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STATE AND TRENDS OF BULGARIA'S FOREIGN TRADE WITH ORES AND CONCENTRATES

The paper presents the results of a study of the state and dynamics of the foreign trade of Bulgaria with some of the commodities of the country's trade list – the ones from class "Ores and Concentrates". It covers the period 2000-2016. Foreign trade situation is defined on the basis of processing and analyzing data published by national and international organizations. State and trends of Bulgaria's foreign trade with these strategic products of the mining industry are assessed in the context of the rapidly changing national, European and global market situation. The geographic concentration and sustainability of exports and imports are determined by developing specific coefficients. On this methodological basis, summaries have been made about the current foreign trade situation.
JEL: F14; F16; F50; L70

Introduction

Concerning the foreign trade, mining industry products occupy a significant place in the Bulgarian export list. Of them, ores and concentrates have the largest share. In the combined nomenclature, from which data on foreign trade flows is collected, ores are not separated from their concentrates. For this reason, everywhere in the current paper they are considered together. The significant participation in foreign trade turnovers implies a need to analyze and reassess the state, dynamics and trends in the export and import of ores, making the topic current and relevant from an economic point of view. Commodities of class "Ores and Concentrates" form an average of 1.3% of Bulgaria's annual export of goods for the period 2000-2016. The characteristics of the Bulgarian ores predict the export of the sector to be predominantly ore concentrates[3] and, to a lesser extent, the ores themselves. This makes it particularly important to monitor the state of the export for its

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[3] To be cleared of rock impurities, the ores are subjected to purification (enrichment or concentration). The resulting ore concentrates represent almost pure metal compounds, from which the corresponding metals are obtained.

functioning. The country has one of the highest shares of the mining sector in GDP among the European Union countries. In some areas, mining is a major livelihood of the population.

At the same time, the technical characteristics of the Bulgarian productions impose the import of ores and concentrates in the form of raw materials. It represents annual 4.5% of total imports of goods for the period 2000-2016. This high share accounts for a serious impact of the international business environment on their activity.

The goal of the current study is to analyze and summarize the state and trends in foreign trade with ores and concentrates.

1. Role of Mining Industry for the Economic Development of Bulgaria

The latest data on the value of the total mineral extraction index, published by the Bulgarian Chamber of Mining and Geology, show that Bulgaria has parameters above the average world values – 11 ton/person (Ministry of Economy, Energy and Tourism, 2012). This gives grounds to be defined as a "mining state". In recent years, the country ranks third in copper extraction, fourth in gold extraction and fifth in lignite extraction in Europe. With these key positions in the mining industry on the continent, Bulgaria is recognized as an important and promising market player.

The mining industry has a strategic importance for the development of the Bulgarian economy. Many industries are directly or indirectly related to the extraction of mineral resources, including metallurgy, chemical industry, electrical engineering, construction, transport, information and telecommunication technologies. "By acquiring an export potential, the industry of ferrous metals and ore mining" gets a significant role for foreign trade in 1991-1997 (Tassev, 2012b).

From a macroeconomic point of view, Bulgarian mining industry provides an average of 4-5% of GDP, which confirms its significant role for the economy (Bulgarian Chamber of Mining and Geology, 2014). Mining gives a boost to the development and improvement of the welfare of certain Bulgarian municipalities. It provides direct employment to more than 30 000 people and induced employment to another more than 120 000 people in other sectors servicing the industry, creating 1.3% of the national employment (Ministry of Economy, Energy and Tourism, 2012). According to data from National Statistical Institute (NSI) to 2015, 386 companies and organizations are engaged in exploration, extraction and processing of mineral natural resources and the related activities and services. Mining enterprises, in comparison with other industrial activities, are defined by the object of their activity – the mineral resources and the related requirements for organization and realization of the production activity (Velev, 2011). Compared with the European ones, they are predominantly profitable and competitive, offering quality production, convertible on the international markets. This makes ores and concentrates commodities, for which Bulgaria has competitive advantages.

Bulgaria is among the five countries in the European Union with the highest share of value added in the mining industry – about 3%. Also, "the gross value added of an employee in

the sector is significantly higher than the total one for the country and the industry" (Stoykova, 2016). According to NSI data, the registered operating incomes amount to 2 848 348 000 BGN (2015). By operation incomes of an employed person, the labour productivity amounts to 114.566 BGN per employed person (2015). By the value added by factor cost of an employed person, it is 46.267 BGN per employed person (2015). These data confirm that mining industry accounts for one of the highest labour productivity, exceeding the one of the other sub-sectors of the Industry sector and twice as high as the average for the country. That is why it is defined as a promising activity given the full potential, though not fully exploited.

The ores and minerals have a great production and, consequently, economic importance as the raw material, from which finished products are obtained. By 2016 in Bulgaria the established deposits of mineral natural resources are 1383, of which 218 are of ore minerals and 225 of non-metallic minerals. The main extracted raw materials are lignite, lead-zinc, copper and polymetal ores, gypsum, limestone, bentonite, kaolin, quartz sands, refractory clays and marble. Today, their extraction in Bulgaria reaches 97.68 million tons. In the last years, the extraction of ore minerals has had the greatest contribution to the total production value (53%). This predetermines that in the coming years the products of the mining industry will continue to be constantly present in the export list of Bulgaria.

Foreign trade with ores and concentrates happens with its own specifics, coming from the peculiarities of their character. First, in quantitative terms, with the exception of manganese ore, ores of ferrous metals are insufficient to meet the needs of the Bulgarian industry, therefore "the production is based mainly on imported raw materials (ores)" (Tassev, 2012a). Second, there is some discrepancy between the qualitative characteristics of the raw materials and the capabilities of the enterprises for their rational and full use. There is such deficiency also in non-ferrous metal ores, which is why part of the needs is secured by import. Third, the shortage of ore minerals and the specifics of their qualitative characteristics impedes the development of the structure-defining economic sectors. The insufficient quantity and the demand for ores with better quality characteristics, including even iron ores, of which Bulgaria is rich, requires imports from other countries. Fourth, despite the shortage, the country is also an exporter of ores. The reason for this can be found in the inconsistency of the needs for available ore minerals, and the potentially necessary ones for business purposes. At the same time, the metal content of most ores extracted in Bulgaria is very low, which adversely affects and raises the costs of the final products. As a consequence of ensuring the normal functioning of key industries, it is necessary to import ores with higher metal content or directly – their concentrates.

2. Research Methodology

Determining the state and role of the mining industry for the economic development of Bulgaria takes into account the most current data and sources on the subject, including reports of state institutions and analyses of branch organizations, published as of October 1st, 2017. Data on exports and imports have been collected and verified by the customs authorities of Bulgaria on the basis of the "Combined Nomenclature" of the European

Union. It is based on the commodity nomenclature of the Harmonized System (UN) and is supplemented by its subsections. Combined Nomenclature is adopted by the European Council **Regulation (EEC) No 2658/87** and is updated annually. The Chapters of the Combined Nomenclature, used for the purposes of the current study, are from 2601 to 2617 of section 26 (see Annex 1). Within the current study, this part of the nomenclature section is called "ores and concentrates".

Regarding the information on foreign trade, the main source is the National Statistical Institute (NSI) and "Statistical Time Series of the Bulgaria's Foreign Trade of Goods, 1986-2006" (Tassev, 2011). Detailed data of partner countries in foreign trade are published in "Foreign Trade" database of NSI. The time series that can be generated by the data start at 2000. For this reason, the current study examines the period 2000-2016. The annual values of the deals with the respective ores and concentrates are used, as well as the quantity of first additional measure – kg.

In view of the set goal, statistical methods have been applied to track the state and dynamics of Bulgaria's foreign trade with ores and concentrates.

First, descriptive statistics tools are used to describe the values and trends in their development. Taking into account the annual value of the respective ore and concentrate, and dividing it to the annual quantity, results in the average annual price of the respective ore and its concentrate.

