

An Empirical Study of Pricing and Trading Volume of Russian Depositary Receipts

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Abstract

Most of the large Russian corporations have their stocks cross-listed in foreign markets. This paper studies the price relationships between Russian Depositary Receipts (DRs) and their underlying Russian equities, as well as the changes in their trading volume in domestic and foreign markets. The significant contribution of this paper is the empirical analysis of the effects of foreign listing on domestic prices and trading volume of a large, but seldom studied emerging market. If there is a significant segmentation and market participants are unable to arbitrage price differences between the foreign and domestic prices, one may observe significant difference in prices in these markets. The results of this study indicate that unlike many other emerging markets, there is no statistically significant premium/discount between the Russian DRs and their underlying stocks. The theory that trading takes place in markets where the cross-listed stock returns are highly correlated with returns of local equity is tested and the results show very little evidence that Russian DR returns are indeed affected by the markets where these DRs are listed.

Key words: Depositary receipts, Russia, Cross-listing, Price discovery, Market integration.

JEL Classifications: F36, G15.

1. Introduction

Why would a domestic firm list its stocks in a foreign market? The most frequently mentioned reason for cross-listing is the need for raising additional capital. However, cross-listing can also have an effect on the return and trading volume of the stock in its home market. The focus of this paper is to study the Russian equities that are cross-listed in the US and European markets and test some of the existing theories on cross-listing, especially in the area of pricing relationship between cross-listed stock and its underlying domestic stock, and whether there is a migration of trading volume to the market where the returns of cross-listed stock have higher correlation with the returns of other equities in that market.

Despite its size and strategic importance, there are relatively few studies on Russian equity market. Anatolyev *et al.* (2003) studied the informational efficiency of Russian equity markets and found some evidence of improvement of the informational efficiency over the time period studied. Using GARCH-M model, Hall and Urga (2002) also tested the market efficiency of most liquid Russian stocks and found that there was improvement in efficiency over time. Some of the other studies on Russian equity markets are market microstructure (Kolodyazhny and Medvedev, 2002), and the effects of ownership structure on performance (Kuznetsov and Muravyev, 2001). Integration of Russian equity markets with the world equity markets were studied by Fedorov and Sarkissian (2000) and Jithendranathan and Kravchenko (2002). Smirnova (2004) is one of the few papers that look at the Russian Depositary Receipts (DRs) market. She investigated the effect of foreign listing on the underlying Russian equity return and found that there is significant abnormal return for the underlying stock on the date of DR listing.

There are several ways of cross-listing stocks in foreign markets, but the most commonly used method is by issuing DRs. In a DR program an intermediary buys the underlying domestic stock and issues against it depositary receipts denominated in foreign currency in a foreign market. The most common type of DR is American Depositary Receipt (ADR). One of the requirements for issuing ADR is that the issuing firm has to follow the US Securities and Exchange Commission's (SEC) guidelines on disclosure. Depending on the level of disclosure and whether the firm is using the ADR to raise new equity, these ADRs are classified into three levels. Level I ADR is

the least expensive to issue and has relatively less stringent disclosure requirements, but can only be traded in the over-the-counter (OTC) market in the US and cannot be used to raise new capital. Level II ADRs are allowed to trade in organized exchanges in the US, but the issuing foreign firm has to undergo full disclosure requirements as stipulated by SEC and cannot be used to raise new capital. With a Level III ADR, the issuing firm can raise new capital and list the ADR in an organized exchange in US, but has to provide to the SEC financial statements prepared according to the US Generally Accepted Accounting Principles (GAPP) or submit a detailed summary of the differences in financial reporting between home and the US.

A foreign firm that would like to raise capital without meeting the full disclosure requirements can do so by using private placements under Rule 144A of SEC. These private placements have a limited secondary market; only Qualified Institutional Investors¹ (QIBs) are allowed to trade these private placements. One of the other developments in the 144A market is the creation of Global Depositary Receipts (GDRs). Some of the US private placements are issued for global investors and then traded in markets outside the US, predominantly in London and several German exchanges. These DRs for sale outside the US are issued under Registration S provision, and can be complementary to a 144A issue in the US. One of the major differences between ADRs and GDRs is that these GDRs are usually listed in a foreign exchange, but cannot be bought and sold by US citizens.

Since 1995, Russian firms used the DR markets for raising new capital as well as providing a trading venue for its stock. The details of Russian DRs are given in Appendix 1. Currently there are 60 Russian firms with DR programs. The majority of these are Level I, with only two firms listed as Level II and four as Level III. There are 21 issues under Rule 144A and/or Regulation S.

One of the main motivations for a firm for cross-listing is to raise new capital (Fanto and Karmel, 1997). Level III ADRs and private placements can be used in achieving this goal. But the benefit of issuing Level I or Level II ADRs, where no additional capital is raised is more difficult to measure. Mittoo (1992) surveyed corporate managers and found that increased liquidity is the main reason for cross-listing stocks. Firms from countries with small and illiquid capital markets can use cross-listing to increase the liquidity of their stocks. The following are some of the theoretical and empirical literature on the economic effects of cross listing.

Cross-listing of stocks broadens the ownership basis of firms. In many countries foreign investors are allowed to participate directly in the domestic stock markets. But difficulties with accessing the information and conducting timely transactions restrict the participation to mainly large institutional investors. Cross-listing also allows non-institutional investors to buy the stock of these firms. The study by Ahearne, Grier and Warnock (2004) showed that the US investors hold 17% of the outstanding stock of the cross-listed firms, which is 14% higher than those firms that are not cross-listed. Lins, Strickland and Zenner (2004) show that cross-listing and raising new capital also allows the firms to be less dependent on the borrowed capital.

Having a group of stockholders who are outside the jurisdiction of the country of domicile of the issuing firm can have a certain restraining effect on the behavior of the managers of the issuing firm. Cross-listing can be construed as a signal by the issuing firm's managers that they are willing to "bond" themselves to not take private benefits from the firm, in exchange for access to the external markets. Coffee (1999, 2002) suggests that listing in US brings the firm under the enforcement powers of the SEC and any violations of the rules can result in legal proceedings against the firm and its managers. This potential for legal actions can have a restraining effect on the managers and hence can reduce the agency cost. The study by Doidge *et al.* (2004) provides some empirical evidence to the bonding hypothesis. For the year 1977, they found that the cross-listed firms enjoyed a 16 percent "cross-listing premium" over similar non-cross-listed firms around the world.

¹ A QIB is defined as a firm that has at least US\$100 million available for investments. Currently there are 4,000 QIBs and they trade on the 144A placements using the closed electronic system called PORTAL (Private Offerings, Resales and Trading through Automated Linkages).

Another set of studies looked into the price reaction of the domestic stocks to foreign listing announcements. Using the event study methodology Miller (1999) found an abnormal return around the listing month for the underlying domestic stocks. Similar abnormal returns were also observed in the studies of Foerster and Karolyi (1999). These abnormal returns were attributed to lowering of investment barriers as well as strategic timing of the listing by the management.

The rationale for listing in multiple markets was studied by Chaplinsky and Ramchand (2000). In their study they compared the global issues with pure domestic issues and found that the negative market reaction that usually accompanies a new issue was lower for global issues compared to pure domestic issues. Foerster and Karolyi (2000) compared the long run performance of exchange listed issues with private placements (Rule 144A) by foreign firms. Their results show that both exchange listed issues as well as private placements underperformed the home market performance indicators over a three-year period. The level of underperformance was greater for private placements.

