

BASIC FACTORS WHICH DETERMINE BUSINESS RUNNING ON THE INTERNATIONAL COPPER MARKET

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ABSTRACT. The paper includes the key factors which have influence on offer, demand and prices on the world copper market. From the standpoint of influence on production and consumption, the emphasis is on costs, especially from the aspect of ore quality and technical and technological factors, as well as on the influence of industrial production and growth of the sectors which represent the largest copper consumers, then on gross national product, substitution, etc. The specific relations of offer and demand, expenses, investment of free capital and stock exchange transactions have been treated as the price factors. Identification of these factors and the recognition of their influence on the market movement can significantly contribute to the quality of production capacity management and to the strengthening of competitive position of companies in this sector.

ОСНОВНИ ФАКТОРИ, ОПРЕДЕЛЯЩИ БИЗНЕС СРЕДАТА НА МЕЖДУНАРОДНИЯ ПАЗАР НА МЕД

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РЕЗЮМЕ. Докладът включва основните фактори, които влияят върху търсенето и предлагането както и цените на световният меден пазар. От гледната точка - влиянието на производството и потреблението, ударението пада върху стойностите, особено от страна на качеството на рудата и технологичните фактори, както и от влиянието на промишленото производство и нарастване на областите, които са най-големите потребители на мед, следователно и от брутния национален продукт, замяната и т.н. Специфичната връзка между предлагането и потреблението, разходите, инвестирането на свободен капитал и трансакциите на фондова борса се разглеждат като ценови фактори.

Идентификация на тези фактори и познаването на тяхното влияние върху пазара може в значителна степен да въздейства върху управление качеството и количеството на произведената продукция и до създаване на конкурентната среда сред компаниите от този сектор.

Introduction

It is stated that copper, gold and silver are metals a man first knew and used. He compared gold with the sun, silver with the moon and copper with the morning star.

It is estimated that copper has been used for more than 6000 thousand years, as the first objects made of copper, such as tools, weapons and ornaments are considered to be that old. Copper, on two occasions at least, had a definite contribution to the entire development of the human evolution and development of human civilization in general. Firstly as the kind of material which transformed a man from the stone age to the copper age, therefore the metal age, and secondly as the metal which made possible a wide application of electricity and electrical devices marked a new revolutionary era in electronics, industry and the development of the entire human society.

Copper market

Copper market has had quite a long history. Copper comes to the market as the raw copper concentrate containing 20-30% of copper, blister copper contains over 95% and refined copper 98% to over 99.9% of pure metal. In international trading operations, the most frequently used is the refined copper in the form of high quality cathodes. Copper also belongs to products of a homogenic type and as a product of

a high and equal quality, it belongs to commodity goods, which enables companies to operate according to the principle „think globally, work locally“ which has marked the global marketing orientation and marketing strategy, so that we can talk of the copper market as the global market or the market with homogenous demand. Copper market is of a very wide range, taking into account the fact that in the course of business operations, a large number of countries and companies meet, either as producers, consumers, brokers, other financing organizations or institutions which do their type of copper business. Owing to such a large number of participants in market events and operations, we could say that in this kind of market there have not been classical forms of limiting market mechanisms and functional dependance on the supply, demand and pricing policy. However, research shows that elements of imperfect competence are characteristic to this market.

The proportion between supply and demand show that the market has a cyclic development and moves through all forms of mutual relationship and interactions. A high demand rate in the period of market conditions lasted, with certain changes, until the end of the world crisis caused by the so-called oil schock. By the mid-seventies the last century and onward, short periods of average three to five years were experienced by the copper market when it moved from the depression cycle to the favourable market conditions cycle. Studies of supply and demand structures show that copper as a raw material in its

primary form and largest quantities comes from developing countries but is processed into final products in industrially developed parts of the world. America long held the first position on the list of the world's largest copper producers to later renounce this position to Chile, in the last decades of the twentieth century. The main copper resources exporter is the South American region, that is Chile, but largest importers are countries with very intensive development which entered the market, such as Japan, South Korea and China, among others, and also countries of the European Union and America as well which is now the importer of copper resources.