Second, geographic structure of foreign trade is thoroughly analyzed. This is realized by examining two important parameters – concentration and sustainability.

In the practice so far, Herfindahl-Hirschman Index (HHI) is used to calculate the foreign trade concentration. In economic theory and practice, it has been accepted as a conditional measure of market concentration. It can establish the existence of a monopoly or a competitive market. HHI is considered a measure of the extent to which a market is dominated by a small number of large firms and a large number of small firms, i.e. it shows the degree of concentration on a certain market (Rutherford, 1997). For example, in a sector with *i* firms the index is calculated using the formula:

$$HHI = \sum Si^2 , \quad (1)$$

where:

Si is a market share of firm *i*.

The index shows both the number of companies and their relative size. Its value is *1* if there is only one company on the relevant market, and it is close to *1* if the companies are few or some of them are much larger than the others. If the value is *0* or close to *0*, then it is a highly competitive market.

Herfindahl-Hirschman Index is used in some foreign trade analyses to measure the degree of concentration and diversification. Used for this purpose, however, it has a weakness regarding the objectivity of the interpretation of the obtained results. Index values change in the range of *1/n*, where *n* is the number of foreign trade partner countries, up to *1*. This

means that they depend directly on the size of the assessed group of countries (Ilieva and Iliev, 2014). The lower limit of the index variation is floating according to the number of foreign trade partners. Thus, if they are too many, the values will change in a larger range, and vice versa – if they are fewer, the values will change in a smaller range. Then the smaller value of the index would mean higher diversification, and the larger value would mean a higher concentration. The described specifics in the interpretation of the index values are present when it is used to track the foreign trade situation. They do not allow for direct comparisons between different periods, if in the meantime the number of foreign trade partners has changed, since then the value of *n* has also changed. In this case, the index values will be incomparable, and comparative analyses based on similar values are not objective.

To avoid the difficulty of interpreting HHI, the authors here suggest that *Geographic Concentration rate (GCr) of export/import* should be used to study the geographical distribution of foreign trade. It is calculated as a coefficient representing the relative share of the sum of the first five countries in the geographical distribution of exports, or respectively imports, to the amount of deals with all countries. The mathematical record is expressed by the following formula:

$$GCr = \frac{\sum_{1}^{5} topD}{\sum_{1}^{n} D}, \tag{2}$$

where:

GCr is Geographic Concentration rate of export/import;

D – foreign trade deals with *n* countries;

top – members of ranked row of deals.

The geographic concentration rate can be calculated for each separate studied time period, for example, a year. Its values change from 0 to 1. The lower the respective value, the lower the geographic concentration, in other words, diversification is achieved. On the contrary, the higher its value, the higher the geographic concentration, i.e. no geographic diversification has been achieved.

The authors suggest the following scale for interpreting the values of the rate (see Table 1).

Table 1

Interpretation of GCr values

GCr value	Interpretation
0.0 – 0.2	Highly diversified geographic structure
0.2 – 0.4	Diversified geographic structure
0.4 – 0.6	Balanced geographic structure
0.6 – 0.8	Concentrated geographic structure
0.8 – 1.0	Highly concentrated geographic structure

The Interpretation of the rate provides analytical and cognitive information on the degree of dependence of a country on its foreign trade partners and on their market situation, political, social and economic environment. It is proven that a greater degree of concentration is unfavourable because it shows a greater degree of dependence and commitment with fewer foreign trade partners and their trading conditions, and vice versa. At the same time, for each country, the high stable and predictable export incomes are of particular economic importance. They can be achieved by diversifying the geographic structure. The greater degree of diversification is more favourable because it reflects into a greater independence and lack of such strong commitment. Moreover, it shows less vulnerability to external shocks and shakings, which can significantly alter the geographical distribution of foreign trade.

It is important that the analysis of a country's foreign trade relations should take into account and include their sustainability over time. *Geographic Sustainability Rate (GSr) of export/import* is introduced to measure sustainability. The coefficient shows changes in the structure over time. The mathematical record is expressed by the following formula:

$$GSr = \frac{\sum_{1}^{5} \frac{C}{m}}{5}, \tag{3}$$

where:

GSr is Geographic Sustainability rate of export/import;

C – number of times the partner country has been on the first five places of the geographic structure by different periods;

m – number of studied periods.

Its values change from 0 to 1. The lower the value, the lower the sustainability of the partner countries in export/import, in other words, the geographic structure is dynamic. On the contrary, the higher the value of the rate, the higher the geographic concentration – during a certain period the partner countries remain for a longer time. The authors suggest the following scale for interpreting the values of the rate (see Table 2).

Table 2

Interpretation of the GSr values

GSr value	Interpretation
0.0 – 0.2	Highly dynamic geographic structure
0.2 – 0.4	Dynamic geographic structure
0.4 – 0.6	Balanced geographic structure
0.6 – 0.8	Sustainable geographic structure
0.8 – 1.0	Highly sustainable geographic structure

Foreign trade theory and practice prove that a higher sustainability for a longer time is a favourable development scenario because it shows relative stability and predictability. If

the partner countries do not change significantly over the years, it can be argued that the followed foreign trade policy has a specific geographic focus. On the contrary, with a smaller degree of sustainability of the connections, substantial structural changes are observed. If such changes are made in short periods, this indicates a lack of stability and predictability of the followed policy. For these reasons, sustainability of foreign trade relations is one of the important characteristics of foreign trade to be traced.

As "an expression of the external sector of an economy, foreign trade of goods is indicative of its openness, its participation in the international division of labour, its international trade specialization and competitiveness" (Marinov, 2017). That is why, when analyzing such a topic, it is important to monitor the state and dynamics of the country's exports and imports. Precisely the geographic structure, which shows the direction of trade relations, has an important place.

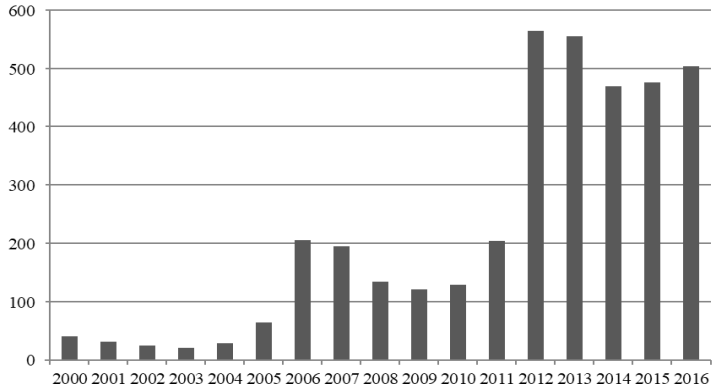
The introduced two coefficients allow to analyze the geographical distribution of foreign trade in a selected class of commodities or total for a country's entire foreign trade over a certain period or to a particular year. This is of great importance because "the development of external economic relations can be assessed by the location and structure of the main trading partners" (Panusheff, 2017). The obtained values show the degree of trade concentration in terms of geographical distribution and sustainability of foreign trade relations.

3. State and Dynamics of Exports of Ores and Concentrates

Between 2000 and 2016, ores and concentrates account for between 1 and 3% of all Bulgarian exports. Figure 1 illustrates the export in value, realized during the studied period.

Figure 1

Exports of "Ores and concentrates" during the period 2000-2016 in value (million EUR)



Source: Constructed by the authors using NSI data, 2017.

Presented data allow the tracking of the state and the dynamics of the realized export. As shown, the lowest value of exports of ores and concentrates is registered in 2003 – 21 million EUR. The highest value is reported in 2012, when exports reach nearly 560 million EUR. The values resulting from the export of these goods fall between 2000 and 2003. At the same time, in 2004-2006 a slight increase starts, followed by a more rapid rise. Between 2006 and 2007 there is a slight decline, followed by a more dynamic one in the next two years. In 2010, the trend breaks, with growth in 2011 and 2012, and the growth rate is double. In this sense, it can be argued that the relatively rapid recovery of the value of Bulgarian exports after the 2008 crisis is due, to a certain extent, to exports of ores and concentrates. Export volumes in value terms in 2013 again mark a slight decline, followed by a faster one in 2014. Data for 2015 and 2016 show a slight increase. This shows the potential opportunity for regaining the positive trends and the results achieved in 2012 and 2013. The projections are for a gradual recovery of the higher levels achieved during these two consecutive years. Thus the presented wave-like development is practically described as a cycle of six years.