Price discovery is an important function of a stock exchange. If a stock is traded in multiple markets, it is important for the investors to know in which market the price discovery takes place. Eun and Sabherwala (2003) used transaction data for 62 Canadian firms cross-listed in the US and found that for the majority of the stocks the price discovery takes place in the US. On the other hand Gramling, Melvin and Schlag (2004) found (for the three German stocks they studied) that German market prices dominated the US prices.

The focus of this paper is the pricing of Russian DRs and the changes in the trading volume of these and underlying stocks over time. The rest of the paper is organized as follows. In section 2 markets in which the DRs and stocks are traded and the data used in this study are described. The empirical models used in the analysis of data and the results arrived at are discussed in section 3. Section 4 concludes this paper.

2. Markets and Data

The two main Russian equity markets are Russian Trading System (RTS) and Moscow Interbank Currency Exchange (MICEX). RTS was established in 1995 and was the most liquid stock exchange in Russia until the financial crisis of 1998. Since then there has been a gradual erosion of trading volume at RTS. RTS quotes the stock prices in US dollars and Russian rubles. MICEX was established in 1992 primarily for currency trading, but in 1998 it started equity trading. Currently most of the equity trading in Russia takes place in MICEX where stocks are quoted only in Russian rubles.

Russian DRs are traded in multiple foreign markets. All these DRs were initially listed in the US and were either concurrently or at a later date listed in European exchanges. The list of the Russian DRs was obtained from the Bank of New York, which provides the details of when the ADR is issued in the US as well as the ISIN number of the DR and the underlying Russian stock. By going through the exchange listings of London and Germany, the DRs that are traded in European exchanges are identified¹. The DRs are listed in the London exchange and six exchanges in Germany (Berlin, Xetra/Deutsche Börse, Düsseldorf, Hamburg, Munich and Stuttgart).

The daily closing prices and volume of the DRs are obtained from Bloomberg. The daily prices and volume for RTS market is obtained from Datastream and the MICEX prices and volume are obtained from MICEX. The currency exchange rates and equity indices are obtained from Datastream.

The data from the OTC market in the US is somewhat sparse. Bloomberg reports the price and volume for this market only if there is a trade during that day. Since many of the Russian DRs are infrequently traded, this gives rise to discontinuity with respect to the time series. On the other hand if there is no trading during the day for a DR or stock, the German markets and RTS will give the daily closing price based on the last bid or ask for the day, which ensures a continuous time series.

¹ Since the DRs listed in Europe are essentially the same instrument as listed in U.S., it is easy to identify the DRs in European markets using the same ISIN identification number.

The list of DRs and the markets where they are traded is given in Appendix 1. As mentioned before, majority of the DRs in US either are private placements or traded in the OTC market. Thirteen DRs are listed in London and 43 are listed in at least one of the German exchanges. The Berlin exchange has the largest number of listings followed by Xetra/Deutsche Börse. The prices in the US and London exchanges are quoted in US dollars, whereas the German exchanges are quoted them in Euros¹.

Many of the DRs are bundles of underlying stock and to make comparison with the underlying stocks these are unbundled to single units of the underlying stock. For example, for Aeroflot DR the bundling ratio is 100, which means that one DR is a bundle of 100 underlying stock. For the purpose of comparing the prices of the DRs with the underlying stock, the price of the DR is divided by 100 to obtain the price of each underlying stock². On the other hand, the trading volume of Aeroflot DR is multiplied by 100 to obtain the volume for comparison with the underlying Russian stock.

The issue date of the DR was available from the Bank of New York, and if it was a Level I, II or III issue, the listing date was also available from the US exchanges. Except for Xetra, it is difficult to obtain the exact listing dates from the German equity markets. In most of the cases, the German trade data starts a few days after the US issue date and hence it can be assumed that the data is complete from the date of issue in those markets.

Even though there are 60 DR programs from Russia, many of these programs did not have any data available from Bloomberg the data for the available 26 DRs for this study. Gazprom DR is one of the most heavily traded DR in all foreign markets, but since there was no corresponding underlying stock traded in the Russian markets, it is excluded from the study.

Since many of the DRs are traded in multiple markets in Germany, it is necessary to aggregate the German market data. As mentioned earlier, if there is no trade during the day, the German markets report the closing prices based on the last bid or ask price. To make the data more reflective of the actual trades, it is necessary to use the closing price of the market with the highest trading volume as the representative price for the day. If there is no trade for a day, the best alternate is to use the average closing price as the day's representative price. For trading volume in the German market the aggregate trading volume of all the German markets is used, and to make the price comparison the German and MICEX prices are converted into US dollars using the appropriate exchange rates.

3. Empirical Models and Results

In a world where capital movement restrictions are minimal, same securities should sell at the same price in all markets, adjusted for exchange rates. Empirical studies of various emerging markets indicate that quite often the DRs are traded in the foreign markets at a premium/discount over the underlying domestic stock. Jithendranathan *et al.* (2000) found that the DRs issued by Indian firms were trading in London and Luxembourg markets at an average discount of 5.66% compared to the underlying Indian equities. Domowitz *et al.* (1997) analyzed Mexican DR market, where multiple classes of shares are used to restrict the ownership to either domestic or foreign investors and concluded that shares that are not restricted to any particular group of investors trade at a substantial premium over the restricted shares. Bailey *et al.* (1999) examined the DR programs from 11 countries and found generally larger price premiums for unrestricted shares relative to matching restricted shares. The main reason for price differences between the DRs is attributed to segmentation of capital markets. The theoretical papers by Errunza and Losq (1985) and Alexander, Eun and Janakiraman (1987) showed that if two markets are segmented and a firm from one such market cross-lists its stock in the other market, then it should lead to higher equilibrium price. Arbitrage is one of the factors that can mitigate the price difference in two markets. Where there

¹ Since euro was introduced only in 1999, earlier prices were in German marks, but Bloomberg reported it by converting it to euros using a synthetic euro rate.

² Bundling of underlying stocks may create a liquidity premium for DRs. For example, if an investor is buying a DR of Aeroflot, he is actually forced to buy 100 underlying shares and this might reduce the liquidity of DRs as compared to the underlying stocks. On the other hand since the DRs and underlying shares are traded in separate markets and potential arbitrage between the two markets can significantly eliminate the potential liquidity premium for the DRs.

are exchange controls and capital movement restrictions, arbitrage is not possible and hence the price differentials can exist.

As compared to many other emerging markets, Russian markets have fewer restrictions on foreign investments. Prior to the 1998 financial crisis, domestic investors in Russia were also allowed to invest (in a somewhat restrictive way) in foreign equities. The Russian ruble was not fully convertible, but it was not difficult for foreign investors to repatriate their profits from Russia. After the financial crisis of 1998, Russia has imposed certain restrictions on convertibility of Russian ruble as well as the ability of domestic investors in investing foreign equities. Overall Russian equity market is still quite open to foreign investors, and there are no new barriers created after the crisis, to foreign investments in Russian equity markets.

To find if there is indirect evidence of market segmentation, this study tests whether there are any persistent premiums/discounts between the DRs and the underlying Russian equities. The existence of such premiums/discounts can be due to the segmentation of the Russian markets from the foreign markets or due to the lack of arbitrage of the price differentials. The following simple price ratio is used to estimate the premium/discount between the DRs and the underlying Russian stocks using the daily closing prices in various markets.

$$\text{Price Ratio}_{i,t} = \frac{p(\text{Stock})_{i,t}}{p(\text{DR})_{i,t}} \quad (1)$$

where $p(\text{DR})_{i,t}$ is the closing price of the Depository Receipt of the i^{th} stock at time t in a foreign market and $p(\text{Stock})_{i,t}$ is the closing price of the underlying stock on the same day in the Russian markets. Any significant deviation of the Price Ratio from 1 is an indication of a premium/discount between the DR and the underlying stock. The statistical significance of the deviation of the price ratio from 1 is tested using t-statistics. From January 1995 through December 2004, price ratios were calculated pair-wise for three DR markets and two Russian markets to see if there is any differential in the prices between these markets.

