Spreads on Local Currency Loans vs Spreads on Hard Currency Loans*

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I. Introduction

When lending in Russia, the European Bank for Reconstruction and Development (EBRD) has the choice of lending either in hard currency or in local currency. For concreteness, let the hard currency be the US dollar (dollar) and the local currency the Russian ruble (ruble). In all transactions considered in what follows, the EBRD lends to the same Russian borrower. The transaction differs only as regards the currency denomination of the loan. In its local currency operations, the EBRD is constrained not to have a net position in local currency. All local currency (ruble) lending therefore has to be funded through local currency (ruble) borrowing. The ruble borrowing can, in principle, be done 'onshore', that is, in the Russian ruble markets, or 'offshore', say by issuing a euro-ruble bond. In practice, the euro-ruble market is currently defunct, and the Russian ruble market is very underdeveloped.

Assume the US dollar benchmark interest rate, i^b, is 0.05 (that is, 5 percent). In what follows I will assume for simplicity that the benchmark rate is also the EBRD's borrowing rate.[1] Assume the spread of the EBRD dollar lending rate, i^l, over the benchmark is 0.03 (that is, 3 percent or 300 basis points (bps)). Assume also that the EBRD's ruble benchmark, i^{*b}, (approximately its ruble borrowing rate) is 0.25 (that is, 25 percent). For simplicity, assume that all features of the loan contract other than currency denomination are the same. What should be the spread on the ruble loan?

The answer depends on how the spread is measured. I consider two different measures of spread. The first measure, λ_1 or λ_1^* is a measured suggested naturally by the form of the asset pricing equations in the next section of this note.

$$\lambda_1 = \left(\frac{1+i^l}{1+i^b}\right) - 1 = \frac{i^l - i^b}{1+i^b} \tag{1.1}$$

$$\lambda_1^* = \left(\frac{1+i^{*l}}{1+i^{*b}}\right) - 1 = \frac{i^{*l} - i^{*b}}{1+i^{*b}} \tag{1.2}$$

** The views and opinions expressed are those of the author. They do not necessarily reflect the views and opinions of the European Bank for Reconstruction and Development.

[1] In reality, the hard-currency benchmark is a rate like libor or euribor. The EBRD's borrowing rate is a small spread below the benchmark. This does not matter for the issue considered here.

The second measure, λ_2 or λ_2^* is the difference between the lending rate and the borrowing rate:

$$\lambda_2 = i^l - i^b \quad (1.3)$$

$$\lambda_2^* = i^{*l} - i^{*b} \quad (1.4)$$

If the dollar loan and the ruble loan differ only as regards the currency of denomination and possibly in the *level* of dollar and ruble rates, the spreads will be independent of the level of interest rates for the first measure of spread. The spread will be increasing in the level of interest rates with the second measure of spread. The effect of the level on the spread is, however, relatively small. In the example under consideration, with the dollar borrowing rate at 5 percent, the dollar lending rate at 8 percent and the ruble borrowing rate at 25 percent, the ruble lending rate would be 28.57 percent. The ruble spread (on the second spread measure) would therefore be 357 bps, as against a spread of 300 bps on the dollar loan. The ruble spread and the dollar spread would be the same on the first spread measure, at about 286 bps.

If other features determining the risk and return on the loan vary with the currency of denomination, very little can be said *a-priori* about the relationship between ruble spreads and dollar spreads. Even if we ignore risk-aversion, non-convexities and potentially surprising covariances, the spread between lending and borrowing rates represents *transaction costs*, *monopoly power* and a *default premium* – the expected fraction of the contractually due payment that is not paid. We consider these three spread determinants in turn.

Transaction costs. These include thick market effects, costs due to delays in effecting transactions due to illiquidity etc. These are bound to be higher for ruble loans than for dollar loans. The domestic Russian ruble markets are very underdeveloped, and indeed practically non-existent at longer maturities. Higher transactions costs in ruble markets therefore seems a likely outcome, especially if one includes the cost of disorderly ruble markets disrupting access by the EBRD to sources of ruble funding.