In the "Ores and concentrates" class, the following items have the largest relative shares in the export structure:

- "Copper ores and concentrates" with an average share of 80%;
- "Precious-metal ores and concentrates" with an average share of 15%;
- "Lead ores and concentrates" with an average share of 2% for the period.

The export of the other representatives of the group of "Ores and concentrates" is of an occasional nature and of negligible size. This is the main reason why they will not be considered within the scope of this study.

3.1. Export of "Copper ores and concentrates"

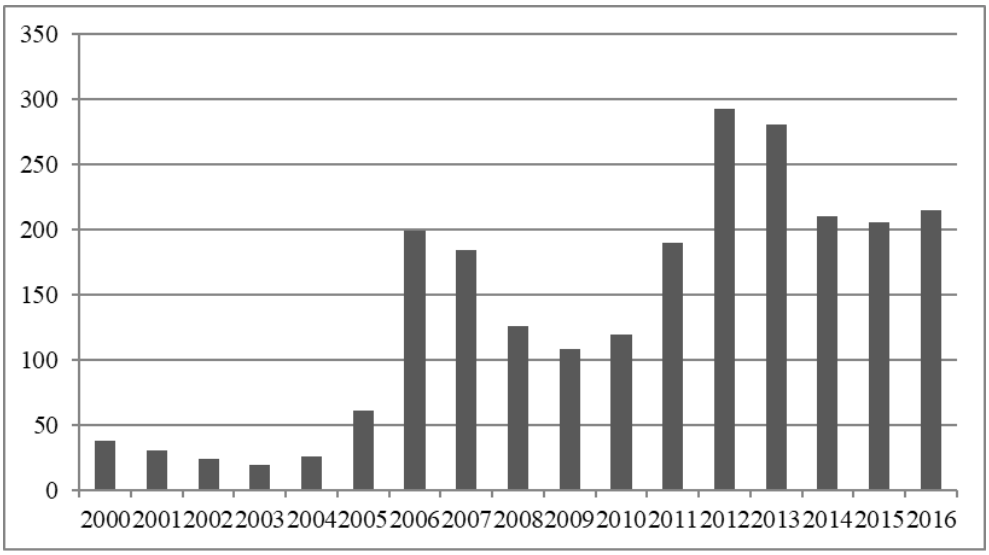
From the structure of export volumes of ores and concentrates, it is clear that during the studied period the average share of the group of copper ores and concentrates was the most significant and amounted to 80%. Although copper ores have a very low metal content (<0.5%), which determines their qualitative characteristics, they have a decisive influence on the total export of ores and concentrates over the years, given their high relative share.

Bulgaria's export of "Copper ores and concentrates" in 2000-2016 is shown graphically on Figure 2. It shows that the export values of "Copper ores and concentrates" follow the trends described for the whole class. Every six years they show cyclical fluctuations. Market demand follows the dynamics of the business cycle, which leads to dependence on the more favourable or unfavourable market situation.

When reporting exported quantities, Figure 3 shows the average annual unit price.

Figure 2

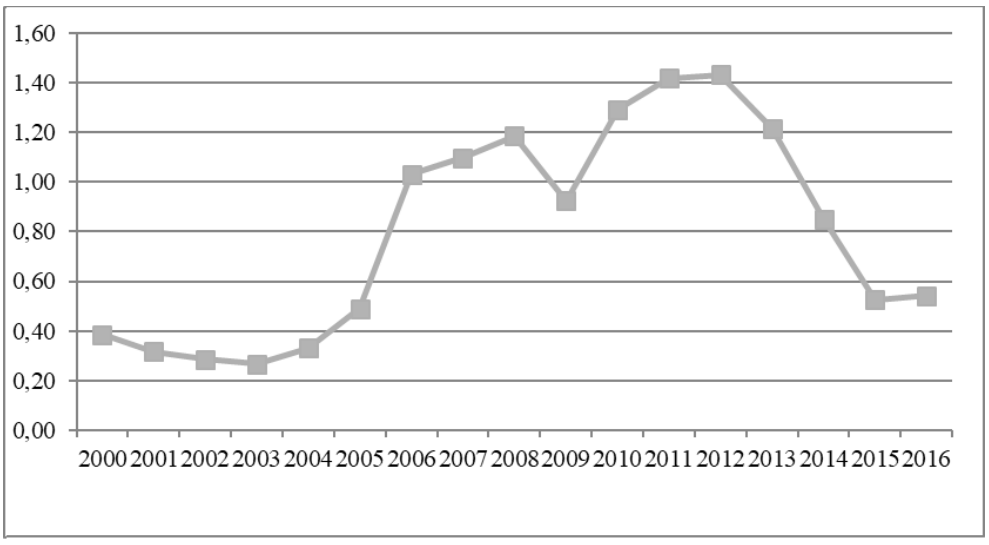
Export of "Copper ores and concentrates" in 2000-2016 (million EUR)



Source: Constructed by the authors using NSI data, 2017.

Figure 3

Average annual price of "Copper ores and concentrates" in the export of Bulgaria (EUR/kg)



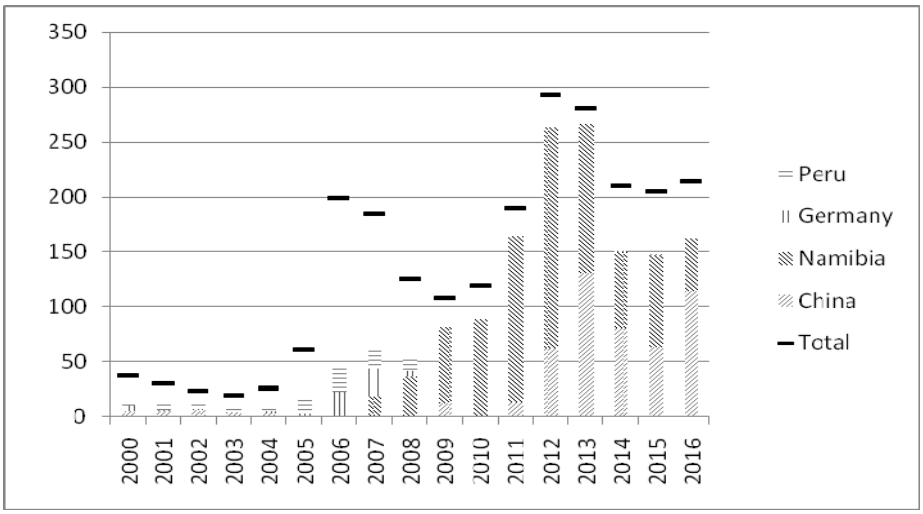
Source: Constructed by the authors using NSI data, 2017.

Data, summarized and presented on Figure 3, give grounds to distinguish four separate sub-periods over the 17-year studied period.

First, in 2000-2005 the average annual export price of "Copper ores and concentrates" is less than 1 EUR/kg. Second, the period 2006-2009 is characterized by a price close to 1 EUR/kg. Third, 2010-2013 is defined as a period with a price above 1 EUR/kg. A downward trend in unit price under 1 EUR/kg appears again in the period after 2014.

Geographical distribution of the deals also influences the dynamics of exports of ores and concentrates. For this purpose, Figure 4 presents the distribution of copper ores and concentrates by partner countries during the studied period.

Figure 4
Foreign trade partners of Bulgaria in the export of "Copper ores and concentrates" in 2000-2016



Source: Constructed by the authors using NSI data, 2017.

