assets, bank risk is reduced and borrowing rates for those banks will be lower. As bank risk increases, although net interest margins increase, net interest spreads are nearly unaffected. In Japan, however, as the loan to asset ratio increases, the net interest spreads fall as seen in Table 17. Clearly this can be understood, as lenders and deposit holders become rapidly more wary due to Japan's lost two decades which was caused by over-lending in the first place. Ben R. Craig and Valeriya Dinger show in their academic paper "Deposit Market Competition, Wholesale Funding and Bank Risk" using a sample of 589 U.S. banks that deposit market competition and bank risk might be indeed linked.<sup>82</sup> GDP growth

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<sup>82</sup> [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1594422](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1594422)

is a crucial determinant of non-performing loans (NPL) and bank's z-scores (Dinger and von Hagen, 2009 and Boyd, 2006).<sup>83</sup> The NPL and z-scores are proxies for bank risk. The z-score is an indicator pointing out of how many standard deviations of the return on average assets are needed to make the bank default. It can be considered as a more general proxy than the NPL, which concentrates mainly on the loan risk of the bank. Craig & Dinger (2009) show that there is a robust statistically significant positive link between deposit rates and bank risk.

Russian GDP growth has been falling from 6.38% to 0.64% according to World Bank data, and one could also spot a jump in NPL. The NPL ratio has been presenting a positive CAGR of 9.98% during 2005-2014 and the z-score has seen a decline of CAGR -4.65% during the period of 2001-2011 and -3.12% between 2005 and 2011. Unfortunately, the z-score data from the St. Louis Federal Reserve was unavailable for the years of 2012, 2013 and 2014. An additional risk factor that had been taken into account was the total loans to total assets. Banks holding more loans on their portfolios tend to be riskier than alternative bank assets. Boyd and de Nicolo (2005) support this argument stating that a more elevated loans to assets ratio raises the risk because of the borrowers' moral hazard.<sup>84</sup> Within the Russian commercial bank system, as previously highlighted, the total loans to total assets ratio has been having a CAGR of 0.38%. According to these academic papers, all these factors presented show a higher risk which likely drove up deposit rates and thereby pushed up deposit interest expenses. Allen & Gale (2000) reiterated that deposit market competition drives bank risk up by increasing the costs of bank retail deposits.<sup>85</sup> Credit risk remains very high in Russia and has been developing within an upward trend, which is quite worrying. One of the reasons for this fact is that the Russian banking sector developed a macro balance sheet position and thereby effectively entangled itself to commodity prices, especially oil & gas prices. These tendencies clearly contributed to a dangerously high ratio of bad loans. According to a Deutsche Bank research paper (2009), banks attempt to restructure their questionable loans instead of foreclosing as there are still various weaknesses in the Russian bankruptcy framework remaining. The government pressures banks to uphold lending to systematically important companies to the economy, while ensuring the provision of partial loan guarantees.<sup>86</sup> In some of the cases, it is reported that loan restructuring in the Russian banking sector is similar to simple rollovers of the loans for a period of six to twelve months with the imposition of higher

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<sup>83</sup> <http://www.sfbtr15.de/uploads/media/223.pdf>

<sup>84</sup> [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=879190](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=879190)

<sup>85</sup> <http://core.ac.uk/download/pdf/6649943.pdf>

<sup>86</sup> [https://www.dbresearch.com/PROD/DBR\\_INTERNET\\_EN-PROD/PROD000000000251634/Russia\\_in\\_the\\_financial\\_crisis\\_and\\_beyond.PDF](https://www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD000000000251634/Russia_in_the_financial_crisis_and_beyond.PDF)

interest rates. During the sample period, the loan-deposit ratio grew at a pace of CAGR 2.93%, so credit expansion was not supported by adequate deposit growth. This gap was mostly filled by turning to foreign borrowing for which I have used the amount outstanding of international debt securities for Russian issuers in the banking sector. All maturities of international debt securities were considered and the data was taken from the St. Louis Federal Reserve Database. The CAGR was computed and equals 29.48%.

In Japan, the interest expenses on deposits have only gone up by CAGR 3.62% in ten years while deposit growth was quantified to be 6.54%. Nonetheless, interest expenses have sunk by 8.02% since the crisis, boosting profitability. This has happened at a time where deposit growth was -0.15%. Japanese income on loans decreased by CAGR 1.44% in the last five years and by CAGR 6.95% in the last ten years. Loan growth was determined to be CAGR 1.11% and CAGR 3.91% respectively. Since deposit expenses went down by 8.02% and loan income retreated by 6.95% of CAGR, we can determine that profitability was positively affected by a difference of CAGR 1.07% since 2010 and CAGR 0.41% in the Russian commercial banking sector. Keeping in mind the entire period a deterioration in profitability of the loan business of CAGR 5.06% compared to a CAGR of -0.86% in Russia. Japanese annual GDP growth developed weakly during the sample period with a fall from 1.30% to -0.10%. Non-performing loans to gross loans was steady with a CAGR of only 0.69% compared to Russia's 9.98%. The z-score has increased from 7.76 to 12.08, while Russia's z-score decreased from 11.09 to 6.57. Japanese commercial banking total assets to total loans ratio decreased by CAGR 2.06% and was solid in the past five years. The total loans to total assets ratio in Japan is 44.78%, whereas Russia's ratio amounts to almost 58%. I can see from these figures that credit risk has been on a steep rise in Russia, which cannot be said to have happened in Japan. Japan has been on track in reducing credit risk and creating a more stable commercial banking system. However, I have to stress that Japan's banking system is found in a much more advanced stage in development than Russia's which is still a volatile emerging market in need of technology advances in order to screen and monitor loan takers better. Structural reforms are also needed in order to boost efficiency, competition, transparency and supervision along with regulations to accompany with the fast Russian development of its banking sector.