Monopoly power. It is difficult to be confident about whether on balance (as a borrower and lender) the EBRD exercises more market power when engaged in a ruble loan than it has when engaged in a dollar loan. The EBRD's mandate requires that its transactions satisfy a 'sound banking' criterion. I interpret this as meaning that risk-adjusted returns should cover costs, including the opportunity cost of funds. It also seems reasonable to infer that it precludes the EBRD from exercising monopoly or monopsony power to achieve above-normal competitive returns.

Default premia. Default risk should be interpreted broadly to include any failure to comply with contractual obligations, including transfer risk, conversion risk etc. Default premia may well be lower for ruble loans than for dollar loans. The central government can print rubles but not dollars. While this may not help lower-tier governments directly, it could help them if the power of the seigniorage printing press makes it easier for the central government to bail out a lower-tier government when the latter has ruble debt than when it has dollar debt. The default premium can be thought of as the product of the probability of default and the fraction of the contractual payment lost as a result of the default. For instance, if the probability of default were one in ten and all of the contractually due payment is lost in case of default, the default premium would be about 10 percent or one thousand basis points. There are also arguments, based on market inefficiencies, going the other way.

There is also an argument that point to the default probability being higher on ruble loans, assuming that the nominal ruble rate exceeds the nominal dollar rate. This would for instance be the case if domestic and international financial markets are integrated, and the ruble is expected to depreciate vis-à-vis the dollar over time (this would follow from uncovered interest parity (UIP) or from the more general 'arbitrage conditions' stated in the next section). If higher nominal rates create a greater risk of cash-flow problems even if the real interest rates are the same (say because it is difficult to get additional credit to make up for the faster erosion of the real value of the outstanding nominal debt), the country with the higher level of nominal rates would also tend to have a higher lending-borrowing spread. Formally, such capital market imperfections co-exist uneasily with the efficient markets framework that lies behind the analysis in the next section. Another possible reason for differences in spreads might be that different currency denominations happen to be associated with differences in seniority of the lender. I would expect that, on balance, *ceteris paribus*, the risk of default on ruble loans would be less than on dollar loans.,

II. The simple analytics of local currency and hard currency spreads and levels

For expositional simplicity, the benchmark rate is identified in what follows with the borrowing rate. Since the role of transaction costs and monopoly power in determining spreads is uncontroversial, I will leave them out of the algebra that follows.

Notation

$i^{b}_{t,t+1}$ EBRD's US dollar borrowing rate.

$i^{l}_{t,t+1}$ EBRD's US dollar lending rate.

$i^{*b}_{t,t+1}$ EBRD's ruble borrowing rate.

$i^{*l}_{t,t+1}$ EBRD's ruble lending rate.

$\lambda_{t,t+1} = i^{l}_{t,t+1} - i^{b}_{t,t+1}$: spread on US\$ loan

$\lambda^{*}_{t,t+1} = i^{*l}_{t,t+1} - i^{*b}_{t,t+1}$: spread on ruble loan

s_t spot exchange rate (number of rubles per US dollar)

$\sigma_{t+1} = \frac{s_{t+1}}{s_t}$ the exchange rate depreciation factor (1 + the proportional rate of depreciation of the ruble)

p US price level (in US dollars)

$\pi_{t+1} = \frac{p_{t+1}}{p_t}$ US inflation factor (1+ the proportional rate of change of the US price level)

E_t expectation operator conditional on information at time t.

Cov_t covariance conditional on information at time t.

δ fraction of the contractually due US dollar payment that is not paid; $0 \le \delta \le 1$.

δ^* fraction of the contractually due rouble payment that is not paid; $0 \le \delta^* \le 1$.