The results of the tests for premium/discount are given in Table 1. Many of the Russian DRs are traded infrequently hence the price ratio is calculated for the total sample and then a restricted sample where the price ratios are calculated only for those days where there was a trade in both markets. The results indicate that, except in one single instance the price ratios were not statistically different from 1. This is an indication that there was no substantial premium/discount between the DRs and underlying Russian stocks. For most of the actively traded DRs the price ratio is between 0.99 and 1.01. Considering the fact that there is limited overlapping trading period between the US and Russian markets and the prices are closing prices for the day, it is interesting to note that there is insignificant deviation of the price ratio from 1. Moreover when the sample is restricted to days where there was trading in both markets, the results are tighter and the standard deviations of the price ratio are smaller than that of the full sample. This again confirms that there is no significant price difference between the DRs and the underlying Russian stocks. Similarly the price ratio between RTS and MICEX also do not exhibit any significant deviation from 1.

Table 1

Pricing Relationship between the Underlying Stock and the Depositary Receipts

Panel 1: All Closing Prices¹

Name of the firm	Price Ratio: Russia/US		Price Ratio: Russia/ London		Price Ratio: Russia/ Germany		Price Ratio: RTS/MICEX (Std. dev) (# obs)
	RTS (Std. dev) (# obs)	MICEX (Std. dev) (# obs)	RTS (Std. dev) (# obs)	MICEX (Std. dev) (# obs)	RTS (Std. dev) (# obs)	MICEX (Std. dev) (# obs)	
Aeroflot			0.8991 ^b (0.0536) 207	0.9047 ^b 0.0535 193	1.0086 (0.0471) 713	1.0099 0.0440 681	1.1489 (5.2024) 1167
AO Mosenergo	0.9700 0.1060 1565	1.0220 0.0440 993	0.9930 0.0630 917	1.0050 0.0200 866	0.9650 0.0990 1871	1.0110 0.0230 1279	0.9760 0.0780 1303
AO Surgutneftgaz	0.9970 0.0440 1970	1.0020 0.0210 1245	0.9990 0.0130 922	1.0010 0.0100 876	1.0010 0.0180 1335	1.0040 0.0160 1273	0.9970 0.0150 1310
AO Surgutneftgaz – Preferred	0.9902 0.0755 650	0.9976 0.0378 591			1.0183 0.1303 1702	1.0099 0.0266 1286	0.9967 0.0269 1310
Avtovaz OAO					1.0329 0.0359 169	1.0391 0.0466 163	1.0046 0.0431 1023
Buryatzoloto					0.8879 0.5988 1687		
AO Torgovy Dom (GUM)	1.0569 0.2292 376				1.0137 0.1261 2139		
Irkutskenergo	1.0154 0.1384 685	1.0482 0.1154 225			1.0293 0.1199 2021	1.0507 0.0878 1299	0.9920 0.0493 1310
JSC MMC Norsilk Nickel	0.9967 0.0191 743		0.9986 0.0150 807		1.0051 0.0198 807		
JSC Samaraenergo	0.9590 0.3920 19	1.2210 0.2050 4			0.9720 0.2790 1728	1.0730 0.0740 582	1.0010 0.0910 593
Kuzbassenergo					0.9709 0.1549 1802	1.0020 0.2261 24	1.0469 0.1715 25
Lukoil	0.9828 0.0250 2237	1.0006 0.0130 1256			0.9858 0.0207 2198	1.0038 0.0109 1285	0.9908 0.0153 1310
Moscow City Telephone	0.9995 0.1672 82				1.0188 0.1888 1390		
Nizhnekamskneftekhim					0.5787 0.3809 1481		

¹ For the US markets closing price is available only if there is a trade during that day. In London, German and Russian markets, even if there was no trade during the day closing price is estimated based on the last bid or ask for the day. In the panel I calculate the Price Ratio using all available closing prices, which implies that some of the closing prices are based on the last bid or ask for the day.

Table 1 (continuous)

Name of the firm	Price Ratio: Russia/US		Price Ratio: Russia/London		Price Ratio: Russia/Germany		Price Ratio: RTS/MICEX (Std. dev) (# obs)
	RTS (Std. dev) (# obs)	MICEX (Std. dev) (# obs)	RTS (Std. dev) (# obs)	MICEX (Std. dev) (# obs)	RTS (Std. dev) (# obs)	MICEX (Std. dev) (# obs)	
OJSC Central Telecommunication	0.9958 0.0151 22						
OJSC Rostelecom	0.9981 0.0348 1721	1.0033 0.0222 1263	0.9996 0.0193 892	1.0005 0.0192 850	1.0048 0.0320 1732	1.0139 0.0235 1286	0.9977 0.0129 1310
OJSC Uralsvyazinform	1.0074 0.1419 233	1.0060 0.1376 265					0.9930 0.0240 589
PJSC Southern Telecomm					0.9902 0.2544 1724		
PJSC Volgatelecom					1.1175 0.4375 1798		
Primorsky Shipping	1.1775 0.0000 1685				1.1348 0.0000 1045		
Rostovenergo					0.9036 0.3066 1603	1.0570 0.0948 707	0.9666 0.2005 718
Sberbank Rossii					0.9924 0.0476 184	0.9931 0.0472 178	1.0002 0.0179 1310
Sibneft	0.9951 0.0461 816	1.0029 0.0405 727	0.9993 0.0223 820	1.0050 0.0185 780	1.0067 0.0364 1433	1.0274 0.3133 973	0.9927 0.0503 991
Tatneft	0.9966 0.0438 1863	1.0009 0.0117 723	0.9980 0.0374 2018	1.0005 0.0140 722	1.0062 0.0409 1714	1.0138 0.0123 732	0.9981 0.0152 748
Trading House Tsum	1.0862 0.1270 9				1.2406 0.3583 1884		
Unified Energy Systems	0.9883 0.0564 1432	1.0026 0.0203 1000	1.0017 0.0230 922	1.001 0.0090 876	0.9939 0.0513 1923	1.0106 0.0184 1286	0.9989 0.0255 1310
Unified Energy Systems – Pref.	0.9884 0.0502 45	1.0017 0.0295 43					0.9944 0.0535 1310
Vimpel Communications	0.9316 0.1659 1113				0.9388 0.1652 1126		
Wimm-Bill-Dann Foods	1.0132 0.0567 661				1.0231 0.0522 670		
Yukos	0.9952 0.0278 906	0.9958 0.0223 855	0.9979 0.0208 820	0.9983 0.0146 771	1.0013 0.0230 946	1.0016 0.0208 895	0.9960 0.0407 1154

^b Significant at 5% level.