The *deposits to total funding (DF)* accounts for the funding risk of the bank. A high and increasing loan-to-deposit ratio in combination with a low total customer deposits-to-total funding ratio might be an indication of a more emphasized funding by foreign capital inflows, which in turn might require the adequate coverage and internalization of the currency risk involved. There is a significant positive relationship of

the variable with the net interest margin and an even more pronounced one with the net interest spread, meaning that the more deposits the banks take on, the less funding risk and foreign exchange risk there are. This applies certainly to Russian commercial banks, as these risks shrink and the banks enjoy lower borrowing rates.

### Net Interest Spread

*Credit reserves (CR)* are insignificant when it comes to the determination of net interest spreads. *Population growth (POP)* with a negative impact and *deposits to total funding (DF)* with a positive association are both very significant. In column (6) of Table 14, inflation loses its significance from Table 10, as *deposits to total funding (DF)* rises to high significance, even though in Table 10 *deposit market concentration (HHD)* was insignificant with regard to net interest spreads.

### **5.4 Panel Regressions for Japan**

**Table 15**

**Japan Full Dataset: Panel Regressions**

The table presents the results of fixed and random effects panel regressions of the dependent variables net interest margin & net interest spread. The full dataset retrieved from Bankscope consists of 139 Japanese commercial banks over the period 2005 – 2014. The dependent variable net interest margin is shown in specifications (1) to (3), whereas the other dependent variable net interest spread is presented in detail in specifications (4) to (6). Columns (1) to (2) and (4) to (5) specialize on fixed effects regressions controlled first for banks, then controlled for banks and years. Even though the conducted Hausman Test suggests the use of fixed effects regressions, random effects were also included in order to guarantee completeness of the analysis, which can be found in columns (3) and (6). Robust standard errors are in parentheses. \*\*\*, \*\*, \* denote significance at 1%, 5% and 10% levels respectively.

Variable	Net Interest Margin			Net Interest Spread		
	(1)	(2)	(3)	(4)	(5)	(6)
TA						
ROAA						
LIQ						
SUB						
CTP	-2.0819** (0.000735)	-3.1193*** (0.000489)	-2.4609** (0.000619)	-0.9785 (0.000772)	-1.0768 (0.000745)	-1.0386 (0.000627)
EQT	-1.0423 (0.011554)	0.3982 (0.010572)	-1.9939** (0.009999)	0.04184 (0.021521)	0.4869 (0.024450)	0.2902 (0.021696)
HHD	-1.8218* (0.000192)	-2.5593*** (0.000349)	-6.3284*** (0.000117)	-0.8010 (0.000148)	-0.8478 (0.000302)	-2.2271** (0.000105)
HHL						
PSD						
GD						
GDP						
INFL						
DUMMY						
Constant	16.5666*** (0.100632)	20.4319*** (0.077653)	18.1976*** (0.092904)	3.9053*** (0.136966)	3.2992*** (0.146165)	4.0853*** (0.123563)

Obs.	1239	1239	1239	1239	1239	1239
R-Sq.	0.7848	0.8811	0.0397	0.7781	0.7964	0.0085
No. Banks	139	139	139	139	139	139
Bank Fixed	YES	YES	NO	YES	YES	NO
Year Fixed	NO	YES	NO	NO	YES	NO

### Net Interest Margin

In contrast to Russia, the *equity to total assets (EQT)* is insignificant in Japan, while *cost to income (CTP)* and *deposit market concentration (HHD)* affect net interest margins negatively. This observation translates to the fact as *loan market concentration (HHL)* and *total assets (TA)* go up, net interest margins increase as well. As *return on average assets (ROAA)* increases, the net interest margin increases, too.

As the net interest margin's calculation is based on the formula  $(Interest\ income_{i,t} - Interest\ expenses_{i,t}) / [(Total\ assets_{i,t-1} + Total\ assets_{i,t})/2]$ , it makes sense for the case of Japan that as the commercial banks increase their *total assets (TA)*, the net interest margin falls. It can be observed that Japanese commercial banks are in the process of de-risking their balance sheets still, meaning that the larger they get, doesn't mean that they necessarily take on more risk by investing in securities with higher interest rates. In fact, it looks like the following: As commercial banks expand their holdings of assets, they focus more on low risk securities with lower interest rates or even more on excess reserves, but not necessarily lower risk loans. The result shows at the same time that Japanese commercial banks operate above their optimum level of size. The *total assets (TA)* does not have any significant effect on net interest spreads. This leads me to conclude that in Japan, there is no visible effect of possible economies of scale, which would have decreased loan rates, as net interest spreads are already very low. Pasiouras and Kosmidou (2007) reasoned a negative association between size and profitability of banks.<sup>87</sup> Cornett et al (2010) figured that banks of all size groups have been facing performance decreases, however the largest banks suffered the most extensive losses.<sup>88</sup>

