

# Specifics of Credit Risk Assessment in Mortgage Lending – Sample of Russia<sup>1</sup>

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## Introduction

Russia has a short but glorious history of mortgage lending. Mortgage activity in the country started only about six years ago. By the end of 1999, in Russia with a population of about 150 million, less than 500 mortgage loans in the amount of US\$11 million were issued. Since then the situation has radically changed. By the end of 2004 the total mortgage portfolio of Russian banks was already equal to 17.8 billion Rubles (about \$0.6 billion). During the year 2005, the total volume of mortgage loans outstanding (including securitized loans) increased more than 4 times to 72.2 billion Rubles (about \$2.6 billion). It is expected that results of the year 2006 will show an even faster growth rate.

The fast developing mortgage market is attracting more and more participants. Numerous banks and investors are anxious to participate in the mortgage business. As a response to this demand, the secondary mortgage market has emerged and is developing at an extremely high speed. Currently there are at least four specialized secondary mortgage market institutions in Russia. One of them is state-owned (Agency for Housing Mortgage Lending), whereas others (Sovfintreid, KIT-Finance, and BTA – Ipoteca, daughter of BTA Bank of Kazakhstan) are private organizations<sup>2</sup>. All these institutions buy mortgage loans

wholesale and sell their debt or securities backed by mortgage loans to investors. Demand for this type of debt and the securities are growing every day.

Why is the Russian mortgage market so attractive for banks and investors? The reason is that mortgage lending in Russia is considered by them to be not only a profitable, but also a risk-free business. The opinion of the Russian business community is that at least one of the major mortgage risks — the risk of borrower's default— does not exist in Russia. This opinion is grounded in the fact that the whole history of mortgage lending in the country does not know even one case of a mortgage borrower's default<sup>3</sup>.

The question is whether Russian mortgage loans really bear no default risk due to some unique features of Russian borrowers, or whether the risk exists, but for some reason has not revealed itself yet.

If the risk exists, but for some reason is latent, several questions arise:

1. Why does the risk not reveal itself?
2. Under which circumstances will the risk reveal itself?
3. Could the number of defaults (default rate level) that will take place when the risk reveals itself be approximated for a Russian mortgage portfolio?

It is very important for mortgage portfolio holders to know answers to these questions. It seems the answers could be found by means of analyzing the way mortgage borrowers default risk, (and hence mortgage portfolio consisting of these loans default risk) is managed.

## Default risk management

At the stage of loan origination the risk of mortgage borrowers defaulting is managed by mortgage underwriting. Mahoney and Zorn describe mortgage underwriting as the analysis of three groups of factors associated with a mortgage loan. These groups they describe as "the three Cs": collateral, capacity and credit reputation<sup>4</sup>. It is presumed that, by knowing the parameters of these three factors for all loans in a mortgage loan portfolio, an investor can approximate the default rate for that portfolio.

It means that two portfolios with different underwriting parameters should have different level of defaults. It also means that, as soon as a mortgage underwriter starts to apply more rigid requirements to any (or to all) of underwriting factors, the default level of the loans goes down, while relaxing the requirements will increase the future default rate.. Does changing these factors really have such an effect? And, if the answer is

<sup>1</sup> The paper benefited from extremely valuable comments provided by Roger Blood from Mercer Management Consulting.

<sup>2</sup> This is unique for developing countries. In most developing countries a secondary mortgage market does not exist at all. In very few countries where it was created only one secondary mortgage market institution is present. Typically these institutions are state owned and is supported by international donors.

<sup>3</sup> Default is the ultimate end of the loan via foreclosure. Russia knows no foreclosures. There were several cases of borrowers being unable to repay the loans but these cases have been peacefully settled between the borrowers and the lenders.

<sup>4</sup> Cited by M.Lea "Perequisites for a Successful Secondary Mortgage Market: The Role of the Primary Mortgage Market HFI Vol XV/No 2 December 2000.

yes, could it be that Russia for some reason is an exception to the rule?