A very important role in the international trade in copper as a commodity product, is the London Metal Exchange, as a permanent, specific and highly organised Exchange for non-ferrous metals trade. The Exchange was established in 1877 in London as a private joint-stock company. First exchange contracts were made for copper and tin, whereas the first original copper contract was made in 1883. The subject of the contract were Chilean bars. According to the number of annual contracts for the metal turnover, the London Metal Exchange ranges among the first five or six largest commodity exchanges in the world. Trading operations in the London Exchange are carried out with strictly pre-determined rules (trade usances) for eight metals, which are: primary aluminium, copper, lead, nickel, tin, zinc, silver and aluminium alloy. Trading in metals means a certified quality, and those who buy the metal registered on the London Exchange are certain that the quality is guaranteed by the standard trademark registered at the Exchange, which is also the case for the standard shape and size of the product, the size of the lot. The most important impact on the international trade in copper and other metals the London Metal Exchange achieves through the price which is considered the reference price and the basis for concluding purchase and sales contracts worldwide. The London Metal Exchange publishes daily official cash prices, prices for futures contracts or average prices (three month prices), fifteen months or twenty-seven month prices as well as the official settlement prices for each month. The settlement price or the seller's price is the officially agreed price used as the reference price (known in business practice as «world price») in the international copper trade.

Futures operations are dominant in the London Exchange and for this reason this Exchange is regarded as identical to the financial market. According to available information, we have come to the conclusion that only 3-5% of futures contracts end up in real deliveries of agreed copper quantities. Futures trade in the London Exchange is primarily carried out for the purpose of providing protection from losses in the course of frequent price fluctuations (hedging operations) and for generating profit out of exchange transactions and speculations. Exchange dealings are main causes of frequent price changes which cannot be explained by the impact of other factors. Our research has shown that the London Exchange still has a dominant role in the international copper trade as it operates under strict conditions set out by the London Exchange, as an Exchange which operates on daily basis.

The characteristic of the copper market is the exchange price as the balancing element of supply and demand or as

the result of the proportion between them in the market. We have also studied the price fluctuations at the London Exchange in the period 1960-2002 as this price is considered in international trading operations as the world price, or the reference price, to be more precise. The price fluctuation is cyclic, which is quite normal and this cyclic feature also appears in the course of production development and consumption. The other important price feature is its frequent fluctuation, or change which comes out daily, weekly, monthly, annually. The price is basically formed under the influence of the proportion between supply and demand, when in the very short term the supply is shown as part of available copper quantities in the form of exchange stocks, and demand also as part of real demand where other numerous factors affect the price. When speaking of the entire period which was the subject of our research, the average copper price was US\$2,838 per ton (US\$ value in 1999) where the highest price achieved in the period 1964-1974 was US\$4,367 and the lowest average price in the last decade of the twentieth century was US\$1,972. Characteristic price cycles alternate in three to five year periods. Therefore, we have confirmed that fluctuations within the cycle are lower, but much higher between two cycles. Within the entire period we analysed, two long-term price fluctuation cycles were identified. In the 1960-1974 cycle, the average annual copper price was at the level of US\$4,030 per ton, and in the second cycle, from 1975-2000 was around US\$2,146 which means that the price in the second cycle was only 53% of the price value in the first cycle. Therefore, in 1975 there was a period of price depression which, along with a slight revival and stabilization at a lower level, lasted all until the end of the last century, with the tendency to continue so in the first years of the twenty-first century.

Regarding the factors affecting the copper price, we studied only the influence of proportion between supply and demand, exchange stocks and total commercial copper stocks, production costs and other factors. It is a very complex matter, particularly due to frequent price fluctuations, market developments and different factors.

The market mechanism is seen in all products, but in case of copper certain specific details became evident with regard to the purpose, character and replacement possibilities, among other things. Having this fact in mind, we first studied the flexibility of price of copper supply and demand. We established that copper belongs to a group of products of unflexible demand with sufficient specific details in contrast to other products, particularly consumer goods. We also studied correlations between the demand and copper price and came to the conclusion that the correlation coefficient in the 1960-2000 period was 0.499 where the coefficient in the high copper price period (1961-1974) was 0.636, and the period of real price decrease and stabilization was at a low level of 0.415 (1975-2000). We also studied trends in the production and copper price when significant particularities in relation to the majority of consumer goods were determined. Copper production, as the largest part of supply, very slowly adapts to price fluctuations. As we analysed production price flexibility, we confirmed that in thirteen out of twenty-nine observed years, the price drop was followed by the production rise and in four years we registered price drop and production drop, but along with the price rise, production also rose in the eleven year period. Production correlation coefficient and the refined copper price for the analysed period was 0.459 whereas the price as well as mining production correlation coefficient was even lower, 0.258. Therefore, market trends have shown

characteristics specific to copper as a product belonging to a group of consumer goods, or to be more precise, raw material. When speaking of the price flexibility, copper is not a flexible product and the correlation coefficients are relatively high if we want to point out the proportion between the demand and price. The case is not the same with production as its adaptability to price fluctuation is very slow.