*Deposit market concentration (HHD)* and *loan market concentration (HHL)* have a negative impact on net interest margins. Boyd and De Nicolo (2000) and Boyd, De Nicolo, Jalal (2006) point out that large banks with considerable market power in industrialized countries have an increased probability of bank failure. The former authors have compared US banks to banks in emerging markets. Banks with especially more loan market power charge higher rates to loan takers and make it more difficult for their customers

<sup>87</sup> [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=897893](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=897893)

<sup>88</sup> [https://www2.bc.edu/~strahan/CMST\\_v15.pdf](https://www2.bc.edu/~strahan/CMST_v15.pdf)

to repay their loans, deteriorating their customers` moral hazard incentives which leads them to go for riskier projects.<sup>89</sup> Overall, this results in the bank having a riskier range of customers thanks to adverse selection. The more concentrated the banking system, the more financial instability is promoted even further by those banks trusting in the explicit and implicit government safety nets Japan has. A classical problem of “too big to fail”. Schaeck, Cihak and Wolfe (2006) demonstrate with their evidence consisting of 38 countries that more competitive banking systems are more stable than monopolistic systems due to lower probability of bank failure.<sup>90</sup> According to my regression results, this description seems to be true for the Japanese commercial banking sector as well. A higher likelihood of insolvency increases borrowing rates of banks, reducing their net interest margins.

As *cost to income (CTP)* increases, implying lower efficiency results in lower net interest margins. This could be related to an increased risk perception by lenders, which charge higher interest rates, while loan rates for loans given to keiretsu network firms cannot be increased easily. At the same time, an increasing *return on average assets (ROAA)* equaling to more profitability and less financial risk leads to an increase in the net interest margin, as it is assumed that lenders will charge less to banks. In contrast it would mean that the less efficient and the less profitable the bank is, the lenders will charge more, however not the deposit holders, as seen from the net interest spread. When it comes to the net interest spread, *cost to income (CTP)* and *return on average assets (ROAA)* are neither significant nor robust. Japanese cost-to-income ratio has increased CAGR 1.00% in the past 10 years and only 0.07% in the past 5 years. The resilience of this ratio shows that efficiency has been solid, but what has to be highlighted is that Japanese banks cost-to-income was hovering at a range of 70% to 73%. At the same time, Russian efficiency has been much lower since the cost-to-income was stuck between 86% and 87%.

*Non-interest income to total assets (SUB)* has a positive relationship to the net interest margin just like compared to Russia, which has a positive one as well. Mixing non-interest income with interest income creates internal diversification benefits within a bank. Demsetz and Strahan (1997); Stiroh (2004); Demirgüç and Huizinga (2010), Liu and Wilson (2013) all found out that volatility outweighs the diversification benefits. They also concluded an increasing non-interest income has a negative impact on net interest margins. However, this does not seem to apply neither to Japan nor to Russia. Indeed diversification benefits within the banks of these countries may outweigh the volatility it brings along.

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<sup>89</sup> [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=956761](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=956761)

<sup>90</sup> [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=917588](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=917588)

## Net Interest Spread

The net interest spread seems to not be significantly affected by the variables introduced for Japan in contrast to Russia. However, once the robustness tests in Table 17 column (6) are introduced, *deposits to total funding (DF)* seems to play a significant role, while *loans to total assets (LF)* shows significance, but at a lower level and negative relationship. *Operating costs to total assets (OPA)* have a significantly positive association with net interest spreads.

### **5.5 Characteristic Groups for Japan**

**Table 16**

**Japan Full Dataset: Net Interest Margin & Net Interest Spread (Characteristic Groups)**

The table presents the results of fixed panel regressions of the dependent variables - the net interest margin & net interest spread. The full dataset retrieved from Bankscope consists of 139 Japanese commercial banks over the period 2005 – 2014. Columns (1) and (5) focus on bank-specific characteristics, which do not correlate significantly with other bank-specific independent variables within the correlation matrix. Columns (2) and (6) focus on bank-specific & market-specific variables, which are not significantly correlated with each other. Columns (3) and (7) represent non-correlated micro- & macro-specific variables. Columns (4) and (8) go for non-correlated macro-, micro- and market specific variables altogether. Robust standard errors are in parentheses. \*\*\*, \*\*, \* denote significance at 1%, 5% and 10% levels respectively.

Variable	Net Interest Margin				Net Interest Spread			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TA	-2.2594** (1.53E-10)							
ROAA								
LIQ								
SUB								
CTP	-2.0935** (0.000724)	-2.0819** (0.000735)			-0.9768 (0.000771)	-0.9785 (0.000772)		
EQT	-1.0173 (0.011446)	-1.04235 (0.011554)			0.0475 (0.021427)	0.0418 (0.021521)		
HHD		-1.8218* (0.000192)		-2.1479** (0.000384)	-0.2892 (1.06E-10)	-0.8010 (0.000148)		-2.5397*** (0.000178)
HHL								
PSD								
GD			-11.235*** (0.000472)	-11.728*** (0.000458)			-0.5654 (0.000629)	-6.7131*** (0.000277)
GDP			-0.035011 (0.002369)	0.0076 (0.002390)			0.3701 (0.001671)	0.0607 (0.002595)
INFL								
DUMMY								
Constant	17.0852 (0.098838)	16.5666*** (0.100632)	25.8154*** (0.101726)	26.6453*** (0.099395)	3.9537*** (0.13549)	3.9053*** (0.136966)	3.7734*** (0.134640)	14.6532*** (0.060423)
Obs.	1239	1239	1242	1242	1239	1239	1389	1243
R-Sq.	0.7860	0.7848	0.8266	0.8297	0.7781	0.7781	0.6167	0.7482
No. Banks	139	139	139	139	139	139	139	139
Bank Fixed	YES	YES	YES	YES	YES	YES	YES	YES