*The collateral factor* refers to the ratio between the loan amount and the value of the collateral. In most cases, the property acquired by the borrower is the only collateral for the mortgage loan. This is the reason why collateral factor analysis usually consists of evaluating the loan-to-value ratio (LTV). It has been documented in numerous studies that in developed countries, a strong correlation exists between the LTV ratio of home mortgage loans and the probability of the mortgagor's default. For example, an analysis of loans purchased by Freddie Mac (the Federal Home Loan Mortgage Corporation) between 1985 and 1989 demonstrated that borrowers of loans with LTV of 95-99% were 5 times more likely to default than the borrowers having loans with LTVs below 80%<sup>5</sup>.

If it were the case for Russian mortgage loans as well as for loans from the Freddie Mac portfolio, the relaxing of this collateral factor underwriting requirement (LTV requirement) would increase the default rate of Russian mortgage loans. But the increase did not take place when Russian banks gradually increased the LTV ratios from 70% in 2001 to 90% in 2006. This change has not to this date entailed any default rate growth. So, it appears that this lack of default rate growth demonstrates that Russia's mortgage loan default rate does not correlate with the collateral factor of loan underwriting..

*Capacity* is a borrower's financial ability to repay the loan. Assessment of capacity is the assessment of whether the borrower's income is enough to make regular mortgage payments, and at the same time, to support the borrower's accustomed way of living. Mortgage underwriters assess this factor in large part by evaluating the borrower's monthly housing payments as a share of total household monthly income. This share

is called the "front-end ratio" (or payment to income ratio)

Taking into account the fact that a huge number of households have other debt besides just the mortgage loan, mortgage underwriters usually calculate also the ratio between all monthly debt obligations (such as mortgage loan, car payments, consumer loans, etc.) and monthly household income. This underwriting ratio is called the "back-end ratio" (or overall debt to the same income ratio).

Mortgage underwriters working in developed countries have no doubt that the capacity of the borrower and the probability of default are strongly correlated. For example, the already mentioned analyses of Freddie Mac's portfolio demonstrate that "borrowers with back-end ratio greater than 36% of their incomes were twice as likely to enter foreclosure as those with ratios below 30%".

The experience of Russian banks so far seems to disprove that such correlation exists at all. Four to five years ago, in most banks the requirement was that front-end ratio should be no more than 30%. Since then the requirement has been gradually relaxed, so that a front-end ratio of 50% now is the most common requirement<sup>7</sup>. The softening of the requirement has not influenced the default ratio of Russian mortgage borrowers at all. It means that default rate of Russian mortgage loans has not been influenced by changes in capacity factor just as it has not been influenced by changes in the collateral factor.

*Credit reputation* refers to the borrower's history of fulfilling his (or her) financial obligations (repaying loans, paying telephone bills, making rental payments, etc). In developed countries this element of underwriting is usually based on data collected and analyzed by credit bureaus. The result of these analyses generally includes a figure ("credit score"), which can

be used in the loan underwriting assessment.

A strong link between the credit score of the borrower and the probability of his (or her) default has been shown in countries with well-developed mortgage markets. It would be intriguing to verify whether the link exists in the Russian mortgage market, but unfortunately this cannot yet be done. In Russia, as in most of the emerging economies, credit bureaus do not yet have adequate information on past credit behavior for the majority of potential borrowers. In fact, most mortgage lenders do not assess credit reputation at all. So, unfortunately, we must exclude credit reputation from the factors we can analyze at this time.

In order to answer the question as to why the relationship between default rate and the parameters of mortgage underwriting cannot be seen in Russia, whereas this relationship so clearly exists in other countries, we must analyze the mechanism of that relationship.

### Capacity and default rate

The correlation between "capacity" of a borrower and probability of his default is grounded in the fact that each borrower, during the term of the loan, faces several "personal risks". Among them is unemployment, disability, loss of one of the earners of the household, increase in number of dependents, etc. These potential events have the same effect on the borrower's financial ability to repay the loan as disappearance of a part of the borrower's household income. To simplify the context, we shall further refer to all personal risks as one risk – the risk of disappearance of a portion of the household's income.

In case the disappearing share of income is high, the remaining amount may not be enough to support the way of living the

<sup>5</sup> Cited by M.Lea "Perequisites for a Successful Secondary Mortgage Market: The Role of the Primary Mortgage Market HFI Vol XV/No 2 December 2000

<sup>6</sup> With no credit enhancement.

