Financial instruments in the trade of forest products

Olga Sushko

Abstract. The development of exchange trading in Russia is an urgent topic in connection with the modern transformation of the market for timber products under the influence of the pressure of sanctions restrictions on Russian producers, the restriction of supplies to Europe. Another important aspect of the relevance of the topic is related to ensuring transparency and reducing the shadow relations of participants in the market. The purpose of the study is to determine the current situation of stock trading and to identify the pricing patterns of spot and futures quotations for timber products. The paper highlights a number of issues of the current situation of exchange trading of timber products in Russia and world exchanges, highlights the specifics of exchange trading of timber products, and identifies the main factors determining the low liquidity of exchange trading. In 2021, the volume of timber trading on the Russian stock exchange amounted to 1% of the total volume of harvesting, which is the minimum trading volume, and therefore does not allow the formation of a relevant market price index. The paper considers the pricing of spot and futures quotations for timber products. The dynamics of bleached softwood pulp futures on the Shanghai Stock Exchange (SHFE), pulp and paper futures on the Norwegian Stock Exchange (NOREXECO) are analyzed. Modern measures and measures for the future up to 2025 aimed at activating exchange trading in LPC products, increasing the liquidity of the futures market for timber products are considered. The study shows the advantages of exchange trading, and possible prospects for the development of exchange trading of timber products in Russia.

1 Introduction

The role of the commodity exchange in the modern economy consists, on the one hand, in displaying the conjuncture of commodity markets in statics and dynamics, and on the other hand, in establishing a market balance in prices with reference to the current parameters of supply and demand. Of particular interest are derivative financial instruments that allow bidders to receive money for deferred deliveries of raw materials, semi-finished products and...
goods at interest for a fixed period, which is an alternative to factoring and lending with collateral.

Almost 90% of the world's exchange trade is accounted for by the exchange centers of America, Japan, and England [1-5]. But the exchange trade in wood-paper goods is still developing slowly. In fact, forest exchanges operate only in the USA (Chicago Mercantil Exchange stands out in terms of trading volume), organizing trade between America and Canada – an area of little interest for participants from other countries. Forest auctions are much more widespread: in many countries of the world, timber is sold at the root through auctions, and in Japan a small part of timber is also sold. But due to the specificity of forest auctions, their prices rarely become indicative for the conclusion of commercial contracts for the supply of paper products. In Russia, exchange trading is carried out on the Moscow and St. Petersburg stock Exchanges. Stock trading in timber began in 2014 on the St. Petersburg Stock Exchange

The Russian state is taking certain steps towards intensifying the exchange trade in timber products. Thus, a significant initiative was the creation of an Exchange Committee, which is designed to optimize the infrastructure of exchange trading and form price indicators for timber products. In July 2021 The President of the Russian Federation signed a package of laws on the reform of the forest complex. Amendments have been made to the Forest Code of the Russian Federation, according to which all wood harvested by state or municipal institutions should be sold only at exchange auctions. From August 2021 mandatory registration of over-the-counter transactions has been introduced for commercial enterprises of the forest industry. For private companies, the sale of wood on the stock exchange is not yet mandatory. In December 2019, the St. Petersburg Stock Exchange launched test trades in timber for export, but no real transactions were recorded. The draft roadmap for the development of exchange trading for 2025, which will be adopted at the end of 2023, proposes a mandatory part of the sale of timber on the stock exchange. Other initiatives for the period 2023-2024 have also been proposed for the development of forest exchange trading:

- mandatory sale of a part of wood and processed products on the stock exchange for the winners of auctions and tenders for the lease of state and municipal forest plots,
- the obligation of the investor to sell part of the forest products on the stock exchange for the approved list of priority projects in the field of forest development.

Due to the introduction of a ban from 2022 on the export of unprocessed and roughly processed timber from Russia, export exchange trading in roundwood has become impossible. From October 2022 The EU adopted the 8th package of anti-Russian sanctions, which blocked the export of pulp, cardboard and paper to the EU countries, thereby export stock trading of timber and paper products was also virtually excluded.

2 Theoretical review of studies
S. Izrailevich and V. Tsudikman considered the construction and optimization of trading strategies for trading futures, options, and stocks [6, 9, 10]. There are other works by authors devoted to modern derivative financial instruments, which present the theory, practice, strategies, or psychology of trading.