$u(c_t)$ period felicity function of the EBRD, assumed to be defined over real consumption or real GDP; $u' > 0$, $u'' < 0$

$\rho > 0$ subjective time preference rate

II.1 Lending-borrowing spreads for ruble loans and for US dollar loans

I assume in what follows that the EBRD borrows at the risk-free rate, whether it borrows US dollars or rubles. I also assume that the investment decisions of the EBRD can be modelled as those of a risk-averse investor who maximises the objective function given in (2.1).

$$E_t \sum_{i=0}^{\infty} \left(\frac{1}{1+\rho} \right)^i u(c_{t+i}) \tag{2.1}$$

When the EBRD borrows *and* lends in US dollar, on competitive terms, the following first-order condition must be satisfied:

$$E_t \left(\frac{(1+i^b_{t,t+1})p_t}{p_{t+1}} \frac{u'(c_{t+1})}{u'(c_t)} \right) = E_t \left(\frac{(1-\delta_{t+1})(1+i^l_{t,t+1})p_t}{p_{t+1}} \frac{u'(c_{t+1})}{u'(c_t)} \right) \tag{2.2}$$

Since both interest rates (as well as the period t price level and consumption level) are set and known at time t, this can be rewritten as

$$\frac{1+i^b_{t,t+1}}{1+i^l_{t,t+1}} = \frac{E_t \left((1-\delta_{t+1}) \frac{p_t}{p_{t+1}} \frac{u'(c_{t+1})}{u'(c_t)} \right)}{E_t \left(\frac{p_t}{p_{t+1}} \frac{u'(c_{t+1})}{u'(c_t)} \right)} \tag{2.3}$$

This implies[2]

$$\frac{1+i^b_{t,t+1}}{1+i^l_{t,t+1}} = 1 - E_t\delta_{t+1} - \frac{Cov_t\left(\delta_{t+1}, \frac{u'(c_{t+1})/u'(c_t)}{\pi_{t+1}}\right)}{E_t\left(\frac{u'(c_{t+1})/u'(c_t)}{\pi_{t+1}}\right)} \qquad (2.4)$$

The term $E_t\delta_{t+1}$ can de called the (expected) default risk premium on a US dollar loan. The term $\frac{Cov_t\left(\delta_{t+1}, \frac{u'(c_{t+1})/u'(c_t)}{\pi_{t+1}}\right)}{E_t\left(\frac{u'(c_{t+1})/u'(c_t)}{\pi_{t+1}}\right)}$ represents the extent to which default risk on the dollar loan co-varies with the marginal utility of a future dollar. If whenever dollars are expected to be valuable in the future (that is, whenever $\frac{u'(c_{t+1})/u'(c_t)}{\pi_{t+1}}$ is high), the default risk on a dollar loan is high, then dollar loans are a bad investment from the point of view of risk diversification, and a higher dollar lending-borrowing spread is called for. Even when there is no risk aversion ($u'(c)$ is independent of *c*), the Covariance term does not vanish, but becomes $\frac{Cov_t\left(\delta_{t+1}, \frac{1}{\pi_{t+1}}\right)}{E_t\left(\frac{1}{\pi_{t+1}}\right)}$. We owe this to Jensen's inequality (that is the fact that $E(f(x)) > f(E(x))$ whenever *f* is a strictly convex function of *x*).

When the EBRD borrows and lends in rubles, the following first-order condition must be satisfied:

$$E_t\left(\frac{(1+i^{*b}_{t,t+1})s_t p_t}{s_{t+1}p_{t+1}}u'(c_{t+1})\right) = E_t\left(\frac{(1-\delta^*_{t+1})(1+i^{*l}_{t,t+1})s_t p_t}{s_{t+1}p_{t+1}}u'(c_{t+1})\right) \qquad (2.5)$$

This can be rewritten as

$$\frac{1+i^{*b}_{t,t+1}}{1+i^{*l}_{t,t+1}} = \frac{E_t\left((1-\delta^*_{t+1})\frac{s_t p_t}{s_{t+1}p_{t+1}}\frac{u'(c_{t+1})}{u'(c_t)}\right)}{E_t\left(\frac{s_t p_t}{s_{t+1}p_{t+1}}\frac{u'(c_{t+1})}{u'(c_t)}\right)} \qquad (2.6)$$