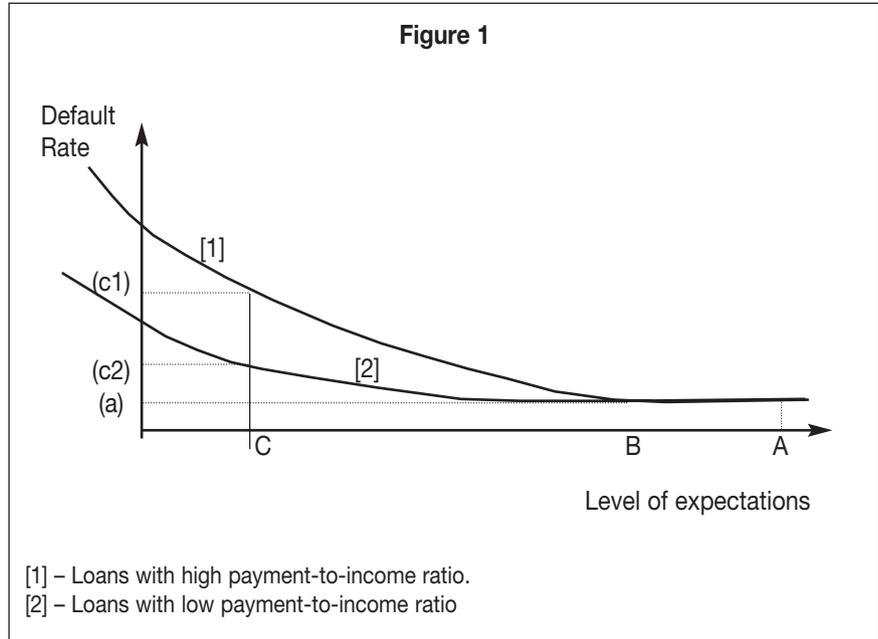
<sup>7</sup> Back-end ratio normally is not assessed in Russia at all since it is impossible yet to get information about other debt of the borrower besides his mortgage loan. One can guess though that a loan with front-end ratio of 50% can easily have back-end ratio of 70%. The ratio is about two times higher than the maximum ratio taken into account by Freddie Mac, which should signal extremely high probability of defaults.

borrower has been used to and also to make the required mortgage payments. What can the borrower do in this case? If he is confident that disappearance of the portion of his income is temporary (optimistic borrower), he will continue to make his loan payments. To do that, he will either tap additional sources of money (use his savings, borrow from his friends or from financial institutions, sell some of his belongings, etc) or temporarily reduce his spending to "bare necessities" (food, clothes, transport, utilities, etc), or he will do both.

If the borrower has reason to believe that the portion of his income has disappeared forever or for a substantial period of time (pessimistic borrower), and if the remaining portion is not enough to support his accustomed style of living, he will not borrow money or reduce spending, but, rather, will start looking for a way to free himself from the obligation to make mortgage payments. One of the ways to do that is to default on the mortgage loan.

In this context we are seeing that the probability of default of the borrower whose income for some reason shrinks depends on two factors: (i) the scale of the reduction: the chances that the reduction of income that takes place will make it burdensome (or even impossible) for the borrower to continue making mortgage loan payments and (ii) income expectations: expectations in connection with the borrower's chances to restore (or even to increase) his income level.

The level of influence of factor (i) on the probability of the borrower's default depends on his payment-to-income ratio<sup>8</sup>. It can be explained in the following way: the smaller is the portion of income the borrower retains after making mortgage payments the more chances are that even small-scale reduction of his income will make it impossible for him to support his living and will force him to default. It means that the higher is the portion of income allocated by the borrower for the monthly loan payment (payment-to-income ratio) the



smaller is the reduction of income that may cause default of the borrower ie the higher is the extent to which factor (i) influences the default rate. It can be concluded that the higher the payment-to-income ratio is, the stronger is the influence of factor (i) on probability of default.