Over the years, the relative shares of the different countries widely vary. The analysis of data on Bulgaria's foreign trade partners in the export of copper ores and concentrates presents the distribution of deals during the period. First, the territorial focus of exports in individual years changes under the influence of certain factors and conditions. Second, it is clear that foreign trade relations with different countries are deepening or limiting, some at the expense of others.

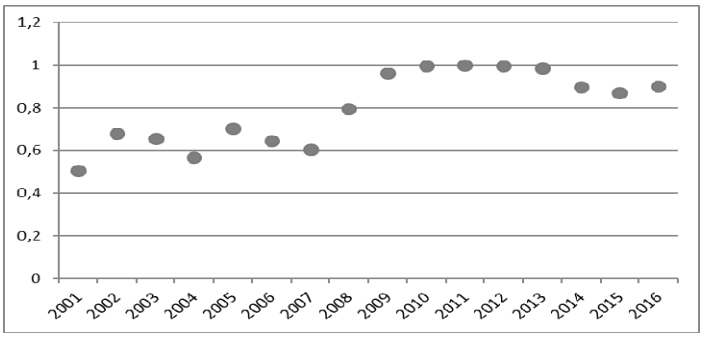
Concerning the partner countries, the export of "Copper ores and concentrates" can be distinguished into two sub-periods with a different profile. The first sub-period is from 2000 to 2008. Then the leading trading partners of Bulgaria are Peru (13%), Canada (13%) and Germany (9%). There have been occasional deals over the years with Serbia, China and Spain in regards to the implementation of specific arrangements. The second sub-period is after 2008. The data show that the geographic focus of exports of "Copper ores and concentrates" radically changes. Namibia (52%) and China (30%) become the leading trading partners. It is noteworthy that trade with Namibia represents over 50% of all exports

of the commodity group, which establishes the country as a leading export destination. In the foreign trade relations with the African state, exactly the raw materials have a dominant role (99%), "and the only product of this commodity group that Bulgaria exports to Namibia is copper ores" (Marinov, 2015). After 2014, exports to China surpass that to Namibia. In the second subperiod, there have been occasional deals with Spain, Finland and Oman, in regards to the implementation of specific company arrangements. To sum up, by 2016 there is a significant concentration of exports of "Copper ores and concentrates" in only two main geographic directions – Namibia and China, which form the predominant share of total exports.

To measure the geographic concentration, a suggested GCr coefficient is calculated, the values of which are presented on Figure 5.

Figure 5

Values of Geographic Concentration rate of exports of "Copper ores and concentrates" in 2000-2016



Source: Constructed by the authors using NSI data, 2017.

GCr shows variations in the range of 0.50 to 0.99. Average in the period it is 0.80. At the beginning of the period, the concentration is lower and the geographic structure can be defined as balanced. After 2007, processes of increasing the concentration begin and the coefficient reaches values close to 1, i.e. a highly concentrated geographic structure is formed.

The registered high concentration of the geographic structure of exports of "Copper ores and concentrates" is indicative of the dependence on a few foreign trade partners. As a result, exports are heavily dependent on the market situation of the two countries – Namibia and China, as well as on their political, economic, social and legal conditions. The risk of transferring negative influences affecting the foreign trade relations of Bulgaria in the event of shakings and internal shocks in the partner countries increases. Exports to such a small number of countries show a high degree of concentration or vulnerability and sensitivity to potential changes in the structure of foreign trade partners. This may lead to a number of shocks related to the risk of losing market positions and revenues from foreign trade.

The sustainability of exports of copper ores and concentrates is measured by the GSr coefficient. For the studied period, it is 0.5375, or there is a relatively balanced geographic structure.

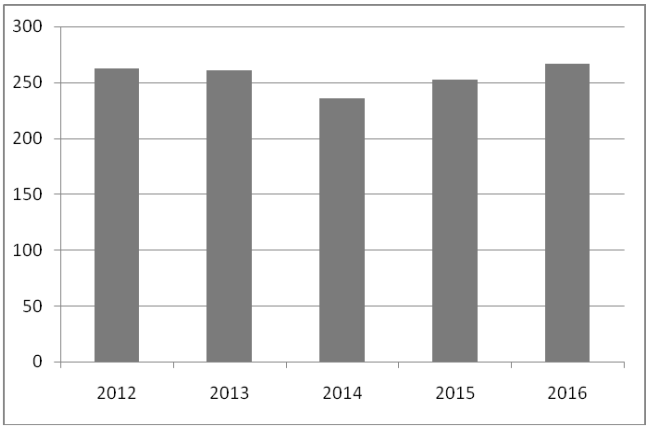
A summary of the data shows that exports of "Copper ores and concentrates" has increased in value over the period. By 2016 there is a significant concentration of the geographic structure of exports, which increases the risk of shakings and shocks, as well as loss of revenue from foreign trade activity. There is a relative sustainability and stability of foreign trade relations. Yet, the main foreign trade partners change, and some export destinations are replaced by other. This shows a certain incoherence of Bulgaria's general foreign trade policy and strategy regarding exports of copper ores and concentrates, given the change of strategic markets with other markets in short periods of time.

3.2. Export of "Precious-metal ores and concentrates"

Statistical information on the export of "Precious-metal ores and concentrates", especially in some of the studied years, falls under the confidentiality hypothesis, defined by the Law on Statistics[4] of Bulgaria. For this reason, the presented data timeline is incomplete. However, for the period after 2012 there are such data, summarized and presented graphically on Figure 6. Lack of information on the export of silver ores and their products for certain years does not allow them to be included in the analysis.

Figure 6

Exports of "Precious-metal ores and concentrates" in 2000-2016 (million EUR)



Source: Constructed by the authors using NSI data, 2017.

Data, presented on Figure 6, are indicative of the relatively constant value of deals with "Precious-metal ores and concentrates", which is around 250 million EUR annually.

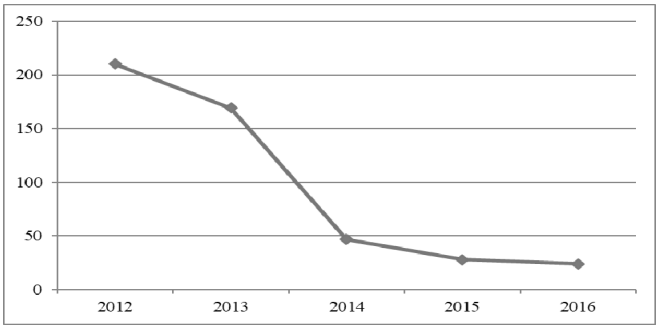
[4] Law on Statistics (to 07.10.2017), Art. 25, Par. 2 и 3, concerning the protection of the statistical secret.

The following unit prices per kilogram are obtained when reporting the quantities.

Data on exports of "Precious-metal ores and concentrates", presented on Figure 7, shows a steep decrease and subsequent keeping of unit prices to around 25 EUR/kg.

Figure 7

Annual prices of export of "Precious-metal ores and concentrates" in 2012-2016 (EUR)

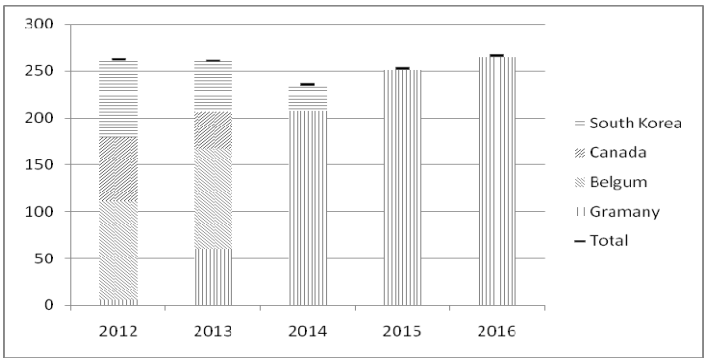


Source: Constructed by the authors using NSI data, 2017.

The partner countries' structure of exports of "Precious-metal ores and concentrates" is shown on Figure 8.