Year Fixed NO NO NO NO NO NO NO NO

### Net Interest Margin

While in Russia the bank-specific variables do explain the variation in the net interest margin the most, the micro- and macroeconomic variables do that for Japan. The market-specific variables just like in Russia do not have much marginal explanatory power. Within the bank-specific variable group, *cost to income (CTP)* and *total assets (TA)* are significant and have a clear negative association to net interest margins, while *return on average assets (ROAA)* and *non-interest income (SUB)* have a significantly positive relationship, even after market-specific variables are introduced. When combined with market-specific variables, *deposit market concentration (HHD)* and *loan market concentration (HHL)* in contrast to Russia, are significant. Within the micro- and macroeconomic specific variable group, *government debt (GD)* has a negative impact on net interest margins, along with *private debt (PSD)* and *inflation (INFL)*. *Economic growth per capita (GDP)* is insignificant. Once market-specific variables are implemented, *economic growth (GDP)* remains in the area of insignificance, while *government debt (GD)* stays robust. In addition, *deposit market concentration (HHD)* is significant and negative.

### Net Interest Spread

When it comes to net interest spread variations, the bank-specific variable group explains the best according to its R-squared in contrast to the net interest margin where the micro-and macroeconomic specific group is more relevant. When micro- and macro-specific variables are combined with market-specific variables, *deposit market concentration (HHD)*, *loan market concentration (HHL)*, *total assets (TA)* do stick out with a negative association to the net interest spread. Furthermore, *government debt (GD)*, *private debt (PSD)* and *inflation (INFL)* affect the net interest spread in a negative way, meaning that as these variables rise, the net interest spread falls.

## **5.6 Robustness Test Results for Japan**

**Table 17**

### **Japan Full Dataset: Net Interest Margin & Net Interest Spread (Robustness Tests)**

The table presents the results of fixed panel regressions of the dependent variables - the net interest margin and the net interest spread. The full dataset retrieved from Bankscope consists of 139 Japanese commercial banks over the period 2005 – 2014. Columns (1) and (2) are robustness tests for the fixed panel regression with respect to independent variables including the replacement of equity to total assets (EQT) with credit reserves (CR) & cost-to-income (CTP) with operation expenses to total assets (OPA). Columns (3) and (4) are robustness tests for the fixed panel regression with respect to independent variables including the GDP per capita growth (GDP) with population growth (POP) & inflation (INFL) with money supply growth (MS). Columns (5) and (6) are robustness tests for the fixed panel regression with respect to independent variables

including the deposits HHI (HHD) with deposits to total funding (DF) & loans HHI (HHL) with loans to total assets (LF).

Columns (1), (3), (5) do all refer to the net interest margin. Columns (2), (4) and (6) have a reference to the net interest spread. Robust standard errors are in parentheses. \*\*\*, \*\*, \* denote significance at 1%, 5% and 10% levels respectively.

Variable	(1)	(2)	Variable	(3)	(4)	Variable	(5)	(6)
TA			TA			TA		
ROAA			ROAA			ROAA		
LIQ			LIQ			LIQ		
SUB			SUB			SUB		
OPA	3.1587*** (4.300813)	2.3932** (2.497035)	CTP	-3.8147*** (0.000499)	-1.0753 (0.000721)	CTP	-2.6494*** (0.000665)	-1.6505* (0.000769)
CR			EQT	-0.6892 (0.00975)	0.1204 (0.021816)	EQT		
HHD	-0.5304 (0.000446)	-0.0049 (0.000234)	HHD	-2.4140** (0.000301)	-1.3173 (0.000183)	DF	3.5246*** (0.004725)	2.1736** (0.010447)
HHL			HHL			LF	0.00898 (0.001127)	-1.7817* (0.000489)
PSD	-1.6786* (0.001780)	-0.0897 (0.001092)	PSD			PSD		
GD			GD			GD		
GDP			POP			GDP		
INFL			MS	-15.093*** (0.006191)	-7.3192*** (0.004080)	INFL	-5.3496*** (0.005636)	-0.4560 (0.008238)
DUMMY			DUMMY			DUMMY		
Constant	6.2780*** (0.289742)	2.4166** (0.168739)	Constant	23.7416*** (0.076229)	4.2157*** (0.137857)	Constant	0.1828 (0.389166)	-1.5564 (0.956273)
Obs.	1211	1211	Obs.	1239	1239	Obs.	1231	1231
R-Sq.	0.7622	0.7238	R-Sq.	0.8620	0.7919	R-Sq.	0.8093	0.8092
No. Banks	138	138	No. Banks	139	139	No. Banks	139	139
Bank Fixed	YES	YES	Bank Fixed	YES	YES	Bank Fixed	YES	YES
Year Fixed	NO	NO	Year Fixed	NO	NO	Year Fixed	NO	NO

### Net Interest Margin & Net Interest Spread

*Private sector debt to GDP (PSD)* and *government debt (GD)* are significant with a negative impact on the net interest margin and *economic growth per capita (GDP)* along with *inflation (INFL)* do have a positive relationship. The most significant variables in this composition are *operating costs to total assets (OPA)*, *non-interest income to total assets (SUB)* and *credit reserves (CR)* with a very highly significant, positive impact on net interest margins. The significant negative impact can be referred to *return on average assets (ROAA)*. The difference for the net interest spread is that only *operating costs to total assets (OPA)* are positively significant, meaning that *return on average assets (ROAA)* pushes down net interest spreads. *Credit reserves (CR)* and *non-interest income to total assets (SUB)* push up net interest spreads as well.