At the same time, the influence of the scale of reduction of income (factor i) can be reduced or increased by the income expectations (factor ii). The higher the income expectations level is, the bigger the reduction of income will be necessary to force a borrower to default, because a borrower with a high level of income expectations will easily find the money necessary to compensate for a temporary reduction of income. It means that the higher the income expectation level for the borrower is, the lower is the probability of his default.

If income expectations for the borrower are high because he (or she) is an educated, energetic, young, and friendly person, it is nearly impossible that he will not find a way to borrow money and avoid defaulting on a mortgage loan, even if the scale of reduction is very big. It can be stated that if

the income expectations level for particular borrowers are extremely high, the level of default may be independent of the payment-to-income ratio of the borrowers.

The relationship between income expectations (changes in unemployment level and in real wages), payment-to-income ratio and default rate may be demonstrated by the curves shown in figure 1. It can be seen that the default level in general is higher for the borrowers with high payment-to-income ratio than for the borrowers with a low ratio. At the same time, in parallel with the growth of the level of expectation, the default rate becomes less and less dependent upon the ratio. At the extreme, the default rate may become completely independent of the payment-to-income ratio.

Income expectations may be high, not only for well-educated young professionals but for a much wider segment of the workforce. In some cases, income expectations may turn out to be high for practically everybody. A high level of income expectation for everybody is generally associated with the periods of rapid economic growth. During such periods, numerous new jobs are

<sup>8</sup> The smaller is the scale (the size) of the reduction of income that may cause the default the stronger is the influence of factor (i).

**Table 1. Income expectations parameters in Russia**

	1998	1999	2000	2001	2002	2003	2004	2005
Unemployment rate	13.2	12.6	9.8	8.9	8.6	8.0	7.8	7.7
Average monthly wages (Rubles)	1,052	1,523	2,223	3,240	4,360	5,499	6,739	8,530
Ruble/Dollar exchange rate	20.65	27	28.16	30.14	31.78	29.45	27.75	28.78
Average monthly wages (\$)	50.9	56.4	78.9	107.5	137.2	186.7	242.8	296.4

created and, hence, the unemployment rate is falling, while real wages are increasing<sup>9</sup>. During such periods, mortgage loan underwriters might decide to permit a high payment-to-income ratio for all borrowers, because practically all of them would be able to avoid default in case of a temporary loss of a portion of their income.

It seems that this relationship is a key factor in explaining why the default rate of Russian mortgage loans is not influenced by the “capacity factor” of these loans. Throughout the last eight years, the Russian economy has experienced extremely fast growth. As a result of the growth, the unemployment level has been falling by approximately 9% every year (See Table 1). Average monthly wages increased during the same period by more than eight times in Ruble terms and nearly six times in US Dollar terms.

In this situation, income expectations for all the borrowers have been extremely high. This means that all Russian mortgage loans are currently at the point A of Figure 1. At this point the default level for both curves is the same (point a), ie, mortgage loan portfolios with different payment-to-income ratios have the same (extremely low) default rate.

It is clear, though, that the risk has not disappeared. If the situation starts to change (eg, the unemployment level stops decreasing and real wages stop increasing) the Russian mortgage market will start

moving along the curve through the points B, C, etc. Starting from the B-level of income expectations, the risk will gradually begin to reveal itself.

Is it important that the risk will reveal itself in different ways for loans with different payment-to-income ratios (the default level will become different for the two curves, as it is at point C). For the loans with high payment-to-income ratios, the default rate equals  $c_1$ , while for the loans with low payment-to-income ratios, the default rate level will be much lower and will be equal to  $c_2$ .

#### Collateral and the default rate

The relationship between collateral value and probability of default is well documented but the nature of this relationship is not clear. The fact that this relationship exists means that if two borrowers with the same income and the same amount of monthly loan payments lose the same portion of their income, the one having more expensive property (lower LTV with the same loan) is less likely to default than the owner of the cheaper property. This cannot be explained by differences in borrowers’ ability to repay the loan. The ability of the borrower to repay the loan is the same.