Figure 8

Exports of "Precious-metal ores and concentrates" in 2012-2016



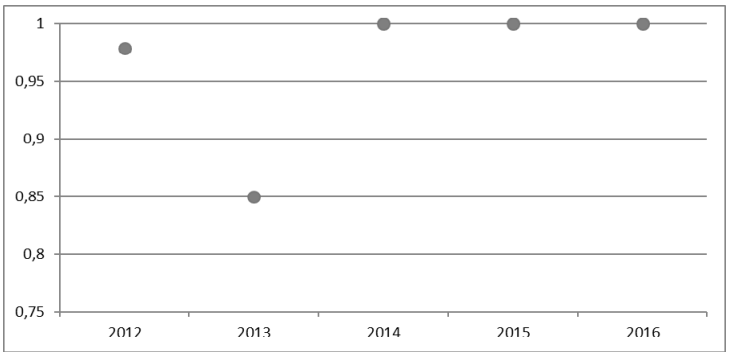
Source: Constructed by the authors using NSI data, 2017.

The generalized data testify that over the last four years the share of exports to Germany has increased to reach 100% in 2016. Over the last three years, Germany has also become a main foreign trading partner. At the same time, exports to other main export destinations – Korea, Canada and Belgium – have stopped.

Measured by GCr, the concentration of "Precious-metal ores and concentrates" turns out to be as high as possible (Figure 9).

Figure 9

Values of Geographic Concentration rate of exports of "Precious-metal ores and concentrates" in 2000-2016



Source: Constructed by the authors using own calculations.

Throughout the whole period, GCr shows high values – close to or equal to 1. On average, it is 0.97, i.e. the foreign trade structure can be defined as highly concentrated. By orienting to only one partner country (Germany), export is directly dependent on the market situation in that country.

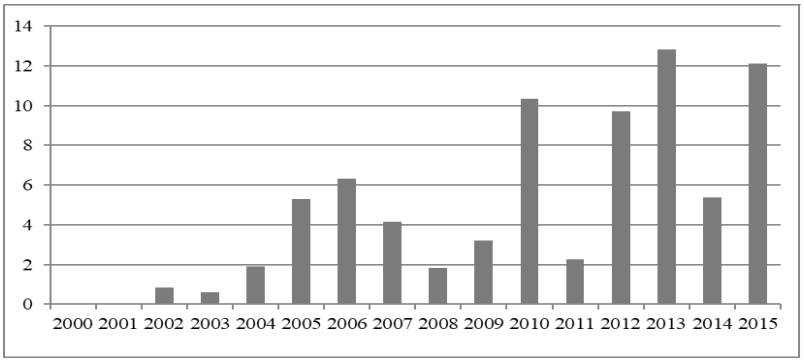
According to the obtained value of the Geographic Sustainability rate (GSr = 0.59), there is a balanced geographic structure, characterized by average sustainability and stability of the foreign trade relations and connections.

3.3. Export of "Lead ores and concentrates"

Exports of ores and concentrates include also deals with "Lead ores and concentrates", presented on Figure 10.

Figure 10

Exports of "Lead ores and concentrates" in 2000-2016 (million EUR)



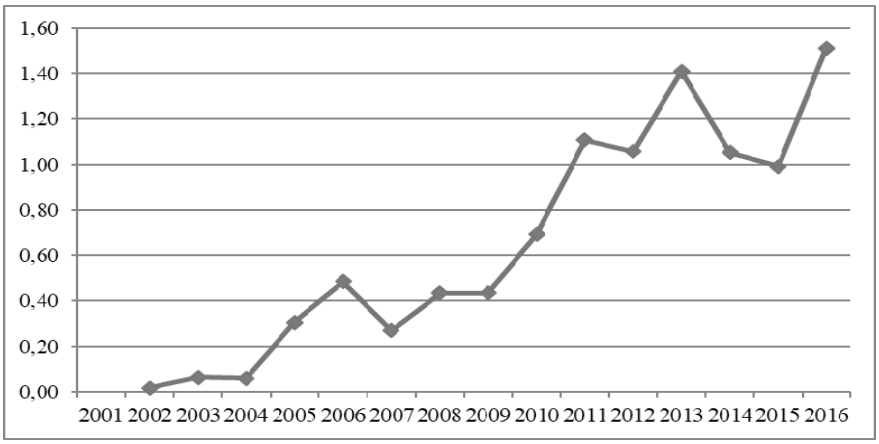
Source: Constructed by the authors using NSI data, 2017.

Obviously, until 2003 the deals with "Lead ores and concentrates" are negligibly few. In the next years, their size is marked by strong fluctuations. Deals reach their maximum of 13 million EUR in 2013.

When reporting exported quantities, the average annual unit price is obtained (Figure 11).

Figure 11

Unit prices of export of "Lead ores and their concentrate" in 2000-2016 (EUR)



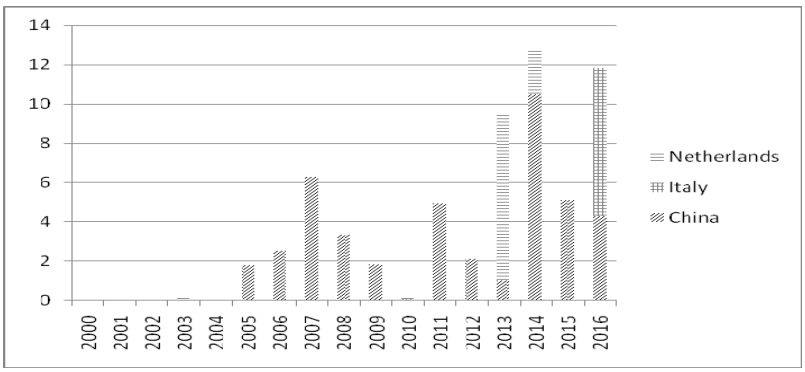
Source: Constructed by the authors using NSI data, 2017.

Concerning the unit prices, Figure 11 shows the unit export price of "Lead ores and concentrates". There is a steady tendency of increase of the unit price of individual deals over the years. Deals start at around 0.02 EUR in 2002 and reach 1.51 EUR in 2016.

Figure 12 shows the interesting tracking of their geographical distribution.

Figure 12

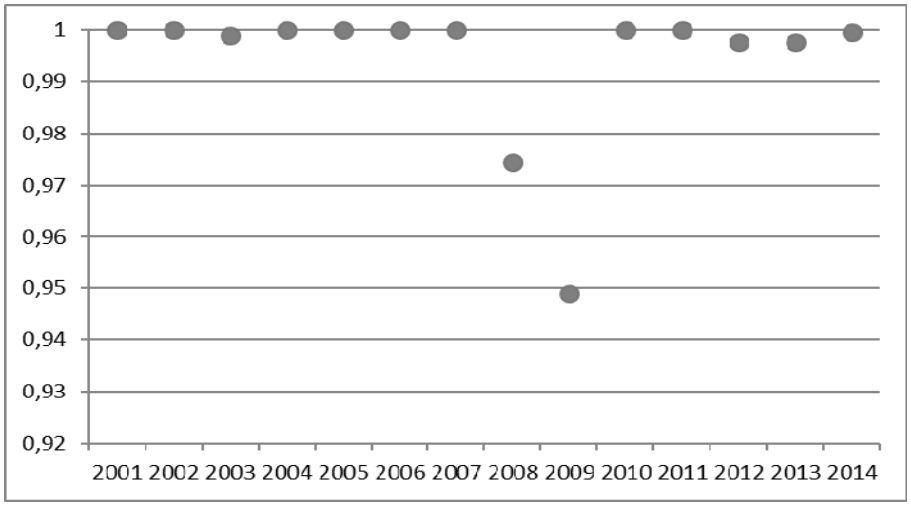
Geographical distribution of exports of "Lead ores and concentrates" in 2000-2016 (million EUR)



Source: Constructed by the authors using NSI data, 2017.

Analysis of the geographic structure of exports of lead ores and concentrates shows that China is again a main trading partner. There are single deals also with the Netherlands and Italy.