*Inflation (INFL)* is substituted by *money supply growth (MS)* and *economic growth per capita (GDP)* is replaced with *population growth (POP)*. *Money supply growth (MS)* has a negative impact on not only net interest margins but also net interest spreads, even though for net interest margins it is stronger. Consequently, *population growth (POP)* has a positive impact on both of the dependent variables. *Private debt (PSD)*, *return on average assets (ROAA)*, *government debt (GD)* have all negative impacts on net interest margins and spreads. *Deposit market concentration (HHD)*, *loan market concentration (HHL)*, *total assets (TA)*, *cost to income (CTP)* all have a significant negative association with the net interest margin, while they do not affect the net interest spread.

*Money Supply growth (MS)* affects the net interest margin and spread negatively. Monetary policy has been already at a zero-bound level, so that benchmark rates do not have much room to be decreased. Deposit rates and short-term financing rates stay quite stable while loan rates fall due to easier monetary policy and very minimal inflation expectations.

When *deposit market concentration (HHD)* is replaced with *deposits to total funding (DF)* and *loan market concentration (HHL)* with *loans to total assets (LF)*, *cost to income (CTP)* stays robust, whereas it becomes significant for net interest spreads. *Deposits to total funding (DF)* is positively significant, while *loans to total assets (LF)* are only negatively significant for net interest spreads.

### **5.7 Empirical Findings & Limitations of Study**

This study targets the identification of the significant components of net interest margins and spreads in the Russian and Japanese commercial banking sectors by using unbalanced, dated panels for each country consisting of 827 Russian commercial banks and 139 Japanese ones over the 2005-2014 period. Empirical results in the form of regression outputs do imply that *equity to total assets*, *non-interest income to total assets*, *liquid assets to short-term liabilities*, *return on average assets* are associated with higher net interest margins in Russia, while *economic growth per capita* has a negative effect on net interest margins. Moreover, *inflation* has a significantly positive relationship with net interest margins, whereas *private debt to GDP*, *government debt to GDP* and *cost to income* are negatively associated. Excluding foreign-owned commercial banks from the full dataset does make *equity to total assets* and *inflation* along with its significantly correlated variables more robust. In Japan's full dataset, however, *cost to income*, *deposit market concentration*, *loan market concentration* and *total assets* do push down net interest margins. *Return on average assets* and *non-interest income to total assets* have a positive relationship with net interest

margins. The biggest contrast to Russia is that *inflation, private debt, equity to total assets, government debt and economic growth* do not play a major role in determining net interest margins.

Coming to net interest spreads, within the Russian commercial banking sector, *cost to income, government debt to GDP and private sector debt to GDP* are all associated with lower net interest spreads, whereas when *inflation* rises, net interest spreads increase. Once I exclude foreign-owned banks from the dataset, *inflation, government debt, private debt and cost to income* become much more significant rising from 10% to 1% significance level, while *equity to total assets, non-interest income to total assets, liquid assets to short-term liabilities and return on average assets* are associated with a rise in net interest spreads, but these spreads are negatively influenced by *economic growth per capita*. These variables, though, are insignificant if I do not exclude the foreign-owned banks. When foreign-owned and state-owned banks are both excluded from the full dataset, there are no large differences to be seen compared to the dataset excluding only the foreign-owned banks. On the other side, considering the entire dataset for the Japanese commercial banking sector, the net interest spread seems to not be significantly affected by the variables introduced for Japan in contrast to Russia. However, once the robustness tests are introduced, *deposits to total funding (DF)* seems to play a significant role, while loans to total assets shows significance, but at a lower level and negative relationship. *Operating costs to total assets (OPA)* have a significantly positive association with net interest spreads. .

In order to question the statistical power of the empirical model, I performed several robustness and soundness checks in which I adjusted the sample composition by taking out state-owned and foreign-owned commercial banks. Further measures comprised the change of the independent variables` sets to soothe this issue as seen in Table 14 and 17. Overall, bank characteristics explain most of the variation in not only net interest margins, but also in net interest spreads in Russia, while in Japan bank-specific variables explain the variation of net interest spreads the best. However, the variations of net interest margins are explained by micro-and macro-specific variables the most. Despite of the explanatory strength of bank-specific variables in general, they do explain less of net interest spreads` variations compared to net interest margins`. The results of the regressions suggest that bank-specific variables alone do explain 48% concerning the variations of net interest margins in Russia. When market-specific, micro-and macroeconomic-specific variables are added, the explanatory power decreases minimally to 46%. The same phenomenon is seen in the variations of net interest spreads. Bank-specific variables prevail by presenting a R-squared of 15%, when other variable groups are added, the R-Squared does not change. Excluding

foreign banks, the explanatory power of all independent variables increases from 48% to 57%. In net interest spreads, the outcome is even stronger, raising the explanatory power from 15% to 29%. In Japan, all the independent variables explain 78% of the net interest margin variation and 77% of the net interest spread variation, a lot higher than in Russia. The bank-specific variables alone explain 79% and 78% respectively.