The futures market began its development due to the desire of commodity producers to reduce the risks associated with significant price fluctuations, to provide themselves with guarantees for the future. On the other hand, the commodity futures market is also interesting to buyers who expect to receive additional profit from the growth of the market value of futures over time. Exchange trading is still focused on raw materials, and has specific features of transactions [11-12]. Spot contract prices and stock futures quotations differ significantly for the same commodity. The contract price on the spot is tied to an urgent transaction that is executed immediately. Futures are set for transactions with deferred execution up to several months from the current moment. That is, the price of the goods on the spot is understood as the current value of a particular product acting as the subject of the transaction, subject to immediate purchase, payment, and delivery. In a broader sense, spot prices are interpreted as the value at which goods of this category are currently traded on the market. As such, stock traders and investors track spot commodity prices on a par with stock prices.

The futures price is intended for a commodity transaction with deferred execution. The futures price of a commodity can be calculated from its current spot value with the addition of the cost of storing the commodity in the period of time before its actual delivery. The basis is the difference between the current spot price of a commodity and the value of the earliest available futures contract for it [13-14]. The basis affects the value of contracts used to hedge risks. In addition, commodity traders use the basis to determine the optimal moment to buy or sell a commodity, making a decision depending on whether the basis is strengthening or deteriorating.

Since financial markets are sensitive to the appearance of any positive and negative news that changes the expectations of stock market players in relation to future profitability, spot and futures quotes are subject to fluctuations (Fig. 1).

Fig. 1. Dynamics of a pulp futures contract with a long-term forecast
Source: https://ru.tradingeconomics.com/commodity/kraft-pulp (accessed 15.02.2023)

3 Research objectives and methods

The hypothesis of research on the exchange trade of timber products proceeds from the following main provisions:

- there is a specificity of the exchange trade of timber products;
different pricing of spot and futures quotations for timber products;
possible prospects for the development of exchange trading of timber products.

The purpose of the study is to determine the current situation of stock trading and to identify the pricing patterns of spot and futures quotations for timber products.

The main tasks of the current stage of the study of stock trading of timber products by econometric methods are to determine:

- volumes of exchange trading of wood and paper products;
- reasons for the slow development of stock trading in forest products;
- correlation of pulp futures quotes with prices of real contracts;
- advantages for exchange trading participants from futures and options.

4 The results of the analysis

Table 1. Dynamics of futures on the Shanghai Futures Exchange (SHFE) in September- October 2022

<table>
<thead>
<tr>
<th>Delivery Date Contract</th>
<th>Futures prices on different trading days, USD/t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9 September 2022</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16.09.2022</td>
</tr>
<tr>
<td></td>
<td>18.10.2022</td>
</tr>
<tr>
<td></td>
<td>16.11.2022</td>
</tr>
<tr>
<td></td>
<td>16.12.2022</td>
</tr>
<tr>
<td></td>
<td>17.01.2023</td>
</tr>
</tbody>
</table>
Source: Shanghai Futures Exchange

To convert prices from yuan to dollars, the exchange rate on the trading date was used, VAT of 13% and logistics costs of $15 per ton were deducted. RISI compares the resulting price with the price of NBSK pulp imports to China. If we take futures trading for the whole of September and convert it into dollars, we can get values for the upper limit of the price at which futures were traded, the lower limit of the price, the final price at the end of trading and the final settlement price for futures transactions (Table 2). However, it should be borne in mind that the trading volume for August-September 2023 is still scanty and, accordingly, real prices may differ.

### Table 2

<table>
<thead>
<tr>
<th>Delivery date</th>
<th>Contract</th>
<th>Upper Price</th>
<th>Lower Price</th>
<th>Closing Price</th>
<th>Settlement Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.10.2022</td>
<td>sp2210</td>
<td>894,36</td>
<td>878,46</td>
<td>883,18</td>
<td>880,95</td>
</tr>
<tr>
<td>16.11.2022</td>
<td>sp2211</td>
<td>877,22</td>
<td>854,86</td>
<td>861,07</td>
<td>859,08</td>
</tr>
<tr>
<td>16.12.2022</td>
<td>sp2212</td>
<td>867,78</td>
<td>830,26</td>
<td>840,70</td>
<td>838,46</td>
</tr>
<tr>
<td>17.01.2023</td>
<td>sp2301</td>
<td>850,88</td>
<td>811,13</td>
<td>817,59</td>
<td>817,09</td>
</tr>
<tr>
<td>16.02.2023</td>
<td>sp2302</td>
<td>847,65</td>
<td>794,73</td>
<td>798,95</td>
<td>799,70</td>
</tr>
<tr>
<td>16.03.2023</td>
<td>sp2303</td>
<td>832,50</td>
<td>781,56</td>
<td>782,56</td>
<td>785,54</td>
</tr>
<tr>
<td>18.04.2023</td>
<td>sp2304</td>
<td>808,64</td>
<td>768,89</td>
<td>771,87</td>
<td>774,11</td>
</tr>
<tr>
<td>16.05.2023</td>
<td>sp2305</td>
<td>800,45</td>
<td>755,23</td>
<td>760,69</td>
<td>761,93</td>
</tr>
<tr>
<td>16.06.2023</td>
<td>sp2306</td>
<td>791,50</td>
<td>752,49</td>
<td>756,72</td>
<td>757,71</td>
</tr>
<tr>
<td>18.07.2023</td>
<td>sp2307</td>
<td>791,75</td>
<td>751,50</td>
<td>757,46</td>
<td>760,69</td>
</tr>
<tr>
<td>16.08.2023</td>
<td>sp2308</td>
<td>783,05</td>
<td>754,73</td>
<td>760,69</td>
<td>760,69</td>
</tr>
<tr>
<td>18.09.2023</td>
<td>sp2309</td>
<td>780,07</td>
<td>743,05</td>
<td>748,02</td>
<td>747,52</td>
</tr>
</tbody>
</table>