This implies:

[2] Since $Cov(x,y) = E(xy) - E(x)E(y)$ and, for any scalars *a, b* $Cov(ax,by) = abCov(x,y)$

$$\frac{1+i^{*b}_{t,t+1}}{1+i^{*l}_{t,t+1}} = 1 - E_t\delta^*_{t+1} - \frac{Cov_t\left(\delta^*_{t+1}, \frac{u'(c_{t+1})/u'(c_t)}{\sigma_{t+1}\pi_{t+1}}\right)}{E_t\left(\frac{u'(c_{t+1})/u'(c_t)}{\sigma_{t+1}\pi_{t+1}}\right)} \qquad (2.7)$$

The term $E_t\delta^*_{t+1}$ can be called the (expected) default premium on a ruble loan.

The term $\frac{Cov_t\left(\delta^*_{t+1}, \frac{u'(c_{t+1})/u'(c_t)}{\sigma_{t+1}\pi_{t+1}}\right)}{E_t\left(\frac{u'(c_{t+1})/u'(c_t)}{\sigma_{t+1}\pi_{t+1}}\right)}$ represents the extent to which default risk on the ruble loan co-varies with the marginal utility of a future ruble. If whenever rubles are expected to be valuable in the future (that is, whenever $\frac{u'(c_{t+1})/u'(c_t)}{\sigma_{t+1}\pi_{t+1}}$ is high), the default risk on a ruble loan is high, then ruble loans are a bad investment from the point of view of risk diversification, and a higher ruble lending-borrowing spread is called for. Even when there is no risk aversion ($u'(c)$ is independent of c), the Covariance term does not vanish, but becomes $\frac{Cov_t\left(\delta_{t+1}, \frac{1}{\sigma_{t+1}\pi_{t+1}}\right)}{E_t\left(\frac{1}{\sigma_{t+1}\pi_{t+1}}\right)}$.

The first measure of the spread (plus 1) is the ratio of the lending factor (1 plus the lending rate) to the borrowing factor (1 plus the borrowing rate). From equations (2.4) and (2.7) if follows that the (first measure of the) spread on an EBRD US dollar loan will be the same as the (first measure of the) spread on an EBRD ruble loan if and only if

$$E_t\delta_{t+1} + \frac{Cov_t\left(\delta_{t+1}, \frac{u'(c_{t+1})}{\pi_{t+1}}\right)}{E_t\left(\frac{u'(c_{t+1})}{\pi_{t+1}}\right)} = E_t\delta^*_{t+1} + \frac{Cov_t\left(\delta^*_{t+1}, \frac{u'(c_{t+1})}{\sigma_{t+1}\pi_{t+1}}\right)}{E_t\left(\frac{u'(c_{t+1})}{\sigma_{t+1}\pi_{t+1}}\right)} \qquad (2.8)$$

Thus even if the expected default probability on a dollar loan is the same as on a ruble loan ($E_t\delta_{t+1} = E_t\delta^*_{t+1}$), the first measure of the spread on a dollar loan need not equal that on a ruble loan. For that two be true it must be the case that in addition,

$$\frac{Cov_t\left(\delta_{t+1}, \frac{u'(c_{t+1})/u'(c_t)}{\pi_{t+1}}\right)}{E_t\left(\frac{u'(c_{t+1})/u'(c_t)}{\pi_{t+1}}\right)} = \frac{Cov_t\left(\delta^*_{t+1}, \frac{u'(c_{t+1})/u'(c_t)}{\sigma_{t+1}\pi_{t+1}}\right)}{E_t\left(\frac{u'(c_{t+1})/u'(c_t)}{\sigma_{t+1}\pi_{t+1}}\right)} \quad (2.9)$$