Table 1 (continuous)

Panel B: Closing prices when there was a trade in both markets

Name of the firm	Price Ratio: Russia/US		Price Ratio: Russia/London		Price Ratio: Russia/Germany		Price Ratio: RTS/MICEX (Std. dev) (# obs)
	RTS (Std. dev) (# obs)	MICEX (Std. dev) (# obs)	RTS (Std. dev) (# obs)	MICEX (Std. dev) (# obs)	RTS (Std. dev) (# obs)	MICEX (Std. dev) (# obs)	
Aeroflot			0.8686 ^b 0.0581 17	0.8809 ^b 0.0582 38	1.0056 0.0402 41	1.0017 0.0370 141	0.9952 0.0497 460
AO Mosenergo	0.9681 0.1071 1424	1.0216 0.0440 992	0.9927 0.0644 743	1.0056 0.0204 805	0.9725 0.1034 1469	1.0111 0.0233 1276	0.9752 0.0791 1204
AO Surgutneftgaz		1.0020 0.0207 1245		1.0010 0.0095 876		1.0038 0.0160 1272	
AO Surgutneftgaz – Preferred	0.9908 0.0813 522				1.0061 0.0519 1125		0.9965 0.0269 1116
Avtovaz OAO					1.0151 0.0359 10	1.0212 0.0474 39	1.001 0.0288 426
Buryatzoloto							
AO Torgovy Dom (GUM)	0.9961 0.1355 106				0.9769 0.0890 208		
Irkutskenergo	1.0061 0.0957 497	1.0481 0.1154 255			1.0394 0.1278 761	1.0496 0.0746 1185	0.9940 0.0407 611
JSC MMC Norsilk Nickel	0.9967 0.0172 672		0.9985 0.0126 725		1.0045 0.0190 704		
JSC Samaraenergo	1.0516 0.3756 9	1.2214 0.2048 4			1.0110 0.2476 194	1.0711 0.07637 246	0.9968 0.0752 107
Kuzbassenergo					1.0020 0.0981 283	1.0002 0.2261 24	1.0602 0.2908 7
Lukoil	0.98304 0.0239 2123	1.0005 0.0129 1256			0.9904 0.0183 1559	1.0037 0.0109 1286	0.9910 0.0144 1300
Moscow City Telephone	0.9832 0.0312 9				0.9935 0.1409 42		
Nizhnekamskneftekhim					0.90423 0.1955 49		
OJSC Central Telecommunication	0.9954 0.0173 15						
OJSC Rostelecom	0.9987 0.0314 1577	1.0032 0.0221 1263	1.0000 0.0153 690	1.0011 0.0160 713	1.0058 0.0303 1441	1.0135 0.0237 1220	0.9979 0.0121 1267
OJSC Uralsvyazinform	1.0074 0.1419 233	1.0060 0.1376 265					0.9930 0.0240 589
PJSC Southern Telecomm.	1.0252 0.1262 33						
PJSC Volgatelecom							
Primorsky Shipping							

Table 1 (continuous)

Name of the firm	Price Ratio: Russia/US		Price Ratio: Russia/London		Price Ratio: Russia/Germany		Price Ratio: RTS/MICEX (Std. dev) (# obs)
	RTS (Std. dev) (# obs)	MICEX (Std. dev) (# obs)	RTS (Std. dev) (# obs)	MICEX (Std. dev) (# obs)	RTS (Std. dev) (# obs)	MICEX (Std. dev) (# obs)	
Rostovenergo					0.9597 0.1977 165	1.0529 0.0916 547	0.9494 0.1815 86
Sberbank Rossii					0.9842 0.0417 66	0.9829 0.0432 69	0.9999 0.0155 1010
Sibneft	0.9949 0.0456 634	1.0028 0.0405 727	0.9992 0.0181 603	1.0049 0.0175 745	1.0064 0.0292 1035	1.0273 0.3137 970	0.9933 0.0521 798
Tatneft	0.9971 0.0346 1592	1.0009 0.0117 723	1.0002 0.0161 686	1.0008 0.0137 650	1.0083 0.0289 1388	1.0138 0.0123 732	0.9987 0.0118 636
Trading House Tsum					1.2035 0.3484 20		
Unified Energy Systems	0.9889 0.0561 1356	1.0026 0.0203 1000	1.0010 0.0229 873	1.0010 0.0090 876	0.9954 0.0532 1551	1.0106 0.0185 1279	0.9991 0.0252 1300
Unified Energy Systems – Pref.	0.9883 0.0502 45	1.001 0.0294 43					0.9943 0.0535 1310
Vimpel Communications	0.9321 0.1012 50				0.9361 0.1057 50		
Wimm-Bill-Dann Foods	0.9897 0.0338 80				1.0062 0.0367 33		
Yukos	0.9953 0.0279 858	0.9957 0.0222 855	0.9980 0.0204 776	0.9982 0.0145 770	1.0009 0.0233 856	1.0010 0.0209 854	0.9994 0.0156 1098

^b Significant at 5% level.

These results can be interpreted as indirect evidence of: 1) Low level of segmentation between Russian and the foreign markets where the DRs are traded, 2) Active arbitrage between the markets, and 3) Absence of qualitative differences like voting rights between the underlying stocks and the DRs as in the case of some of the Latin American stocks. Another interesting feature is the “bids” and “asks” in European markets and RTS, also corresponds, to the real trading price in a different market. This is a stronger evidence of arbitrageurs being active in both domestic and DR markets.

One of the notable events during the period covered by this study is the financial crisis of 1998. The development of the market based economy in Russia suffered a serious set back in August 1998 when the Russian government defaulted on the domestic and external debt payments. On August 17, 1998 Russian abandoned the defense of the Russian ruble and placed a 90-day moratorium on commercial external debt payments. The value of Russian ruble plunged from USD1 = RUR6.235 at the end of July 1998 to USD1 = RUR16.064 by the end of September 1998. The effect of the financial crisis was also felt in the equity markets. On March 31, 1998 the RTS index stood at 325.5, but by September 30, 1998 it came down to 43.8. After the crisis many of the stocks were either de-listed for a period of time or were traded very infrequently. Jithendranathan and Kravchenko (2002) found that the 1998 crisis had a significant impact on the integration of the Russian market with the world markets.

After the financial crisis of 1998, MICEX started trading equities and soon garnered a substantial part of the trading volume in Russian market. In this respect it is necessary to look at the time period before and after the 1998 crisis separately, to understand the volume and pricing relationship in Russian equity market.