Figure 13
Values of Geographic Sustainability rate of export of "Lead ores and concentrates" in 2000-2016



Source: Constructed by the authors using own calculations.

Throughout the period, GCr shows high values – close to 1. The average value for the period is 0.99, hence the foreign trade structure can be defined as highly concentrated. Obviously, however, with the orientation to a certain partner country, the export of copper ores and concentrates is directly dependent on its market situation.

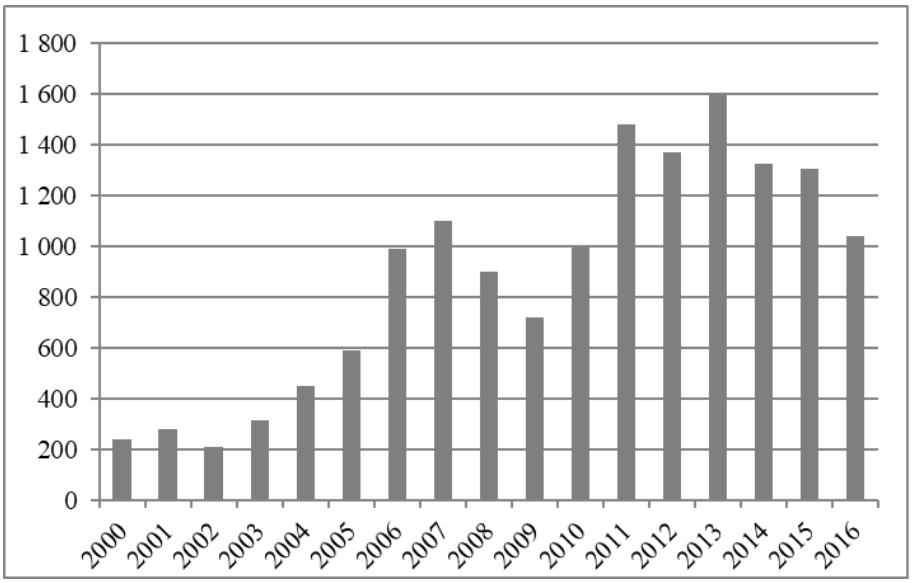
According to the obtained value of the Geographic Sustainability rate (GSr = 0.61), there is a sustainable geographical structure, characterized by stability of the foreign trade relations and connections.

In the studied period, Bulgaria exports also "Zinc ores and concentrates" and "Chrome ores and concentrates". Their values, however, are irregular and can be referred to rather occasional deals than to a trend or regular foreign trade relations, which could be traced.

4. State and Dynamics of Imports of Ores and Concentrates

In the period 2000-2016, ores and concentrates occupy between 3 and 6% of all Bulgaria's commodity imports. Figure 14 shows graphically the value of their imports.

Figure 14
Imports of "Ores and concentrates" during the period 2000-2016 in value (million EUR)



Source: Constructed by the authors using NSI data, 2017.

As Figure 14 shows, the lowest value of imports of ores and concentrates for the studied period is in 2003 – nearly 200 million EUR. The highest value is in 2013 when imports in value terms reach nearly 1.6 billion EUR. It is noteworthy that the values realized by imports of this commodity class have their peak in 2001. At the same time, in 2003-2007 a slight increase begins, followed by a more rapid one. Between 2008 and 2009, there is a significant drop. In 2010, the trend breaks, with growth in 2010 and 2011. For this reason, it can be argued that there is a relatively rapid recovery of imports of ores and concentrates in Bulgaria after the impact of the 2008 financial and economic crisis. In 2013, the import volume in value terms marks its record and in the years after that there is a consistent decrease.

In the class of ores and concentrates, the following subclasses have the largest relative shares in the imports structure:

- "Copper ores and concentrates" with an average share of 81%;
- "Zinc ores and concentrates" with an average share of 8%;
- "Lead ores and concentrates" with an average share of 7%;
- "Iron ores and concentrates" with an average share of 4% for the period.

Deals with the rest of the group of ores and concentrates are of negligible values. This is the main reason why they will not be considered in the context of this paper.

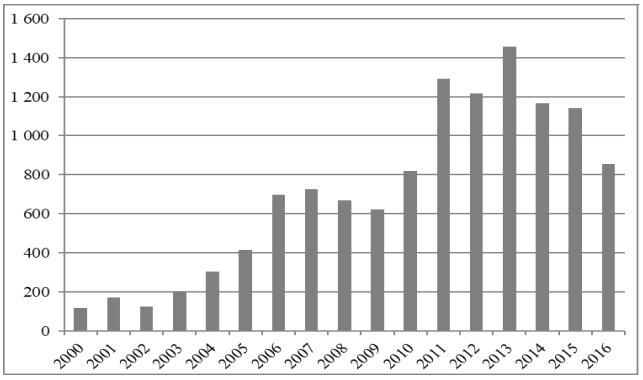
4.1. Imports of "Copper ores and concentrates"

When considering the import of ores, expressed in value, it is clear that during the period the average relative share of the group of "Copper ores and concentrates" is the most significant and amounts to 81%.

Figure 15 shows graphically the import in Bulgaria of copper ores and concentrates in 2000-2016.

Figure 15

Imports of "Copper ores and concentrates" in 2000-2016 (million EUR)



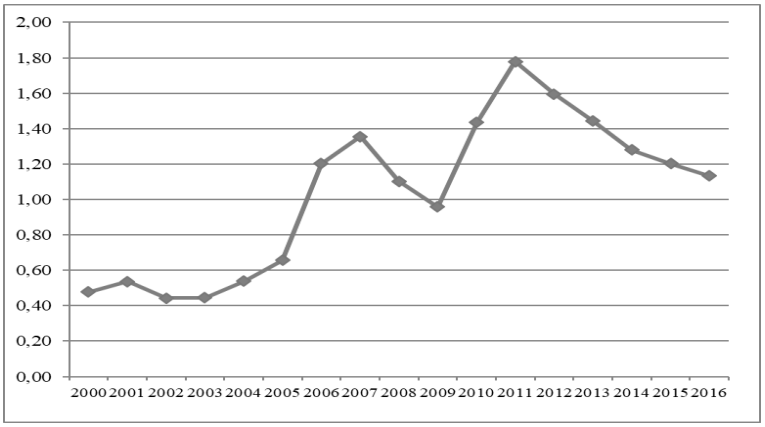
Source: Constructed by the authors using NSI data, 2017.

Figure 15 shows that the values of import of "Copper ores and concentrates" follow the trends described for the whole class.

When reporting imported quantities, the average annual unit price is obtained (Figure 16).

Figure 16

Average annual price of imports of "Copper ores and concentrate" of Bulgaria (EUR/kg)

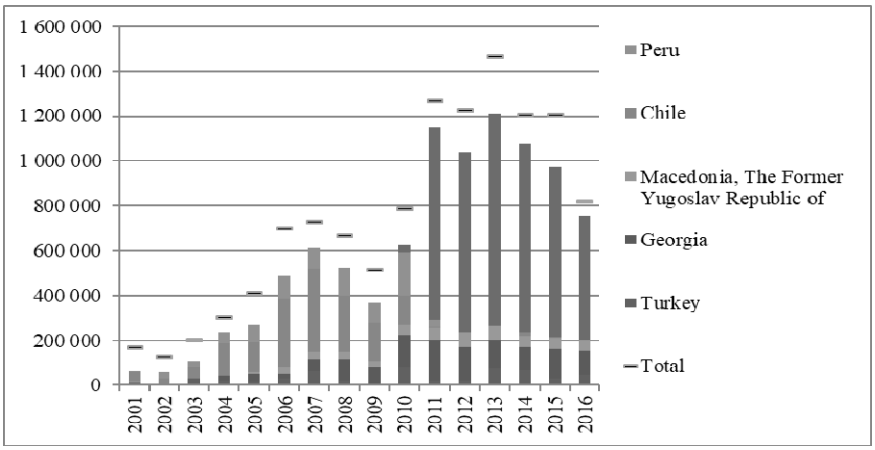


Source: Constructed by the authors using NSI data, 2017.