There exist multiple limitations of this study. Firstly, while foreign-owned and state-owned banks can be taken out of the full dataset for the Russian commercial banking sector in order to see consequent results from the regression, this work cannot be undertaken for the Japanese commercial banking sector hindering me to create a comparison of both countries on more profound levels, as there are no state-owned commercial banks. Plus, there are only two commercial banks out of 139 which are foreign-owned. Leaving them out to create a new sample would not make sense due to the restricted number of foreign-owned commercial banks in Japan. Secondly, one has to keep in mind that financial statements may not reflect the true performance of commercial banks at all times. Through low or not timely enforcement of regulations, accounting rules and banks taking advantage of certain tax and accounting loopholes, banks may have engaged in activities in order to make certain accounting items look better especially for crucial stakeholders such as investors and regulators. Some accounting changes may have been implemented to discourage potential acquirers, especially during the ongoing intense consolidation phase within the Russian commercial banking sector. As most of the data used as bank-specific variables for regressions performed within this study consist of accounting measures computed by the utilization of bank financial statements, they may strengthen or weaken the results obtained and their attached explanations and interpretations. Thirdly, a study by Radha (2011) found evidence that different segments within the Kenyan banking sector encounter clients of significantly different size and type. The client segmentation does have an effect on lending decisions, deposit mobilization and banking governance.<sup>91</sup><sup>92</sup> However, the research on this study faced data limitations for the commercial banking sector especially in Russia, so that more profound analysis on this issue was prevented. Fourthly, the positive relationship between total assets and net interest margins in Russia to some extent reflects the market structure of the commercial banking sector in which large banks are associated with more market power. They usually enjoy superior reputation and trust, hence are able to easily mobilize deposits or financing even at lower rates. However, if the higher margins are merely the interpretation as an indicator of inefficiency, one can easily conclude that

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<sup>91</sup> <http://www.sciencedirect.com/science/article/pii/S1879933714000256>

<sup>92</sup> [http://eprints.soas.ac.uk/14149/1/PhD\\_corrected\\_final.pdf](http://eprints.soas.ac.uk/14149/1/PhD_corrected_final.pdf)

large banks are less efficient. This may or may not necessarily be the case. The higher margins associated with the size of the banks could manifest other dynamics that require further research beyond this study. A similar observation applies to the positive relationship between net interest margins and return on average assets, provided, that the latter is treated as an indicator of profitability.

## **6. Conclusion**

This paper employs net interest margin and spread as indicators of financial intermediation efficiency and explores determinants for Russia and Japan with the use of a bank-level unbalanced panel dataset extending from 2005 to 2014. Even though Russia and Japan belong to the bank-based German-Japanese financial system model, there exist considerable differences when it comes to the determinants of net interest margins and spreads. While in Russia, capitalization, micro- and macroeconomic variables have a high significance, in Japan that is not the case. Market-specific variables with a spotlight on market concentration play a crucial role there. Hence, it can be said that further improvements in the financial intermediation efficiency in the Russian commercial banking sector should specialize on the development and deepening of private and public equity markets, the regulatory requirements concerning equity holdings of banks and the continuance of successively bringing inflation down. Despite the many distinctions, there are variables, which do emerge in a significant manner in Russia as well as in Japan: As the substitution effect and profitability are on the rise, net interest margins advance. Unlike the common view in the existing literature though, the substitution effect via the non-interest income to total assets has a positive effect on net interest margins. Cost inefficiency is associated to net interest margin slumps in both countries in contrast to my previous expectations. In Japan, net interest margins and spreads are very low, making banks unprofitable which has been posing an unprecedented challenge to the local commercial banking sector. Empirical results suggest that bank-specific variables explain most of the variation with respect to net interest margins and spreads in both countries' commercial banking sectors, even though they have a lot less explanatory power when it concerns net interest spreads.

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# Appendix

**Table 1**

**Full Dataset Correlation Matrix: Russia & Japan**

The upper matrix showcases the correlations between all considered dependent variables for all the commercial banks of the full dataset for Russia. The lower matrix illustrates the correlations between the same variables but this time for Japanese commercial banks. Furthermore the statistical significance can be found for each correlation considered. Those variables with a 1% or 5% statistically significant correlations were taken into account and one of them dropped to avoid multi-collinearity.