Table 2

Share Trading Volume in Different Markets

Name of the firm	US Trading Volume Share			London Trading Volume Share			German Trading Volume Share			RTS Trading Volume Share			MICEX Trading Volume Share		
	1995-2004	1995-1998	1999-2004	1995-2004	1995-1998	1999-2004	1995-2004	1995-1998	1999-2004	1995-2004	1995-1998	1999-2004	1995-2004	1995-1998	1999-2004
Aeroflot	0.0000	0.0000	0.0000	0.0146	0.0000	0.0174	0.0168	0.0000	0.0200	0.4385	1.0000	0.3328	0.5298	0.0000	0.6296
AO Mosenergo	0.1333	0.2369	0.0762	0.0637	0.0000	0.0988	0.2068	0.1106	0.2598	0.2497	0.6524	0.0277	0.3464	0.0000	0.5374
AO Surgutneftgaz	0.4849	1.0000	0.3149	0.2059	0.0000	0.2739	0.0512	0.0000	0.0681	0.0000	0.0000	0.0000	0.2578	0.0000	0.3429
AO Surgutneftgaz – Preferred	0.1622	0.0655	0.1998	0.0000	0.0000	0.0000	0.0793	0.0118	0.1055	0.3726	0.9225	0.1594	0.3856	0.0000	0.5352
Avtovaz OAO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0027	0.0000	0.0028	0.1103	1.0000	0.0929	0.8868	0.0000	0.9041
Buryatzoloto															
AO Torgovy Dom (GUM)	0.1422	0.3994	0.0186	0.0000	0.0000	0.0000	0.7070	0.1452	0.9771	0.1506	0.4552	0.0041	0.0000	0.0000	0.0000
Irkutskenergo	0.1889	0.3579	0.0953	0.0000	0.0000	0.0000	0.2271	0.0732	0.3125	0.2296	0.5688	0.0416	0.3541	0.0000	0.5505
JSC MMC Norsilk Nickel	0.2142	0.0000	0.2142	0.6737	0.0000	0.6737	0.0065	0.0000	0.0065	0.1055	0.0000	0.1055	0.0000	0.0000	0.0000
JSC Samaraenergo	0.0201	0.0097	0.0236	0.0000	0.0000	0.0000	0.4680	0.2229	0.5496	0.2482	0.7672	0.0752	0.2636	0.0000	0.3514
Kuzbassenergo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.8656	0.3866	0.9669	0.1336	0.6133	0.0321	0.0007	0.0000	
Lukoil	0.5037	0.7288	0.3789	0.0000	0.0000	0.0000	0.1374	0.0803	0.1691	0.0823	0.1908	0.0221	0.2764	0.0000	0.4297
Moscow City Telephone	0.1216	0.0000	0.1939	0.0000	0.0000	0.0000	0.2495	0.0000	0.3978	0.6288	1.0000	0.4082	0.0000	0.0000	0.0000
Nizhnekamskneftekhim	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.7452	0.0000	0.7764	0.2547	1.0000	0.2235	0.0000	0.0000	0.0000
OJSC Telecommunication Central					0.0000									0.0000	

Table 2 (continuous)

Name of the firm	US Trading Volume Share			London Trading Volume Share			German Trading Volume Share			RTS Trading Volume Share			MICEX Trading Volume Share		
	1995-2004	1995-1998	1999-2004	1995-2004	1995-1998	1999-2004	1995-2004	1995-1998	1999-2004	1995-2004	1995-1998	1999-2004	1995-2004	1995-1998	1999-2004
OJSC Rostelecom	0.3741	0.2353	0.4511	0.0407	0.0000	0.0632	0.0271	0.0064	0.0386	0.2864	0.7582	0.0248	0.2715	0.0000	0.4221
OJSC Uralsvyazinform					0.0000									0.0000	
PJSC Southern Telecomm.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0750	0.0000	0.0924	0.9250	1.0000	0.9075	0.0000	0.0000	0.0000
PJSC Volgatelecom	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Primorsky Shipping	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0147	0.0000	0.0256	0.9852	1.0000	0.9743	0.0000	0.0000	0.0000
Rostovenergo	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.6380	0.0000	0.7403	0.1669	1.0000	0.0333	0.1949	0.0000	0.2262
Sberbank Rossii														0.0000	
Sibneft														0.0000	
Tatneft	0.4900	0.7191	0.3989	0.1071	0.0000	0.1497	0.2123	0.0000	0.2562	0.0630	0.1789	0.0170	0.1274	0.0000	0.1780
Trading House Tsum	0.0311	0.0090	0.0460	0.0000	0.0000	0.0000	0.5001	0.1634	0.7261	0.4686	0.8275	0.2278	0.0000	0.0000	0.0000
Unified Energy Systems	0.0413	0.0838	0.0177	0.0348	0.0000	0.0541	0.0804	0.0000	0.0823	0.3213	0.8390	0.0343	0.5220	0.0000	0.8114
Unified Energy Systems - Pref.					0.0000									0.0000	
Vimpel Communications	0.9997	0.9966	0.9872	0.0000	0.0000	0.0000	0.0102	0.0033	0.0126	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000
Wimm-Bill-Dann Foods	0.9956	0.0000	0.9956	0.0000	0.0000	0.0000	0.0036	0.0000	0.0036	0.0007	0.0000	0.0007	0.0000	0.0000	0.0000
Yukos	0.1826	0.0000	0.2198	0.2955	0.0000	0.3558	0.0132	0.0000	0.0158	0.2649	1.0000	0.1150	0.2437	0.0000	0.2934
Total	0.2267	0.3085	0.1983	0.0507	0.0000	0.0683	0.2490	0.0778	0.3084	0.2484	0.6135	0.1217	0.2250	0.0000	0.3031

Another interesting issue addressed in this paper is the relationship between the trading volume and price discovery. Table 2 summarizes the weekly trading volumes of various DRs and underlying stocks in different markets. Share of trading volume is the average weekly trading volume in each of the markets as a fraction of total volume in all markets combined for that week. The weekly volumes are used to reduce the instances of zero trades during a period. The period covered is again 1995 through December 2004. Since the beginning of equity trading at MICEX in 1998, there is a significant shift in trading volume towards this market. To capture this effect, the data is subdivided into two periods and the results are given in separate columns. All volumes are de-bundled to make the ratios comparable.

The total trading volume of the 24 stocks and DR programs shows that the US market had 22.67%, London had 5.07%, German markets had 24.90%, RTS had 24.84% and MICEX had 22.50% of the total trading volume. This indicates a relatively even distribution of trade between the US, German, RTS and MICEX markets. But once we look at the sub-periods it is clear that since 1998, RTS lost its predominant role as the main venue for trading in Russian stocks. During the period between 1995 and 1998, RTS had 61.35% of the trading volume followed by 30.85% in the US and 7.78% in the German markets. In the second period from 1999 to 2004, the RTS share of trading volume fell to 12.17% and MICEX share increased to 30.31%. Similarly the share of the US market also fell to 19.83% and the German market share increased to 30.84%. London saw 6.83% of the total trading volume during the period. The result indicates a trading volume shift from RTS to MICEX in the Russian market and from the US to London and Germany in the DR market. The creation of Xetra and the affiliated New Market created exclusively for trading Eastern European stocks may be the reason for the DR market volume to shift away from the US to Germany.

There is considerable variation in trading volume between different DRs and underlying stocks. One of the notable features is that for all the stocks that are listed in both RTS and MICEX, the trading volume shifted away from RTS to MICEX. London captured the largest share of trading volume for JSC MMC Norsilk Nickel (67.37%) and Yukos (35.58%). For those stocks that are traded in New York Stock Exchange, the US trading volume was the greater than any other markets. For example the US share of trade volume for OJSC Rostelecom was 37.41%, Tatneft was 49.00%, Vimpel Communications was 98.97% and Wimm-Bill-Dann Foods was 99.56%.

For the Level I and Rule 144A DRs, the German markets generally had the highest share of the trading volume. But one of the puzzling features is the role of multiple listing of the same DRs in more than one German exchange. One of the examples is AO Torgovy Dom (GUM). This DR is traded in five of the six German exchanges, but has very few trades in any one of them. Considering the cost of listing stocks in a market, one may speculate the strategic benefit of listing these infrequently traded stocks in multiple markets.

Finally the theoretical model of Baruch, Karolyi and Lemmon (2003), on the relationship between the trading volume and the information measures of various stocks is tested. In this model they hypothesize that trading volume of a stock will migrate to markets in which the cross-listed shares are more likely to meet similar firms. They use the flowing empirical model to construct the information measure with which they explain the trading volume in different markets.

The return of a stock in a market is subject to the overall price movements of that market. But if the stock is cross-listed in another market, it is possible that the overall movements in both markets can have an effect on the return of that stock. The following two regressions are used in capturing the relationship between a stock's return and the markets where it is listed.

$$R_{it} = \alpha_i + \beta_{i,H} R_{H,t} + \varepsilon_t \quad (2)$$

$$R_{it} = \alpha_i + \beta_{i,H} R_{H,t} + \beta_{i,F} R_{F,t} + \varepsilon_t \quad (3)$$

$R_{i,t}$ is the return of the i^{th} stock in the week t in any one of the three foreign markets.