The only explanation may be that it is not the ability but the willingness of the

borrowers to repay the loans that differs in the case. The difference in “willingness level” may be explained in the following way: In case the borrower faces the situation that he (or she) for some reason has no financial means to continue making mortgage payments (for example if he has lost his job and cannot borrow money), the borrower has two options:

- Option A. He can sell the house and repay the loan.
- Option B. He can default on the loan.

In order to choose the most appropriate option, the borrower assesses how his decision will influence his current financial status and his future status. The major factors he evaluates in connection with both options are presented in table 2.

The borrower that decides to default on the loan has strong advantages. He can live in the mortgaged house and pay neither mortgage payments nor rent till he is evicted<sup>10</sup>. Normally he would have several months until actual eviction takes place<sup>11</sup>.

At the same time, the defaulting borrower ruins his credit reputation and loses an opportunity to keep in his possession the difference between current market price of the house and mortgage debt outstanding (value difference)<sup>12</sup>. After the home of the defaulted borrower is sold (in most cases below the market price), the lender withholds not only the amount of

<sup>9</sup> In reality expectations are a more complex matter than just a function of economic growth rate. In some cases they may be high because of recent political changes in spite of current difficulties or may be low due to the memory of recent crises in spite of positive trends in the economy.

<sup>10</sup> The amount of rental payments the borrower would be supposed to pay if he sells his mortgaged home during the period of time equal to foreclosure period – we will call Rentals Accumulated. Rentals Accumulated equals to market rent price multiplied by foreclosure period. Foreclosure period is the period between the day the borrower stopped making mortgage payments and the day of eviction.

<sup>11</sup> In numerous countries foreclosure takes several years or turns out to be impossible.

<sup>12</sup> We are considering that down payment was paid by the borrower’s own money (borrowers equity) and hence the whole Value difference is kept by the borrower.

Table 2

Factors	Option A (Sell the property and repay the loan)	Option B (Default on the loan).
The difference between current market price of the house and mortgage debt outstanding (Value difference).	Kept by the borrower (if the funds for the down-payment were not borrowed by the borrower).	To great extent is withheld by the lender in the form of compensation for foreclosure expenses, interest unpaid through the foreclosure period, penalties, etc.
Credit history of the borrower.	Remains unscathed.	Is ruined.
Home expenses.	High. Must start paying rent.	Negligible. Pays neither rent nor mortgage loan repayment.

outstanding debt but also foreclosure expenses, interest unpaid through the foreclosure period, penalties, etc. It means that in most cases where the borrower that has selected Option B and defaulted, he or she receives nothing or close to nothing when the house is resold.

It can be stated that, depending upon what option is selected, the borrower loses either his credit reputation and rentals accumulated or the value difference. It means that, selecting one of the options, the borrower must compare these three factors and decide what makes better sense for him to lose. In order to compare he must somehow assess the value of each of the factors.

It is not easy to predict what value a borrower will attribute to credit reputation (loss thereof). Credit reputation may be extremely valuable for a young family and may not be as valuable for a middle-aged person who has no intention and little chance to find a new job and to apply for a new mortgage loan. It is rather easy, though, to predict how the borrower will assess and compare rentals accumulated and value difference because both are expressed in monetary terms.

Of course, no borrower compares the value difference and rentals accumulated using a calculator, but nevertheless, some kind of calculation goes through his mind. The

question he must answer to himself comparing the values is: "If I sell the house and repay the loan will I receive enough cash to provide my family with a rental home for a substantial period of time?" If the answer is: "Definitely not!" the chances that the borrower will decide to default are rather high.

Value difference is directly related to current LTV. Current LTV is the LTV at the moment the borrower loses the ability to repay the loan.<sup>13</sup> It is clear that the higher Current LTV is (and hence the lower value difference is), the greater is the chance that the borrower will decide to default.

The break-even point is reached when the value difference becomes equal to the rentals accumulated. If the Current LTV makes the value difference higher than the rentals accumulated, the borrower will probably decide to sell the property and repay the loan. It does not mean that the borrower will inevitably do it. The borrower's behavior is not always rational. Some of them may not sell the house and resettle due to psychological factors such as unwillingness to move or indecision, but the probability that default will not take place is very high in the case.