It is clear that in 2000-2007 the average annual import price of copper ores and concentrates has steadily increased. There is a decline in 2008 and 2009, followed by a rise in 2010 and 2011, and there is a sustained price drop towards the end of the period.

The geographical distribution of the executed deals also influences the dynamics of imports of ores. For the purposes of the analysis, Figure 17 presents the distribution of copper ores and concentrates by partner countries over the studied period.

Figure 17
Foreign trade partners of Bulgaria in the import of "Copper ores and concentrates" in 2000-2016 (thousand EUR)



Source: Constructed by the authors using NSI data, 2017.

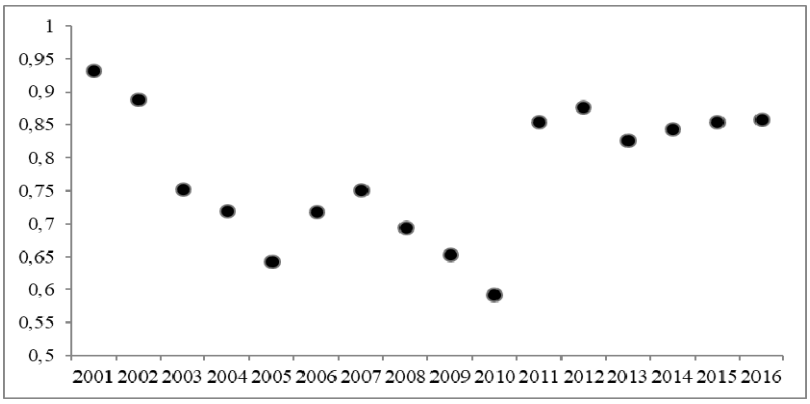
In terms of geographic distribution, at the beginning of the studied period, the main imports are from three countries – Indonesia, Chile and Peru. After 2010, this distribution changes significantly. Strategic trading partners become Spain, Georgia, Macedonia and Turkey. It is noteworthy that in 2016 Spain's share rises significantly to 67%.

Determining the degree of concentration of imports, the geographical distribution has an important significance for the objectivity of the analysis. For its determination, the Geographic Concentration rate, which values are presented on Figure 18, is calculated. During the different years, it shows variations ranging from 0.55 to 0.95.

Interpreting the values of the coefficient, those closer to 1 indicate a very high concentration of deals in the import of copper ores and concentrates and their limiting to only a few partner countries. On the contrary, values close to 0 indicate a lower concentration of deals and respectively certain degree of diversification of trade connections. It is clear that there is a higher concentration in 2001-2002 and 2011-2016. There is a relatively lower concentration in 2003-2010, with 2010 being the year with the lowest concentration in the whole period. The average value of the coefficient for the studied 17 years is 0.78, indicating a significant concentration in the distribution of deals and a highly concentrated geographic structure.

Figure 18

Values of Geographic Concentration rate of exports of "Copper ores and concentrates" in 2000-2016



Source: Constructed by the authors using NSI data, 2017.

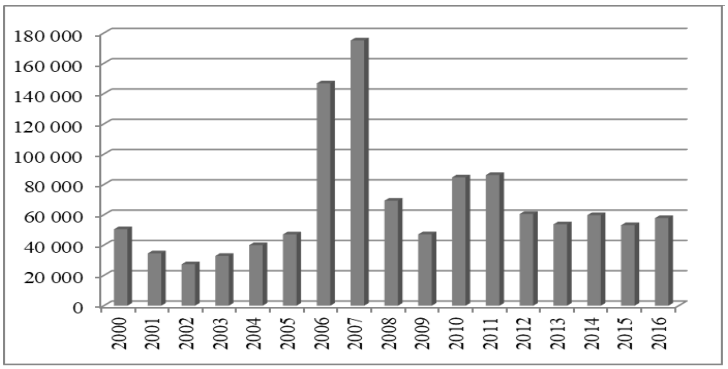
On the other hand, the specific Geographic Sustainability rate is calculated to characterize the sustainability of trade relations and to track changes in the structure of partner countries. For the period 2000-2016, its value is 0.63, indicating relative stability and sustainability of the geographic structure.

4.2. Import of "Zinc ores and concentrates"

Zinc ores and concentrates form an average of 8% of imports of ores and concentrates in Bulgaria. The import to Bulgaria of zinc ores and concentrates in value during the period 2000-2016 is presented graphically on Figure 19.

Figure 19

Imports of "Zinc ores and concentrates" in 2000-2016 (million EUR)



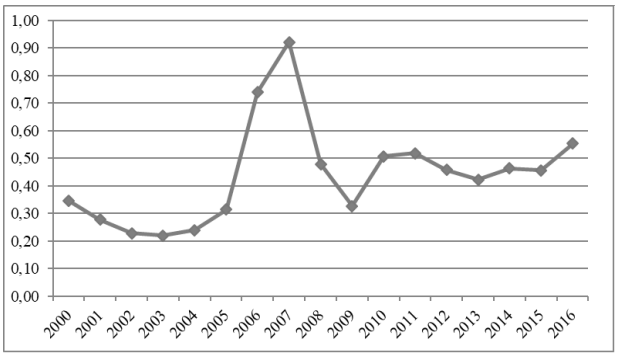
Source: Constructed by the authors using NSI data, 2017.

Generally, the import of zinc ores and concentrates follows the typical cyclicality of deals for the whole class of ores. In the different years, deals range around 20-80 million EUR. 2006 and 2007 are exceptions with their extreme values, reaching up to 140-180 million EUR.

Taking into account the imported quantities, the average annual unit price can be obtained (Figure 20).

Figure 20

Average annual price of import of "Zinc ores" in Bulgaria (EUR/kg)



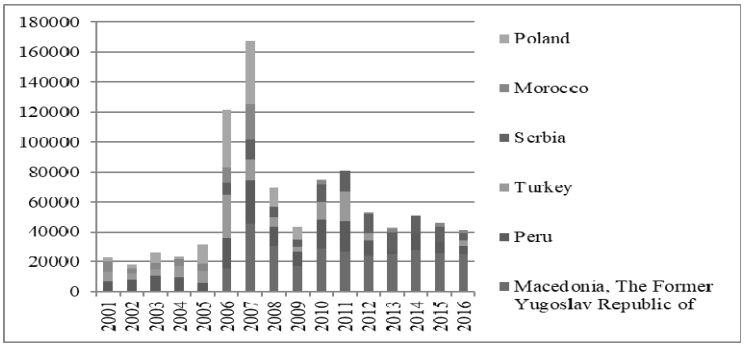
Source: Constructed by the authors using NSI data, 2017.

Figure 20 shows that the price per kilogram of imports of zinc ores ranges from 0.2 to 0.6 EUR. Only 2006 and 2007 are exceptions with prices of 0.9 EUR.

Geographical distribution of the deals also influences the dynamics of imports of ores and concentrates. That is why Figure 21 presents the distribution of zinc ores and concentrates by partner countries during the studied period.

Figure 21

Foreign trade partners of Bulgaria in the import of "Zinc ores and concentrates" in 2000-2016 (thousand EUR)



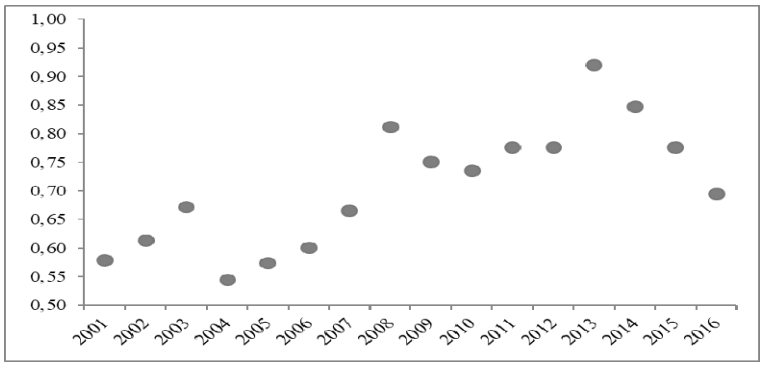
Source: Constructed by the authors using NSI data, 2017.