If the utility function is of the exponential class $u(c) = \frac{1}{\eta}c^\eta \quad \eta \leq 1$, equation (2.10) becomes

$$\frac{Cov_t\left(\delta_{t+1}, \frac{(c_{t+1}/c_t)^{\eta-1}}{\pi_{t+1}}\right)}{E_t\left(\frac{(c_{t+1}/c_t)^{\eta-1}}{\pi_{t+1}}\right)} = \frac{Cov_t\left(\delta^*_{t+1}, \frac{(c_{t+1}/c_t)^{\eta-1}}{\sigma_{t+1}\pi_{t+1}}\right)}{E_t\left(\frac{(c_{t+1}/c_t)^{\eta-1}}{\sigma_{t+1}\pi_{t+1}}\right)} \quad (2.10)$$

I have no strong intuition (or empirical evidence) about the covariance between default risk probabilities, consumption growth rates, inflation rates and currency depreciation rates.

With risk-neutrality by the EBRD ($u'(c)$ is constant), (2.10) simplifies to

$$\frac{Cov_t\left(\delta_{t+1}, \frac{1}{\pi_{t+1}}\right)}{E_t\left(\frac{1}{\pi_{t+1}}\right)} = \frac{Cov_t\left(\delta^*_{t+1}, \frac{1}{\sigma_{t+1}\pi_{t+1}}\right)}{E_t\left(\frac{1}{\sigma_{t+1}\pi_{t+1}}\right)} \quad (2.11)$$

Again, I have no strong intuition (or empirical evidence) about the covariance between default risk premia, inflation rates and currency depreciation rates.

If the two covariance terms are the same, the only reason there could be a difference between the first measure of the spread on dollar loans and the first measure of the spread on ruble loans, would be different default premia. Thus, in the absence of risk aversion and of the relevant second moments,

$$\lambda^*_{1,t+1} - \lambda_{1,t+1} \equiv \frac{1+i^{*l}_{t,t+1}}{1+i^{*b}_{t,t+1}} - \frac{1+i^{l}_{t,t+1}}{1+i^{b}_{t,t+1}} = \left(\frac{1}{1-E_t\delta^*_{t+1}}\right) - \left(\frac{1}{1-E_t\delta_{t+1}}\right) \quad (2.12)$$

Note that, unless the default premia themselves depend on the levels of the interest rates, (2.12) is independent of the levels of the interest rates.

However, the second measure of the spread *will* depend on the level of interest rates.

$$\lambda^*_{2,t+1} - \lambda_{2,t+1} \equiv \left(i^{*l}_{t,t+1} - i^{*b}_{t,t+1}\right) - \left(i^{l}_{t,t+1} - i^{b}_{t,t+1}\right)$$

$$= (1+i^{*b}_{t,t+1})(1+i^{b}_{t,t+1})\left[\left(\frac{1}{1-E_t\delta^*_{t+1}}\right) - \left(\frac{1}{1-E_t\delta_{t+1}}\right)\right] \qquad (2.13)$$

$$+ i^{l}_{t,t+1} i^{*b}_{t,t+1} - i^{*l}_{t,t+1} i^{b}_{t,t+1}$$

Consider the case where the default premia are the same $E_t\delta^*_{t+1} = E_t\delta_{t+1}$, $i^b = 0.05$, $i^l = 0.08$ and $i^{*b} = 0.25$. That is, the dollar borrowing rate is 5 percent, the dollar lending rate is 8 percent and the ruble borrowing rate is 25 percent. It follows from (2.13), that the ruble lending rate is given by $i^{*l} = 0.28571$. It follows that the second measure of the ruble spread is given by $\lambda^*_{2,t+1} - \lambda_{2,t+1} \approx 0.03571$. On the second measure, the dollar spread is 300bps, but the ruble spread, for exactly the same fundamentals is 357bps.

It may be possible to boost this 57bps difference in the second measure of the spread by considering continuous compounding of interest, but the difference is likely to be minor.

II.2 Spreads between the ruble lending rate and the US dollar lending rate

In this section I consider some of the reasons why the level of ruble rates might be higher than the level of dollar rates. The analysis of the previous section does not depend on what the reasons for any differences between the levels of ruble and dollar rates are.