$R_{H,t}$ is the return of either RTS Index or MICEX index for the week t .

$R_{F,t}$ is the return of S&P 500 Index or FTSE 100 Index or DAX Index for the week t .

Since there are two Russian markets and three foreign markets these regressions are pairs of the market leading to overall six sets of regressions. From the adjusted R^2 of the above regression equations, the following F-statistic is calculated, which is used as the information measure for the corresponding market.

$$\frac{(R_{(3)}^2 - R_{(2)}^2)}{(1 - R_{(3)}^2)} \quad (4)$$

The numerator of the above equation has 2 degrees of freedom and the denominator has $(n-2-1)$ degrees of freedom, where n is the number of weekly observations included in the regression. Since there was a fundamental shift in Russian markets due to the financial crisis of 1998, it is necessary to calculate the information measure separately for the two sub-periods. The higher the information measure as given by equation (4), it can be assumed that the foreign market had a higher information share in the stock return as compared to the domestic market. According to the Baruch *et al.* the higher the information share is, the greater will be the trading volume in that market.

Table 3

Information Shares of Foreign Markets

Name of the Firm	For the period of 1995-1998			For the period of 1999-2004		
	US Information Share	London Information Share	German Information Share	US Information Share	London Information Share	German Information Share
Aeroflot RTS MICEX					0.0859 0.0611	-0.0039 -0.0012
AO Mosenergo RTS MICEX	0.1131		-0.0178	0.0146 -0.0368	0.0026 -0.0028	0.0029 -0.0084
AO Surgutneftgaz RTS MICEX	0.2695			-0.0181 -0.0668	0.0254 0.0003	0.0247 -0.0032
AO Surgutneftgaz – Preferred RTS MICEX			0.0000	0.0188 0.0018		-0.0017 0.0033
Avtovaz OAO RTS MICEX						-0.0267 -0.0009
Buryatzoloto						
AO Torgovy Dom (GUM) - RTS				-0.0734		0.0035
Irkutskenergo RTS MICEX	0.1164		-0.0112	-0.0465 -0.1090		-0.0122 -0.0037
JSC MMC Norsilk Nicke - RTS				0.0053	0.0093	0.0349
JSC Samaraenergo RTS MICEX			0.0275			0.0005 -0.0003
Kuzbassenergo RTS			0.0186			-0.0063
Lukoil RTS MICEX	0.1576		-0.0091	-0.0050 -0.0423		-0.0058 -0.0089

Table 3 (continuous)

Name of the Firm	For the period of 1995-1998			For the period of 1999-2004		
	US Information Share	London Information Share	German Information Share	US Information Share	London Information Share	German Information Share
Moscow City Telephone - RTS						-0.0006
Nizhnekamskneftekhim RTS						0.0003
OJSC Central Telecommunication						
OJSC Rostelecom RTS MICEX	0.1889		-0.0192	0.0312 0.0008	0.0036 -0.0063	0.0177 -0.0146
OJSC Uralsvyazinform						
PJSC Southern Telecomm. - RTS			-0.0138			-0.0041
PJSC Volgatelecom RTS			-0.0219			-0.0031
Primorsky Shipping RTS				-0.0038		0.0019
Rostovenergo RTS MICEX						0.0037 0.1050
Sberbank Rossii						
Sibneft						
Tatneft RTS MICEX	0.4123	0.1931	-0.0298	-0.0033 -0.0073	0.0016 -0.0075	0.0059 -0.0103
Trading House Tsum RTS			-0.0167			0.0006
Unified Energy Systems – RTS MICEX	0.2655		-0.0115	-0.0181 -0.0525	0.0545 -0.0040	0.0242 -0.0208
Unified Energy Systems – Pref.						
Vimpel Communications -RTS				0.0065		-0.0025
Wimm-Bill-Dann Foods - RTS				-0.0046		-0.0040
Yukos RTS MICEX				-0.0053 0.0005	-0.0019 0.0119	0.0074 0.0226

The information shares of the US, London and German markets are given in Table 3. The results indicate that none of the information shares are statistically significant at 10% level. This implies that the returns of the Russian stocks that are cross-listed are primarily driven by the Russian markets and not by the foreign markets where these securities are cross-listed. Individually, the information share of the US market was higher during the pre-crisis period of 1995 to 1998, and went down in the post-crisis period of 1999 to 2004. Even though it is not reported in this paper, the individual regressions showed that the adjusted R^2 of regression equation (3) is not substantially different from the adjusted R^2 of regression equation (2). In many instances the former was less than the latter resulting in a negative information share for the foreign market.

The following regression equation is used to test whether the information share of each of the foreign market had any predictable power on the trading volume

$$v_{i,t} = \alpha + \beta I_{i,t} + \varepsilon_t, \quad (5)$$

where $v_{i,t}$ is the fraction of the total trading volume of the i^{th} stock at time t in a foreign market and $I_{i,t}$ is the information share of the same stock as estimated by equation (4). Using the pooled data of all available DR programs three separate regressions are done for each of the three markets. The first regression covered the entire time period, while the other two regressions covered the two separate time periods of 1995 to 1998 and 1999 to 2004.

Table 4

OLS Regressions of Foreign Trading Volume

	US Information Share			London Information Share			German Information Share		
	1995-2004	1995-1998	1999-2004	1995-2004	1995-1998	1999-2004	1995-2004	1995-1998	1999-2004
Intercept (α) (t-stat)	0.3675 ^a (64.668)	0.6072 ^a (22.81)	0.3723 ^a (62.310)	0.3639 ^a (43.76)		0.3639 ^a (43.76)	0.4055 ^a (70.638)		0.4055 ^a (70.638)
Information Measure (β) (t-stat)	1.6336 ^a (28.725)	0.6237 ^a (5.638)	3.9438 ^a (15.449)	-2.802 ^a (-8.666)		-2.802 ^a (-8.666)	-10.300 ^a (-22.224)		-10.300 ^a (-22.224)
Adj. R ² (F-stat)	0.1748 ^a (825.1)	0.0458 ^a (31.7880)	0.0681 ^a (238.6775)	0.0538 ^a (75.1117)		0.0538 ^a (75.1117)	0.0876 ^a (493.9128)		0.0876 ^a (493.9128)
Observations	3889	639	3248	1301		1301	5127		5127

^a Significant at 1%.

^b Significant at 5%.

^c Significant at 10%.

The results of these regressions are given in Table 4. As predicted by theory, the information share of US market has a positive effect on the trading volume in this market. The effect of information share was more significant for the 1999-2004 period. On the other hand both London and German information shares have significant negative effect on the trading volume. One possible explanation for this anomaly is that many of the information share measures for these two markets are negative.

4. Conclusion

This paper has taken a comprehensive look at the universe of Russian DR programs. The first set of tests indicates that there was no statistically significant difference between the exchange rate adjusted closing DR price and underlying stock price. Also, it was noted that there was again no significant difference in prices in two of the Russian markets studied. The possible reason for the congruence of DR and the underlying stock price may be active arbitrage between the markets. The trading volumes indicate that overall, there is an even distribution of trade volume between the two Russian markets and the US and German markets. The role of London market is more of a specialized venue for trade in a few selected DRs. Since 1999, there has been a dramatic shift in the volume of trade between the RTS and the MICEX markets, with MICEX capturing the larger share of trading volume for dual listed stocks in those two markets. Similarly, there is a drop in the trading volume in the US market in favor of the German markets. The tests of the effects of the information measure on trade volume show a positive effect on the US trade volume, while the London and German information shares have a negative effect on the trade volume.