Covariance Analysis: Ordinary  
 Date: 10/11/15 Time: 19:42  
 Sample: 2005 2013  
 Included observations: 7039  
 Balanced sample (listwise missing value deletion)

Covariance Correlation t-Statistic Probability	COST TO PR	DEPOSITS DUMMY PRE	EQUITY TO T.GDP PER	CAGOVERNMENT	INFLATION	LIQUID ASSE	LOANS PRIVATE DEB	ROAA TOTAL	ASSET TOTAL	NON I			
COST_TO_PROFIT	397.9585 1.000000 ----- -----												
DEPOSITS	-35.74395 -0.091960 -7.747059 0.0000	379.6377 1.000000 ----- -----											
DUMMY_PRE_POST	3.599181 0.382016 34.67606 0.0000	-0.045468 -0.004941 -0.414489 0.6785	0.223053 1.000000 ----- -----										
EQUITY_TO_TOTAL	7.970984 0.024606 2.064728 0.0390	-11.80919 -0.037323 -3.133114 0.0017	0.321053 0.041862 3.514737 0.0004	263.7006 1.000000 ----- -----									
GDP_PER_CAPITA	-30.86904 -0.331112 -29.43636 0.0000	0.386487 0.004244 0.356055 0.7218	-1.465633 -0.664036 -74.50029 0.0000	-4.451608 -0.058659 -4.929169 0.0000	21.84036 1.000000 ----- -----								
GOVERNMENT_DEB	2.577902 0.058500 4.915839 0.0000	0.135416 0.003146 0.263933 0.7918	0.464629 0.445364 41.72686 0.0000	0.630370 0.017573 1.474391 0.1404	-2.364203 -0.229017 -19.73600 0.0000	4.879509 1.000000 ----- -----							
INFLATION	-5.873421 -0.110425 -9.320239 0.0000	0.119196 0.002294 0.192473 0.8474	-0.806291 -0.640303 -69.92757 0.0000	0.481287 0.011116 0.932538 0.3511	-0.094918 -0.007618 -0.639032 0.5228	-2.361275 -0.400918 -36.71128 0.0000	7.108963 1.000000 ----- -----						
LIQUID_ASSETS_TO	144.6089 0.085271 7.179264 0.0000	-44.63027 -0.026944 -2.261109 0.0238	3.491838 0.086971 7.323493 0.0000	570.3329 0.413141 38.05679 0.0000	-20.83592 -0.052445 -4.405547 0.0000	5.376543 0.028631 2.402770 0.0163	-12.31753 -0.054343 -4.565429 0.0000	7226.860 1.000000 ----- -----					
LOANS	-35.54318 -0.078936 -6.642434 0.0000	427.3213 0.971647 344.7394 0.0000	-0.061294 -0.005750 -0.482344 0.6296	-11.56088 -0.031541 -2.647183 0.0081	0.254739 0.002415 0.202581 0.8395	-0.029029 -0.000582 -0.530794 0.9610	0.368729 0.006127 0.513979 0.6073	-43.88042 -0.022868 -1.918855 0.0550	509.4745 1.000000 ----- -----				
PRIVATE_DEBT	53.76962 0.270256 23.54710 0.0000	-1.183529 -0.006090 -0.510920 0.6094	2.811922 0.596975 62.42162 0.0000	1.368648 0.008451 0.708928 0.4784	-22.57267 -0.484295 -46.43470 0.0000	-3.249142 -0.147481 -12.50853 0.0000	-12.05478 -0.453328 -42.66397 0.0000	43.64492 0.051477 4.323998 0.0000	-1.127373 -0.005008 -0.420109 0.6744	99.46878 1.000000 ----- -----			
ROAA	-26.27605 -0.370345 -33.44525 0.0000	-0.374897 -0.005410 -0.453829 0.6500	-0.097493 -0.058041 -4.877097 0.0000	10.12271 0.175270 14.93398 0.0000	0.997470 0.060012 5.043279 0.0000	-0.049710 -0.006327 -0.530794 0.5956	0.072627 0.007659 0.642493 0.5206	8.530616 0.028214 2.367762 0.0179	-0.642667 -0.008006 -0.671580 0.5019	-1.842620 -0.051947 -4.363535 0.0000	12.64936 1.000000 ----- -----		
TOTAL_ASSETS	-21774677 -0.145501 -12.33692 0.0000	1.27E+08 0.870505 148.3746 0.0000	126783.3 0.035784 3.003752 0.0027	-9682363. -0.079480 -6.688510 0.0000	-551029.9 -0.015717 -1.318641 0.1873	306544.4 0.018499 1.552055 0.1207	-693366.7 -0.034665 -2.909702 0.0036	-35285944 -0.055330 -4.648579 0.0000	1.39E+08 0.822236 121.1896 0.0000	2157754. 0.028840 2.420286 0.0155	-467850.9 -0.017535 -1.471185 0.1413	5.63E+13 1.000000 ----- -----	
TOTAL_NON_INT_I	175.5909 0.366189 33.01139 0.0000	-18.83030 -0.040206 -3.375512 0.0007	2.467206 0.217332 18.67775 0.0000	59.55655 0.152579 12.95105 0.0000	-39.06778 -0.347785 -31.11710 0.0000	-2.465962 -0.046443 -3.900166 0.0001	5.022003 0.078360 6.593671 0.0000	81.28281 0.039778 3.339517 0.0008	-18.92075 -0.034874 -2.927233 0.0034	45.95485 0.191695 16.38452 0.0000	6.812591 0.079689 6.706211 0.0000	-12557306 -0.069639 -5.856009 0.0000	577.7710 1.000000 ----- -----



Covariance Analysis: Ordinary  
Date: 10/06/15 Time: 18:17  
Sample: 2005 2014  
Included observations: 1238  
Balanced sample (listwise missing value deletion)