If the EBRD lends in dollars (respectively rubles) in competitive markets without transaction costs, the first-order condition in (2.14) (respectively (2.15) must be satisfied.

$$u'(c_t) = \frac{1}{1+\rho} E_t\left((1-\delta_{t+1}) \frac{(1+i^{l}_{t,t+1})p_t}{p_{t+1}} u'(c_{t+1}) \right) \qquad (2.14)$$

$$u'(c_t) = \frac{1}{1+\rho} E_t\left(\frac{(1-\delta^*_{t+1})(1+i^{*l}_{t,t+1})s_t p_t}{s_{t+1}p_{t+1}} u'(c_{t+1}) \right) \qquad (2.15)$$

These two conditions imply the following relationship between the ruble and US dollar lending rates:

$$\frac{1+i^{l}_{t,t+1}}{1+i^{*l}_{t,t+1}} = \frac{E_t\left((1-\delta^*_{t+1}) \frac{s_t p_t}{s_{t+1}p_{t+1}} \frac{u'(c_{t+1})}{u'(c_t)} \right)}{E_t\left((1-\delta_{t+1}) \frac{p_t}{p_{t+1}} \frac{u'(c_{t+1})}{u'(c_t)} \right)} \qquad (2.16)$$

This can be rewritten as (2.17):

$$\frac{1+i^{l}_{t+1}}{1+i^{*l}_{t+1}}=\frac{(1-E_t\delta^*_{t+1})\left[E_t\left(\frac{1}{\sigma_{t+1}}\right)E_t\left(\frac{1}{\pi_{t+1}}\frac{u'(c_{t+1})}{u'(c_t)}\right)+Cov_t\left(\frac{1}{\sigma_{t+1}},\frac{1}{\pi_{t+1}}\frac{u'(c_{t+1})}{u'(c_t)}\right)\right]}{(1-E_t\delta_{t+1})E_t\left(\frac{1}{\pi_{t+1}}\frac{u'(c_{t+1})}{u'(c_t)}\right)-Cov_t\left(\delta_{t+1},\frac{1}{\pi_{t+1}}\frac{u'(c_{t+1})}{u'(c_t)}\right)}$$

$$-\frac{Cov_t\left(\delta^*_{t+1},\frac{1}{\sigma_{t+1}\pi_{t+1}}\frac{u'(c_{t+1})}{u'(c_t)}\right)}{E_t(1-\delta_{t+1})E_t\left(\frac{1}{\pi_{t+1}}\frac{u'(c_{t+1})}{u'(c_t)}\right)-Cov_t\left(\delta_{t+1},\frac{1}{\pi_{t+1}}\frac{u'(c_{t+1})}{u'(c_t)}\right)} \tag{2.17}$$

If all terms involving risk aversion and second moments drop out, (2.17) simplifies to:

$$\frac{1+i^{l}_{t+1}}{1+i^{*l}_{t+1}}=\frac{(1-E_t\delta^*_{t+1})E_t\left(\frac{1}{\sigma_{t+1}}\right)}{(1-E_t\delta_{t+1})} \tag{2.18}$$

Approximately, therefore,

$$i^{*l}_{t,t+1}-i^{l}_{t+1}\approx E_t\delta^*_{t+1}-E_t\delta_t+E_t\left(\frac{s_{t+1}-s_t}{s_{t+1}}\right) \tag{2.19}$$

Thus, absent risk aversion and awkward second moments, the spread between the ruble lending rate and the US dollar lending rate equals the difference in the expected default rate on ruble loans and US dollar loans plus the expected proportional rate of depreciation of the ruble.