Basic factors

The Exchange and total commercial stocks are important factors of current price fluctuations. During the analysis of this factor we included annual change of stocks and real prices in the period 1998-2000 as well as monthly changes in the period 1997-2000. Although Exchange stocks were only 3.3% out of total copper consumption in the last twenty years of the twentieth century, we established that the correlation coefficient was -0.621 . The correlation coefficient of the total commercial stocks (the exchange plus the stocks of producers, consumers and traders) and real copper prices were in the same period -0.508 . The correlation analysis shows a high mutual dependence between the price and stocks. In other words, when stocks rise, prices drop and vice versa, the rise in prices causes stocks to drop.

Copper price fluctuations can not be fully explained only by means of the real proportion between supply and demand and stocks flow. Interests of the financial capital are reflected in this market and market mechanisms of price formation and speculations creating false supply and demand highly affect the price fluctuation of this metal. Prices are always affected by other factors as well which are sometimes very difficult to recognize, particularly quantify or foresee, such as variations in exchange rates, interest rates, etc.

Production costs are also a factor with a long-term impact on the price. Market prices should finally cover production costs in order to provide continuation of further production. We concluded in previous points that copper production is very specific due to big differences in the level of costs of certain producers and various natural mining conditions and other circumstances. Upon segmentation of copper production in countries with market economy, we established, depending on the cost level, that 50.6% of this production in 1995 had lower than average cost, 28.1% higher that average of up to 20%, and 21.3% higher that average of over 20%. We also confirmed that in the period 1983-1995 there were certain changes in the participation of certain segments in the total production. Participation of production with costs lower than average was increased and the share of production with costs higher than average, was reduced. Considering the position of each segment in relation to price fluctuation of this metal in the market, we concluded that the copper price had a tendency to move more towards the average production cost in the world than marginal producers with high production costs. In the 1983-1995 period, copper prices covered full costs with 73-83% of copper production and gained a full profit. The remaining part of the production covered only variable and part of fixed costs, whereas full costs and profit were covered only in the period of very high copper prices.

In order to sustain and develop production, supply and copper consumption, of the key importance will be the scope

and the quality of the raw material and mining conditions. Relevant information regarding ore reserves and mining life from previous periods bring us to the conclusion that explored and confirmed reserves, along with necessary losses during mining operations of deposits and extraction processes, will be sufficient for further copper production of forty years.

In the next 10-15 years there will not be significant changes of the copper content in the ore in relation to the content now being mined (0.75%). However, the average copper content largely depends on market price fluctuations. Maintaining low prices in longer periods causes temporary or permanent closure of mines with low copper content which further causes the average copper content to rise worldwide. And vice versa, in case of high copper prices, even deposits with low copper content start to operate which leads to the decrease of the average content.

From the point of view of the copper production technology, best results are expected in the field of hydrometallurgy. Copper production by means of hydrometallurgy will further develop and grow slowly as a large number of deposits with such ore are already being mined. Extensive research work aimed at copper production with this type of process but also from sulphide and not only oxide ores, can become a turning point in the development of copper production in the world. Copper production costs could be greatly reduced and copper reserves significantly increased so that mining operations would be economically more efficient.

Environmental protection is one of the most important problem with regard to copper production development. Distinctive results in this field were achieved in developed countries and upon replacing their smelting technology good results were also achieved in developing countries. However, basic copper production constantly generates new environmental problems connected to soil disintegration, water pollution, etc. There are numerous and large environmental problems inherited from the previous period which are yet to be solved in the period to come. On the other hand, requests for environmental protection are growing and taking a more global character. Overcoming these issues requires permanent investments and inevitably increases production costs. It is estimated that environmental protection costs, beside all previous investments, will take 7-10% of total copper production costs.