The analysis of the Russian DRs also raises a few interesting questions. The first question is why the trading volume is so low for many of the Russian stocks? On the other hand, even with the low trade volume, the prices in different markets tend to equalize, which can be due to active arbitrage between markets. It may be interesting to study this feature with intra-day data. The second question is why with such low turnover so many of the Russian DRs are listed in multiple exchanges in Germany? Considering the cost of listing there must be a rationale for these listings. In conclusion it can be said that the Russian stocks are primarily driven by Russian market factors, but there may be industry specific links between Russian stocks and foreign markets. It may be interesting to look at the link between the Russian stock returns and specific industry segments in foreign markets rather than in the broader markets as done in this study.

References

1. Ahearne, A., W. Grier, F. Warnock . Information Costs and Home Bias: An Analysis of US Holdings of Foreign Equities // *Journal of Financial Economics*, 2004. – N^o 62. – pp. 313-336.
2. Alexander, G., C.S. Eun, S. Janakiraman. Asset Pricing and Dual Listing on Foreign Capital Markets: A Note // *Journal of Finance*, 1987. – N^o 42. – pp. 151-158.
3. Anatolyev, S., A.Gerko, D. Shakin, O. Kryukovskaya . Dynamics and Predictability in Russian Financial Markets // *New Economic School Working Paper*, 2003.
4. Bailey, W., P. Chung, J. Kang. Foreign Ownership Restrictions and Equity Price Premiums: What Drives the Demand for Cross-Border Investments? // *Journal of Financial and Quantitative Analysis*, 1999. – N^o 34. – pp. 489-511.
5. Chaplinsky, S., L. Ramchand. The Impact of Global Equity Offerings // *Journal of Finance*, 2000. – N^o 55. – pp. 2767-2789.
6. Coffee, J. The Future as History: The Prospects for Global Convergence in Corporate Governance and its Implications // *Northwestern University Law Review*, 1999. – N^o 93. – pp. 641-708.
7. Coffee, J. Racing Towards the Top? The Impact of Cross-Listings and Stock Market Competition on International Corporate Governance // *Columbia Law Review*, 2002. – N^o 102. – pp. 1757-1831.
8. Doidge, C., G.A. Karolyi, R. Stulz. Why are Foreign Firms that are Listed in the US Worth More? // *Journal of Financial Economics*, 2004. – N^o 71. – pp. 205-238.
9. Domowitz, I., G. Glen, A. Madhavan. Market Segmentation and Stock Prices: Evidence from Emerging Market // *Journal of Finance*, 1997. – N^o 52. – pp. 1059-1085.
10. Errunza, V., E. Losq. International Asset Pricing Under Mild Segmentation: Theory and Test // *Journal of Finance*, 1985. – N^o 40. – pp. 105-124.
11. Eun, C., S. Sabherwal. Cross-Border Listings and Price Discovery: Evidence from US-Listed Canadian Stocks // *Journal of Finance*, 2003. – N^o 58. – pp. 549-574.
12. Fanto, J.A., R.S. Karmel. A Report on Attitudes of Foreign Companies Regarding a US Listing // *Stanford Journal of Law, Business and Finance*, 1997. – N^o 58. – pp. 549-574.
13. Federov, P., S. Sarkissian. Cross-sectional Variation in the Degree of Global Integration: the Case of Russian Equities // *Journal of International Financial Markets, Institutions and Money*, 2000. – N^o 10. – pp. 131-150.
14. Foerster, S.R., G.A. Karolyi. Long-Run Performance of Global Equity Offerings // *Journal of Financial and Quantitative Analysis*, 2000. – N^o 35. – pp. 499-528.
15. Foerster, S.R., G.A. Karolyi. The Effects of Market Segmentation and Investor Recognition of Asset Prices: Evidence from Foreign Stocks Listing in the United States // *Journal of Finance*, 1999. – N^o 54. – pp. 981-1013.
16. Gramming, J.M. Melvin, C. Schlag. Internationally Cross-listed Stock Prices During Overlapping Trading Hours: Price Discovery and Exchange Rate Effects // *Journal of Empirical Finance*, 2005. – N^o 12. – pp. 139-164.
17. Hall, S., G. Urga. Testing for Ongoing Efficiency in the Russian Stock Market // *Working Paper*, 2002. Imperial College, London.

18. Jithendranathan, T., N. Kravchenko. Integration of Russian Equity Markets with the World Equity Markets – Effects of the Russian Financial Crisis of 1998 // Working paper, 2002. University of St. Thomas.
19. Jithendranathan, T., T.R. Nirmalanandan, K. Tandon. Barriers to International Investing and Market Segmentation: Evidence from Indian GDR Market // Pacific-Basin Finance Journal, 2000. – № 8. – pp. 399-417.
20. Kolodyazhny, G., A. Medvedev. Microstructure of Russian Stock Market and Profitability of Market Making // Working Paper, 2002. Economics Education Research Consortium – Russia and CIS.
21. Kuznetsov, P., A. Muravyev. Ownership Structure and Firm Performance in Russia, Working Paper No. 01/10, 2001. Economics Education Research Consortium.
22. Lins, K., D. Strickland, M. Zenner. Do Non-US Firms Issue Equity on US Exchanges to Relax Capital Constrains? // Journal of Financial and Quantitative Analysis, 2004. – № 40. – pp. 109-133.
23. Miller, D.P. The Market Reaction to International Cross-listing: Evidence from Depositary Receipts // Journal of Financial Economics, 1999. – № 51. – pp. 103-123.
24. Mittoo, U. Managerial Perceptions of the Net Benefits of Foreign Listing: Canadian Evidence // Journal of International Financial Management and Accounting, 1992. – № 4. – pp. 40-62.
25. Smirnova, E. Impact of Cross-listing on Local Stock Returns: Case of Russian ADRs // William Davidson Institute Working Paper, 2004. – № 691.