It is possible to compare prices on the NOREXECO exchange for softwood pulp for China for the 4th quarter of $919 per ton and SHFE – $860 per ton, for the 1st quarter of 2023, respectively, $880 per ton and $801 per ton. The difference may be caused by various reasons, including delivery conditions, quality characteristics, volume discounts, etc.

### Table 3

<table>
<thead>
<tr>
<th>Futures term</th>
<th>NBSK – Europe</th>
<th>BHKP – Europe</th>
<th>NBSK – China</th>
<th>BHKP – China</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q422</td>
<td>1483</td>
<td>1377</td>
<td>919</td>
<td>827</td>
</tr>
</tbody>
</table>
The analysis of futures quotations for bleached softwood pulp delivered to China showed that there is a difference in the stock quotes of different exchanges for the same product focused on the same regional market. The main reason for this phenomenon is the difference in the morphology of softwood fiber depending on the region of growth, from which the differences in the consumer characteristics of cellulose arise:

- the best or worst ability to absorb liquids,
- higher or less high contamination of cellulose fiber with resin inclusions,
- the residual content of bound chlorine in the fiber, which depends on the bleaching technology used.

Suppliers of pulp of lower quality, due to the above, are usually forced to give a discount compared to the reference NBSK. In particular, this also applies to pulp producers from the Russian Federation.

Also, the difference in quotations is influenced by the terms of delivery of the goods, since the same goods can be delivered by sea or by land, with the transfer of ownership rights either in the warehouse of the seller, or at the port of departure, or at the port of destination, or at the border crossing point, or in the warehouse of the buyer. Each listed option has a different amount of logistics costs, because of which the contract price of the same product varies depending on the terms of delivery.

Using the basic model of the theory of storage of raw assets [21-24], we can propose the following formula for determining the futures price (Ft,T) for timber products:

\[ F_{t,T} = S_{t}^{(r(t,T)+z(t,T)) (T-t)} \]

where

- \( t \) — the term of the contract in the period T;
- \( S_{t} \) — the spot sale price of pulp in the period t;
- \( z(t, T) \) — the cost of storing pulp in the period t with a term (T–t);
- \( r(t, T) \) — the interest rate of the loan in the period t with a term (T–t).

The sum of the components \( r(t,T)+z(t,T) \) determine the payment of costs for a futures contract, which usually increases as the futures contract is prolonged. At the same time, the pulp futures price will be higher than the actual price \( F_{t,T} > S_{t} \) with small changes in spot prices for pulp on actual deliveries.

At the present time, the sale of forest products in most cases occurs through established supply channels on the spot market. Producers and traders, when selling timber products, also actively use futures terms of supply and to reduce risks from price volatility. At the same time, the use of long hedging can be observed on the timber products exchange: the purchase of futures by a counterparty followed by the actual purchase of timber products on the spot market [10-11].

5 Conclusions
exchange commodity due to insufficient unification. The opacity of the market is added to the objective global negatives of the exchange trade in LPC products in Russia. Open exchange trading would help bring the industry out of the shadows. The growth of exchange trading will allow the introduction and development of exchange instruments, will gradually form benchmarks. According to experts, the minimum share of exchange trading in wood and its products is 5%, and the optimal 10%. The introduction of derivative financial instruments of exchange trading will solve a number of problems:

- risks and losses from the volatility of prices for forest products will decrease as a result of fixing stock prices,
- uniformity of price conditions for market participants will be established,
- transparency and a clear understanding of the principles of market pricing will increase,
- industry participants receive an array of price quotes in dynamics, which can be used to improve the accuracy of business planning and, thereby, stimulate the growth of new capacities.

In addition, the development of derivative financial instruments in the forest products market will make it possible to more accurately forecast the company's revenue, which will give advantages in planning the financial activities of organizations.

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