The main problem encountered in the copper production are still production costs and big differences in costs which are not present on such a scale in other industries. Some 25-35% of the world production can not cover full costs with the selling price of US\$ 1,900 per ton. If we observe this issue in the long run, we could come to the conclusion that it will cause the production with high cost to reduce as it can not be completely covered by the rise in production with low costs. In the previous period, production with high costs was largely reduced in developed countries. In the period 1998-2000 North American production rates were reduced by 24.6% and in 2002 this trend continued. If we look at different regions, copper production will maintain same tendencies as expressed so far. Developing countries will still be main producers with a dominant position held by the Latin American and the Far East countries. Copper production in the former Soviet Union has now come out of long years of crisis and a significant increase at the turn of the century has been registered. China's reserves are quite modest ones but they try to maximise their mining production, provide necessary refined

copper and engage metallurgic facilities by importing the concentrates and blister copper. Copper production in Africa is still at the level of some 30% of the rates achieved in 1980. What we can expect in real terms is that production should be returned to previous levels which would further increase copper production throughout the world.

More precise predictions regarding copper consumption can be given for a period of 10-15 years, as predictions for longer periods are uncertain due to possible changes which are more difficult to predict. Industrial production growth is the most important factor of consumption for the future period. In developed countries, copper consumption will not register such a rapid growth in contrast to industrial production of 10-15%, whereas developing countries will have a much rapid growth than developed countries. Technical and technological development will not only further reduce the consumption of specific finished copper products, but also existing substitutes will be improved and new ones discovered. However, technological development can contribute to the discovery of new fields of copper application which will increase its consumption. Copper consumption will continue to drop according to the already established trends, but this drop will generally be slow due to a larger participation of developing countries in the global copper consumption and it is common knowledge that the copper consumption grows in these countries due to a rapid growth of industrial sectors known to be important copper consumers.

More serious copper consumption growth can be expected along with a more rapid growth in developing countries. Copper consumption in these countries is very low and it used to be around 1.3 kg in the year 2000. It is quite realistic to expect a significant industrial and economic growth in these countries and more intensive copper consumption as well. Also realistic is the assumption that copper consumption will increase in former socialist countries, particularly in the countries of the former Soviet Union. In case copper consumption in these countries returns to the 1980 level of 1.300.000 tons, it would mean it will globally increase by 6.8% annually. It is also expected to grow in China taking into account the present trend of industrial development, as it will probably reach the level of 4-4.5 million tons at the beginning of the twenty-first century or 7-9% at the annual rate. Countries of the Middle East, Far East and Latin America are considered to be big potential copper consumers which will enable larger consumption of copper in the form in finished products. Higher copper consumption in these countries in the period 1991-2000 at the average rate of 8.9% annually shows that such expectations are quite realistic and that mentioned tendencies will continue in the forthcoming period.

From the point of view of the given predictions of the possible proportion of copper consumption in the world, with natural resources at hand, we can conclude that favourable conditions will exist for carrying out production processes and providing necessary copper supplies. Excluding large changes which could appear in the course of copper consumption, our research indicates that this production will grow in the range between 70% and 80% of the industrial production growth rate in the next 10-15 years.

Production and consumption of copper in Yugoslavia has been in crisis characteristic for the countries with their economies in transition. The crisis has become deeper and bigger having in mind all the consequences of doing business under economic sanctions and other unfavourable circumstances in the last decade of the twentieth century which actually prevented modernization and faster adaptation to economic trends. RTB Bor which once used to be an important producer of high quality copper in Europe has found itself in the most difficult situation, with its mining production constantly decreasing, particularly since the year 2000, without any long term plans for its recovery and further development. Having in mind an objectively very difficult position of RTB Bor, complex structural changes are necessary along with modern technical and technological achievements as priorities and compensation for low copper content in ore deposits, changes in the organization and management in order to increase productivity, lower the costs and make business operations more effective and competitive.

Conclusion

In the future period, technical and technological development will affect the proportion between the supply, demand and copper price in the world market. In contrast to copper and its sources of supply which are limited and unrenovable, the technology itself is a resource created by man who is very important for the entire development of all fields of industrial and social life, partially as well as globally. When speaking of copper and copper market, we should point out that the technological development is influenced by a wide range of important factors: it compensates or eliminates negative impacts of permanent deterioration of natural mining conditions, particularly a decrease in copper content in the ore; it improves competitiveness of copper in its struggle with the substitutes for the same consumption and same markets; it can increase the use of copper by creating new fields or potential areas of its use which can increase the present level of copper consumption in the future.

Following the details of our research analysed in this doctoral dissertation, our conclusion is that the general hypothesis has proved the impact of the scope and quality of ore bodies, technological development, industrial production growth and gross national product as independent variables on the supply, demand and copper price as dependent variables. Simultaneously, other established hypothesis have also been proved and as such are logically connected to the general hypothesis.

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