The relationship between US dollar borrowing rates and ruble borrowing rates is the same as between the two corresponding lending rates, except that, by assumption, there is no borrowing default risk. Thus

$$\frac{1+i^{b}_{t,t+1}}{1+i^{*b}_{t,t+1}}=\frac{E_t\left(\frac{s_t p_t}{s_{t+1}p_{t+1}}\frac{u'(c_{t+1})}{u'(c_t)}\right)}{E_t\left(\frac{p_t}{p_{t+1}}\frac{u'(c_{t+1})}{u'(c_t)}\right)} \tag{2.20}$$

or

$$\frac{1+i^{b}_{t,t+1}}{1+i^{*b}_{t,t+1}}=E_t\left(\frac{1}{\sigma_{t+1}}\right)+\frac{\left[Cov_t\left(\frac{1}{\sigma_{t+1}},\frac{1}{\pi_{t+1}}\frac{u'(c_{t+1})}{u'(c_t)}\right)\right]}{E_t\left(\frac{1}{\pi_{t+1}}\frac{u'(c_{t+1})}{u'(c_t)}\right)} \tag{2.21}$$

If all terms involving risk aversion and second moments drop out, (2.23) simplifies to:

$$\frac{1+i^{b}_{t,t+1}}{1+i^{*b}_{t,t+1}} = E_t\left(\frac{1}{\sigma_{t+1}}\right) \tag{2.22}$$

Approximately, therefore,

$$i^{*l}_{t,t+1} - i^{l}_{t+1} \approx E_t\left(\frac{s_{t+1}-s_t}{s_{t+1}}\right) \tag{2.23}$$

Thus, absent risk aversion and second moments, the spread between the (risk-free) ruble borrowing rate and the (risk-free) US dollar borrowing rate equals the expected proportional rate of depreciation of the ruble. This holds regardless of the relationship between the exchange rate and inflation differentials. However, the expected rate of depreciation of the ruble is likely to be correlated with the expected difference between the rate of inflation in Russia (in rubles) and the US rate of inflation (in US dollars). Any version of Purchasing Power Parity (PPP) theory would imply this property, at least in the long run.

III. Conclusion

If the economic fundamentals –default risk, transaction costs and monopoly power - are the same, the lending-borrowing spread for ruble loans will be the same as the lending-borrowing spread for US dollar loans if the spread is measured as the *ratio* of the lending factor (1 plus the lending rate of interest) to the borrowing factor (1 plus the borrowing rate of interest).[3] If the spread is instead measured by the *difference* between the lending rate and the borrowing rate, the spread will increase with the level of interest rates, even if the fundamentals are the same. This is a matter of arithmetic, not theory. For a dollar borrowing rate of 5 percent, a dollar lending rate of 8 percent and a ruble borrowing rate of 25 percent, the ruble lending rate would be 28,571 percent. The ruble spread, measured as the difference between the ruble lending rate and the ruble borrowing rate, would be 57 bps larger than the dollar spread. Transaction costs are likely to be higher for ruble transactions. This would boost the spread. Default risk is likely to be lower for ruble loans. This would lower the spread. Monopoly or monopsony power should not play a role in either ruble or dollar markets, given the EBRD's mandate.

For the kind of interest rate levels considered in the example given here, it would seem to be difficult to justify a ruble spread that exceeds the corresponding dollar spread by more than 60 bps. The difference between the spreads could well be less

[3] I assume that nothing convincing can be said about the sign, let alone the magnitude, of

$$\frac{Cov_t\left(\delta_{t+1}, \frac{u'(c_{t+1})/u'(c_t)}{\pi_{t+1}}\right)}{E_t\left(\frac{u'(c_{t+1})/u'(c_t)}{\pi_{t+1}}\right)} - \frac{Cov_t\left(\delta^{*}_{t+1}, \frac{u'(c_{t+1})/u'(c_t)}{\sigma_{t+1}\pi_{t+1}}\right)}{E_t\left(\frac{u'(c_{t+1})/u'(c_t)}{\sigma_{t+1}\pi_{t+1}}\right)}.$$

than 60 bps. Indeed, if the default risk on ruble loans is much less than that on US dollar loans, the ruble spread could be less than the dollar spread.