Covariance Correlation t-Statistic Probability	COST TO PR	DEPOSITS_HHI	DUMMY_PRE_POST	EQUITY TO TA	GDP PER CAPITA	GOVERNMENT_DEB	INFLATION	LIQUID ASSETS TO TA	LOANS_HHI	PRIVATE_DEBT	ROAA	TOTAL_ASSETS	TOTAL_NON_INT
COST_TO_PROFIT	994.8279 1.000000 ---- ----												
DEPOSITS_HHI	-63.42967 -0.038115 -1.340986 0.1802	2783.801 1.000000 ---- ----											
DUMMY_PRE_POST	-0.129517 -0.008487 -0.298371 0.7655	0.120514 0.004721 0.165964 0.8682	0.234122 1.000000 ---- ----										
EQUITY_TO_TA	2.445076 0.040683 1.431483 0.1525	-1.251345 -0.012447 -0.437622 0.6617	0.033253 0.036066 1.268808 0.2047	3.630799 1.000000 ---- ----									
GDP_PER_CAPITA	-4.198883 -0.052994 -1.865715 0.0623	-0.471304 -0.003556 -0.125014 0.9005	-0.112629 -0.092661 -3.271726 0.0011	0.275892 0.057637 2.029717 0.0426	6.310573 1.000000 ---- ----								
GOVERNMENT_DEB	-2.160834 -0.002874 -0.101052 0.9195	-2.487687 -0.001978 -0.069546 0.9446	10.34204 0.896754 71.24269 0.0000	3.566528 0.078529 2.769394 0.0057	1.643291 0.027445 0.965252 0.3346	568.0999 1.000000 ---- ----							
INFLATION	1.474249 0.042276 1.487606 0.1371	-0.700772 -0.012013 -0.422369 0.6728	-0.039669 -0.074153 -2.614165 0.0091	0.159368 0.075647 2.667161 0.0077	0.188146 0.067741 2.387051 0.0171	7.478055 0.283772 10.40422 0.0000	1.222400 1.000000 ---- ----						
LIQUID_ASSETS_TO	0.206208 0.000534 0.018777 0.9850	11.62708 0.018003 0.633030 0.5268	0.859136 0.145056 5.154207 0.0000	3.995183 0.171289 6.112299 0.0000	0.671751 0.021846 0.768210 0.4425	53.76130 0.184268 6.591151 0.0000	1.343263 0.099254 3.506768 0.0005	149.8350 1.000000 ---- ----					
LOANS_HHI	-92.41775 -0.085934 -3.032373 0.0025	824.4900 0.458299 18.12821 0.0000	-0.017202 -0.001043 -0.036656 0.9708	0.888943 0.013682 0.481067 0.6306	0.087947 0.001027 0.036098 0.9712	-2.891874 -0.003558 -0.125101 0.9005	-0.291620 -0.007736 -0.271967 0.7857	33.04022 0.079162 2.791857 0.0053	1162.612 1.000000 ---- ----				
PRIVATE_DEBT	-1.289667 -0.010906 -0.383439 0.7015	2.174252 0.010991 0.386441 0.6992	0.892903 0.492199 19.87878 0.0000	-0.499663 -0.069941 -2.464947 0.0138	-5.447038 -0.578340 -24.92360 0.0000	11.37471 0.127287 4.511714 0.0000	-2.813917 -0.678831 -32.50130 0.0000	-1.137563 -0.024787 -0.871703 0.3835	0.810838 0.006343 0.222993 0.8236	14.05678 1.000000 ---- ----			
ROAA	-10.24562 -0.533108 -22.15287 0.0000	0.366200 0.011391 0.400487 0.6889	0.022791 0.077304 2.725902 0.0065	0.100497 0.086557 3.054541 0.0023	0.167115 0.109177 3.861396 0.0001	1.572205 0.108255 3.828395 0.0001	0.021050 0.031246 1.099044 0.2720	0.704676 0.094479 3.336490 0.0009	0.929391 0.044733 1.574259 0.1157	-0.088858 -0.038896 -1.368487 0.1714	0.371277 1.000000 ---- ----		
TOTAL_ASSETS	-7.75E+08 -0.095761 -3.382187 0.0007	1.16E+10 0.858380 58.82472 0.0000	6035694. 0.048587 1.710182 0.0875	10978959 0.022443 0.789209 0.4301	-331351.5 -0.000514 -0.018062 0.9856	2.59E+08 0.042268 1.487348 0.1372	-2295856. -0.008088 -0.284364 0.7762	2.98E+08 0.094800 3.347947 0.0008	6.15E+09 0.702543 34.70735 0.0000	20940730 0.021755 0.765023 0.4444	9451945. 0.060421 2.128085 0.0335	6.59E+16 1.000000 ---- ----	
TOTAL_NON_INT	-2.121886 -0.114352 -4.046784 0.0001	0.114068 0.003675 0.129197 0.8972	0.009496 0.033359 1.173466 0.2408	0.450293 0.401688 15.42086 0.0000	0.073798 0.049935 1.757741 0.0790	0.556866 0.039713 1.397284 0.1626	-0.006956 -0.010695 -0.376008 0.7070	3.116272 0.432736 16.87550 0.0000	1.580043 0.078767 2.777836 0.0056	-0.019622 -0.008896 -0.312762 0.7545	0.102865 0.286954 10.53126 0.0000	8470983. 0.056084 1.974854 0.0485	0.346108 1.000000 ---- ----