On the contrary if the current LTV makes the value difference lower than the rentals accumulated, the borrower will have a strong inclination to default. Whether he

does it or not will depend on how much he values his credit reputation.

For example, if the rental cost per year were to be approximately 20% of the price of the house, and if the average default period were equal to one year, the break-even point for current LTV would equal 80%. This means that it is not rational for the borrower to default on the loan if current LTV is lower than 80%. On the contrary, if the current LTV is higher than 80%, the probability of the borrowers defaulting is high<sup>14</sup>. It may be said that the key factor defining probability of default is the LTV at the moment the borrower loses his ability to repay the loan (current LTV).

Current LTV is different from the LTV at the moment of underwriting (original LTV). Throughout the life of the loan, LTV is constantly changing due to two factors. The first factor is change (typically reduction) of mortgage amount outstanding; and second, changes in the market value of the mortgaged house<sup>15</sup>.

If self-amortizing mortgages are used (the most common type of mortgage loan), the debt outstanding amount is constantly reducing through the life of the loan. The amount of monthly reduction increases each month through the whole life of the loan. It is clear that "old loans" tend to have lower current LTVs than "young loans". Since the mortgage business has started in

<sup>13</sup> Value difference can be calculated as Market price of the house multiplied by (100% - LTV).

<sup>14</sup> We are not taking into account taxation, transaction costs and several other expenses.

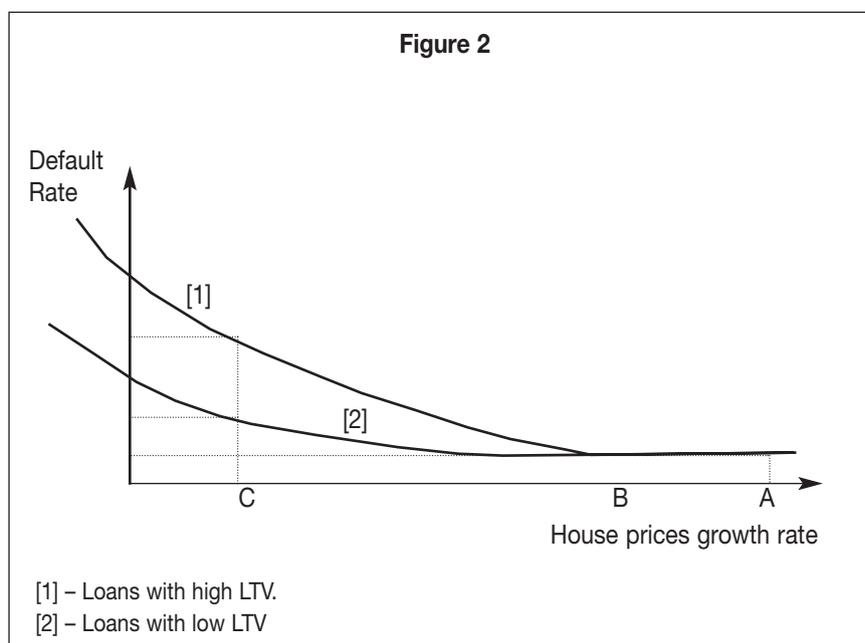
<sup>15</sup> We will not take into account amortization though if rapidly deteriorating construction materials are used, amortization should be taken into account

Russia only recently, the total mortgage portfolio in the country consists of loans of comparatively young age. Due to the young ages of the loans, their current LTVs should be comparatively high, which could signal a rather high level of future defaults. Since the default level to date is low, it seems clear that in Russia (as well as in several other countries with real estate booms), the current LTV level is being driven mostly by home price growth.

The nature of this influence is the following: If the housing market goes up, the value of mortgaged property is increasing and, therefore, current LTV is reducing<sup>16</sup>. The higher is the increase in housing prices, the faster current LTV is reducing and, hence, the faster value difference is growing. This means that the faster the increase in housing prices is, the faster current LTV reaches a break-even point, and the faster it becomes unreasonable (and hence improbable) for the borrower to default on the mortgage loan instead of selling the property and repaying the loan.

From the above, we are seeing that the probability of default is strongly driven by the speed with which house price growth pushes current LTV to the level below the break-even point<sup>17</sup>.