Appendix 1: List of Russian Depository Receipts

Name of the Firm	Issue Dates	Type of Issue	Trading System: US	Trading System: London	Trading System: Germany	Trading System: Russia
Aeroflot	12/22/2000	144A, Reg. S	PORTAL	SETS	Frankfurt ¹	RTS, MI-CEX
AO Lenenergo	09/16/1999	Reg. S		SETS		RTS
AO Mosenergo	07/17/1997	Level I	OTC	SETS	Berlin, Frankfurt, Munich, Stuttgart, Dusseldorf	RTS, MI-CEX
AO Surgutneftgaz	12/30/1996	Level I	OTC	SETS	Berlin, Frankfurt, Munich, Stuttgart, Dusseldorf, Hamburg	RTS
AO Surgutneftgaz – Preferred	03/19/1998	Level I	OTC		Berlin, Frankfurt, Munich, Stuttgart	RTS
AOA Moscow Candy Factory	08/20/1999	Reg. S				RTS
Avtovaz OAO	10/28/1999	Reg. S				RTS, MI-CEX
Bank Vozrozhdeniye	07/03/1996	Level I	OTC		Berlin, Frankfurt, Stuttgart	RTS
Bashinformvyaz	11/02/1998	Level I	OTC			RTS, MI-CEX
Buryatzoloto	10/27/1997	Level I	OTC		Berlin, Frankfurt, Stuttgart	RTS
Far Eastern Shipping Company	09/16/1999	Reg. S				RTS
Gazprom OAO	10/01/1996 05/21/1999	144A, Reg. S	PORTAL	SETS	Berlin, Frankfurt, Munich, Stuttgart	
AO Torgovy Dom (GUM)	07/07/1996	Level I	OTC		Berlin, Frankfurt, Munich, Stuttgart, Dusseldorf	RTS
Inkombank	05/28/1996	Level I	OTC		Berlin, Frankfurt,	RTS
Irkutskenergo	01/23/1997	Level I	OTC		Berlin, Munich, Frankfurt, Stuttgart	RTS, MI-CEX
Name of the Firm	Issue Dates	Type of Issue	Trading System: US	Trading System: London	Trading System: Germany	Trading System: Russia
JSC Lenenergo	06/13/2001	Level I	OTC			RTS
JSC MMC Norsilk Nickel	06/15/2001	Level I	OTC	SETS	Berlin, Frankfurt, Munich, Stuttgart, Dusseldorf	RTS, MI-CEX
JSC Rosneftegazstroy	08/07/1997	Level I	OTC		Berlin, Frankfurt, Munich, Stuttgart, Dusseldorf	RTS, MI-CEX
JSC Samaraenergo	02/09/1998	Level I	OTC		Berlin, Frankfurt, Stuttgart	RTS, MI-CEX
JSC Samaraenergo - Preferred	02/09/1998	Level I	OTC		Berlin	RTS, MI-CEX
Kazan City Telephone Network	03/19/1998	Level I	OTC		Berlin, Munich, Stuttgart	RTS
Kazanorgsintez	04/27/1999	Level I	OTC		Berlin, Stuttgart,	RTS
Kuzbassenergo	10/23/1997	Level I	OTC		Berlin, Frankfurt, Stuttgart	RTS
Lomo AO	09/16/1999	Reg. S				RTS

¹ This includes the XETRA.

Appendix 1 (continuous)

Name of the Firm	Issue Dates	Type of Issue	Trading System: US	Trading System: London	Trading System: Germany	Trading System: Russia
Lukoil	12/01/1995	Level I	OTC			RTS, MI-CEX
Lukoil	11/03/1997 11/29/2002	144A, Reg. S	PORTAL		Berlin, Frankfurt, Munich, Stuttgart, Dusseldorf, Hamburg	RTS, MI-CEX
Mechel Steel Group	10/29/2004	Level III	NYSE	SETS		RTS
Mobile Telesystems	04/22/2003	144A, Reg. S		SETS	Berlin, Frankfurt, Stuttgart	RTS, MI-CEX
Mobile Telesystems	06/06/2000	Level III	NYSE			RTS, MI-CEX
Moscow City Telephone	06/21/1999	Level I	OTC		Berlin, Stuttgart	RTS
Nizhnekamskneftekhim	12/18/1998	Level I	OTC		Berlin, Stuttgart	RTS
Nizhnekamskshina	11/02/1998	Level I	OTC		Berlin	RTS
NTV	01/28/2000	144A	PORTAL			RTS
OAO Kostromskaya	02/13/2004	Level I				RTS
Name of the Firm	Issue Dates	Type of Issue	Trading System: US	Trading System: London	Trading System: Germany	Trading System: Russia
OJSC Central Telecommunication	09/04/2001	Level I	OTC			RTS
OJSC Electrosvyaz Novosibirsk	09/04/2001	Level I	OTC			RTS
OJSC Electrosvyaz Primorsky	09/04/2001	Level I	OTC			RTS
OJSC Novogorodtelecom	04/24/2002	Level I	OTC			RTS
OJSC Petersburg Telephone	09/04/2001	Level I	OTC			RTS
OJSC Rostelecom	12/30/2002	Level II	NYSE	SETS	Berlin, Frankfurt, Stuttgart, Dusseldorf	RTS, MI-CEX
OJSC Rostovelectrosvyaz	04/24/2002	Level I	OTC			RTS
OJSC Uralsvyazinform	04/24/2002	Level I	OTC		Berlin, Frankfurt, Munich, Stuttgart, Dusseldorf	RTS, MI-CEX
OJSC Uralsvyazinform – Pref.	11/25/2002	Level I	OTC		Berlin	RTS
Open Investment OAO	11/16/2004	Reg. S				RTS
PJSC Southern Telecomm.	04/24/2002	Level I	OTC		Berlin, Frankfurt, Stuttgart	RTS
PJSC Volgatelecom	04/24/2002	Level I	OTC		Berlin, Frankfurt, Stuttgart	RTS
Primorsky Shipping	03/25/1998	Level I	OTC		Berlin, Stuttgart	RTS
Rostovenergo	09/22/1998	Level I	OTC		Berlin, Munich, Stuttgart	RTS
Rostovenergo Preferred	09/22/1998	Level I	OTC		Berlin, Munich, Stuttgart	RTS
Sberbank Rossii	03/29/2004	Reg. S			Berlin, Stuttgart	RTS
Seversky Tube Works	02/01/1996	Level I	OTC		Berlin, Frankfurt, Stuttgart	RTS
Severstal	12/15/2003	Reg. S			Berlin, Stuttgart	RTS

Appendix 1 (continuous)

Name of the Firm	Issue Dates	Type of Issue	Trading System: US	Trading System: London	Trading System: Germany	Trading System: Russia
Sibneft	04/20/1999	Level I	OTC	SETS	Berlin, Frankfurt, Munich, Stuttgart	RTS, MICEX
Name of the Firm	Issue Dates	Type of Issue	Trading System: US	Trading System: London	Trading System: Germany	Trading System: Russia
Slavneft	09/16/1999	Level I	OTC			RTS
Slavneft - Preferred	09/16/1999	Reg. S				RTS
Sun Interbrew	06/24/1999	144A, Reg. S	PORTAL			RTS
Tatneft	03/25/1998	Level II	NYSE	SETS	Berlin, Frankfurt, Munich, Stuttgart, Dusseldorf, Hamburg	RTS, MICEX
TNT-Teleset	01/28/2000	144A	PORTAL			RTS
Trading House Tsum	07/03/1997	Level I	OTC		Berlin, Frankfurt, Stuttgart	RTS
UHM	01/16/2001	Level I	OTC			RTS
UHM	01/15/1998	144A, Reg. S	PORTAL	SETS	Berlin, Munich, Stuttgart	RTS
Unified Energy Systems	12/10/2001	Level I	OTC	SETS	Berlin, Frankfurt, Munich, Stuttgart	RTS, MICEX
Unified Energy Systems – Pref.	12/10/2001	Level I	OTC			RTS, MICEX
Unified Energy Systems	05/12/1997 04/01/2004	144A, Reg. S				RTS, MICEX
Utair	05/26/1998	Level I			Frankfurt, Stuttgart	RTS
Vimpel Communications	11/01/1996	Level III	NYSE			RTS
Vimpel Communications	07/28/2000	Reg. S			Frankfurt, Munich, Stuttgart	RTS
Wimm-Bill-Dann Foods	02/08/2002	Level III	NYSE			RTS
Wimm-Bill-Dann Foods	05/06/2003	Reg. S			Berlin, Frankfurt, Munich, Stuttgart	RTS
Yukos	12/22/2000	Level I	OTC			RTS, MICEX
Yukos	02/28/2002	Reg. S		SETS	Berlin, Frankfurt, Munich, Stuttgart, Dusseldorf, Hamburg	RTS, MICEX