In the case of extremely fast home price growth, the loans issued with high original LTV (above break-even-point level) may turn out to become loans with low current LTV (below break-even-point) in a very short period of time. This period may be much shorter, even, than a typical foreclosure period. In this situation, for the borrowers on loans with original LTVs above the break-even-point, default can become as improbable as for the borrowers on loans



with original LTVs below the break-even-point.

This means that, if real estate prices are growing at an extremely high speed, the probability of default can decrease to the point where it becomes effectively independent of the original LTV and hence independent of the collateral factor of mortgage underwriting.

The correlation between home price growth and the default rate for mortgage loans with different LTVs is demonstrated in Figure 2.

The recent situation in Russia may be used to illustrate this point. At present, Russia is experiencing a great real estate boom. Changes in average home price per square meter in Moscow are presented on table 3. It is easy to see that in less than a year and

a half, home prices in Moscow increased more than 1.5 times (from \$1800 per square meter to \$3050 per square meter). On average, home prices have increased by 3.5% every month.

As it is demonstrated in table 4 this rate of home price growth only in three months after loan issuance turns the loan with original LTV of 90%, into the loan with current LTV below 80%, and in a bit more than half a year the LTV of the loan becomes close to 70%!<sup>18</sup>

If we consider that in Russia the break-even point for the current LTV is equal to 80%, we can conclude that all loans with original LTVs below 90% reach break-even level in less than four months<sup>19</sup>. This means that even the borrowers who received loans with LTVs of 90% and started experiencing

**Table 3. House prices in Moscow**

Date	Jan 2005	Jul 2005	Jan 2006	April 2006
Price per square meter	\$1,800	\$1,900	\$2,300	\$3,050

<sup>16</sup> Decline in market prices influences current LTV in right the opposite way.

<sup>17</sup> Of course, the break-even point is also not fixed but is gradually changing in parallel with rental price changes. The break-even point may also be changed if new legislation reducing or increasing average foreclosure period is applied.

<sup>18</sup> Calculations were conducted based on the following presumptions: loan term – 20 years, interest rate – 12%.

<sup>19</sup> Loans with the original LTV equal (and lower than) 80 % are at break-even point already at the moment of issuance

**Table 4. Changes of Current LTV (Sample of 1 square meter house bought on January 2005).**

Month from the issue date		1	2	3	4	5	6	7	8	9	10	11	12
Market home price (\$)	1,800	1,860	1,923	1,987	2,054	2,122	2,194	2,267	2,343	2,422	2,503	2,587	2,673
Mortgage debt outstanding (\$)	1,620	1,618	1,617	1,615	1,613	1,612	1,610	1,608	1,606	1,605	1,603	1,601	1,599
Current LTV	90%	87%	84%	81%	79%	76%	73%	71%	69%	66%	64%	62%	60%

difficulties with mortgage payments very soon after receiving the loans will have no inclination to default on the loans.

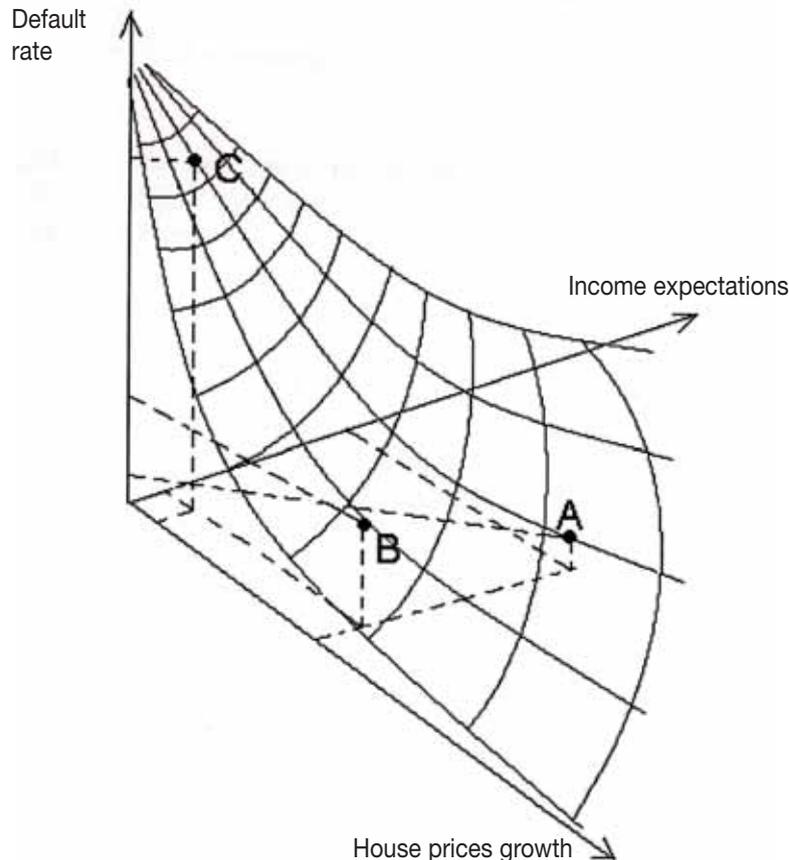
The Russian housing and mortgage market currently is at the point A in Figure 2. At this point, the default level for the both curves is the same, ie, it is not related to the original LTV. It is clear, though, that if the situation starts to change (real estate price growth slows down or even declines), the Russian

mortgage market will move to the point B and later to the point C. At this point, the default level will be different for the two curves. The loans with original LTVs above 90% will not reach break-even-point for a substantial period of time, while loans with LTVs below 80% will be already below that point. This means that the probability of defaults for loans with original LTVs above 90% will be much higher than for loans with original LTVs below 80%.

**Conclusion**

It is clear that the currently low rate of mortgage defaults in Russia is explained not by the unique nature of Russian borrowers, but by variety of other factors among which such macroeconomic parameters as income expectations and house prices growth rate seems to be of major importance<sup>20</sup>.

**Figure 3**



<sup>20</sup> Among other factors are: owner-occupation of practically all mortgaged property; high educational level of the borrowers (several heads of underwriting departments interviewed by the author have not been able to remember even one mortgage borrower to be a manual worker), etc.

The relation between default rate and these two parameters may be visualized with the help of Figure 3. (The Figure has only one curve, while actually it should have an unlimited number of curves each associated with a particular LTV and a particular payment-to-income ratio).

Figure 3 can help to find answers to the questions posed at the beginning of this paper. The default risk does not reveal itself because currently Russia is at the point A of Figure 3 where both income expectations and house prices growth rate are at extremely high levels. This level of the parameters makes default rate very low for all mortgage loans, whatever the original LTV and payment-to-income ratio of these loans may be.

The default risk will start to reveal itself when one of these parameters - or both of them - starts to go down. In parallel with these changes, the probability of default will start to rise.

For example, as shown in Figure 3, if income expectations go down, while house prices growth remains unchanged, the system will move to the point B and level of default will increase from a-level to b-level. If both income expectations and house prices growth rate go down the system will move to the point C where the level of default will increase to the much higher c-level.

If therefore mortgage lenders and investors take into account (based upon analysis of macroeconomic indicators) future trends in income expectations and real estate prices, they would be able to better predict the future default rate of their portfolios.

The most important conclusion that can be made, based on analysis of the specifics of the current Russian market, is that mortgage portfolio holders in Russia, as well as in other countries, should not rely on information about the current default rate of their portfolios when assessing the future behavior of the portfolio. Instead, portfolio

holders should take into account trends of macroeconomic changes and calculate future default rates associated with these expected changes.

The lack of understanding of the fact that the default rate level is not a fixed parameter of the portfolio, but rather a dynamically changing parameter (influenced by macroeconomic environment) may cause a serious under-valuation of the risk.

The consequences of under-valuation of any housing finance risks (including risk of default) may prove to be extremely dangerous, not only for mortgage portfolio holders but also for the economy as a whole. It must be stressed (though it is not the subject of the paper) that not only the risk of borrower's default but several other important mortgage risks (cash-flow risk, currency risk, agency risk, etc.) are neglected by most mortgage lenders and investors in Russia which aggravates the situation considerably.