At the beginning of the studied period, main imports are from Peru, Turkey and Morocco, which are main trading partners. After 2006, there are imports also from Macedonia. As a result, geographical distribution changes, with the main trading partners at the end of the period being Macedonia, Bosnia and Herzegovina, and Peru, which has been a strategic partner since 2000. The significant relative share of Macedonia, which accounts for just over half of all imports, is noticeable.

The calculation of the Geographic Concentration rate of imports of zinc ores and concentrates is presented on Figure 22.

Figure 22

Values of Geographic Concentration rate of imports of "Zinc ores and concentrates"



Source: Authors' calculations.

As Figure 22 shows, there is a variation of the values of GCr in the range of 0.55 to 0.92 in the different years. Average for the period the rate is 0.71. This value indicates a relatively higher concentration and smaller diversification, expressed in higher dependence on a few trading partners, which increases a number of risks and worsens the prospects of the foreign trade relations.

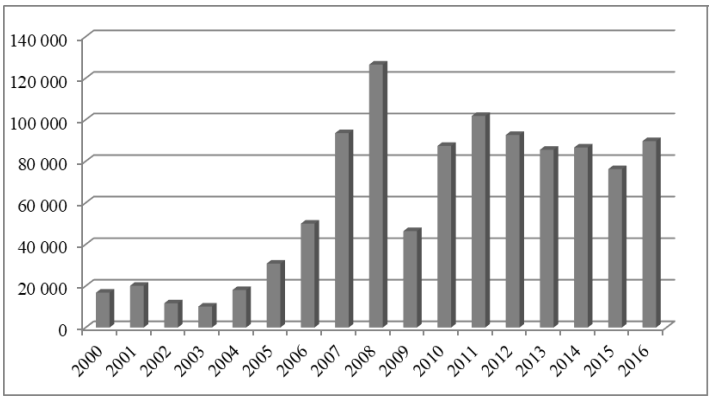
According to the obtained value of the Geographic Sustainability rate (GSr = 0.70), there is a relatively sustainable geographic structure, characterized by stability of the foreign trade connections.

4.3. Import of "Lead ores and concentrates"

Imports of "Lead ores and concentrates" represent about 7% on average of total imports of ores and concentrates in Bulgaria. Imports for the period 2000-2016 in volume terms are shown graphically on Figure 23.

Figure 23

Import of "Lead ores and concentrates" in 2000-2016 (thousand EUR)



Source: Constructed by the authors using NSI data, 2017.

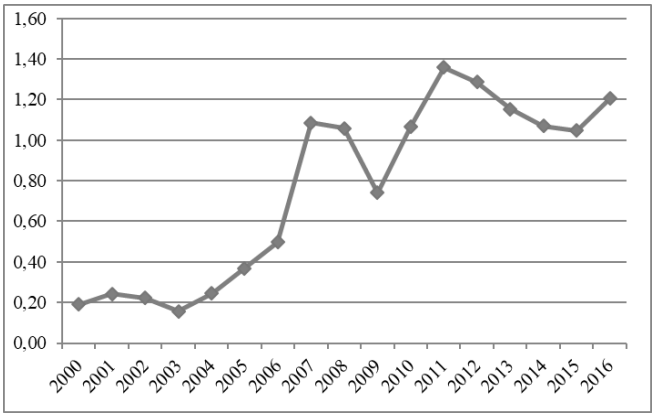
As Figure 23 shows, the lowest value of imports of "Lead ores and concentrates" in the studied period is in 2003 – nearly 10 million EUR. The highest value is in 2008, when imports in value amount to nearly 130 million EUR. It is noteworthy that the values, realized by imports of this commodity class, have their peak in 2001. At the same time, in 2003-2007 there is a slight increase, followed by a more rapid one. Between 2008 and 2009, there is a significant drop. In 2010, the trend breaks, with growth in 2010 and 2011.

Referring to these data, we can argue that there is a relatively rapid recovery in the value of imports of ores and concentrates in Bulgaria after the 2008 crisis. The volume of imports in value terms is record high in 2013, and consistently declining in the years after that.

When reporting imported quantities, the average annual unit price is obtained (Figure 24).

Figure 24

Average annual price of lead ores and concentrates of import of Bulgaria (EUR/kg)



Source: Constructed by the authors using NSI data, 2017.

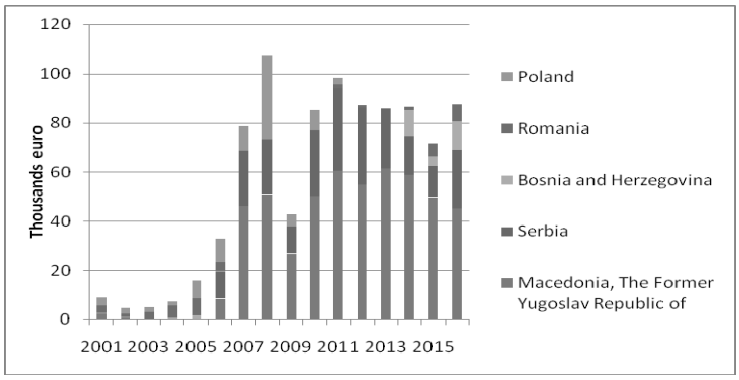
Figure 24 shows that the unit import price of lead ores and concentrates has a steady upward trend, with small fluctuations over the years.

The geographical distribution of the deals also has a significant impact on the state and dynamics of imports of lead ores and concentrates.

Figure 25 presents the distribution of deals with lead ores and concentrates by partner countries over the studied period. At the beginning of the period, main trading partners are Greece, Poland, Romania. Gradually they change and at the end of the period, such are Macedonia, Serbia, Bosnia and Herzegovina.

Figure 25

Foreign trade partners of Bulgaria in the import of "Lead ores and concentrates" in 2000-2016 (thousand EUR)

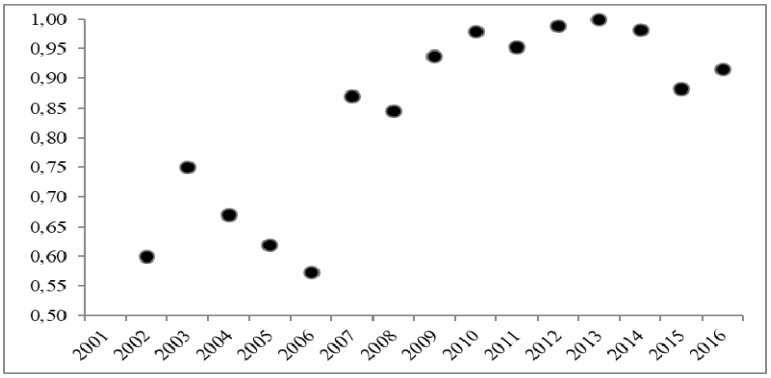


Source: Constructed by the authors using NSI data, 2017.

For determining the concentration of the import of "Lead ores and concentrates", Geographic Concentration rate is calculated, presented on Figure 26.

Figure 26

Values of Geographic Concentration rate of import of "Lead ores and concentrates"



Source: Constructed by the authors using NSI data, 2017.

It is evident that in the different years the rate ranges from 0.55 to 1. Average in the period it is 0.82, which shows a quite high level of concentration. In 2009-2016, the values are significantly higher, and in the period 2002-2006, they are lower.

According to the obtained value of the Geographic Sustainability rate (GSr = 0.71), there is a sustainable geographic structure, characterized by stability of the foreign trade connections.

4.4. Import of "Iron ores and concentrates"

Imports of "Iron ores and concentrates" represent about 4% on average of the total imports of ores and concentrates in Bulgaria. Imports during the period 2000-2016 are shown graphically on Figure 27.

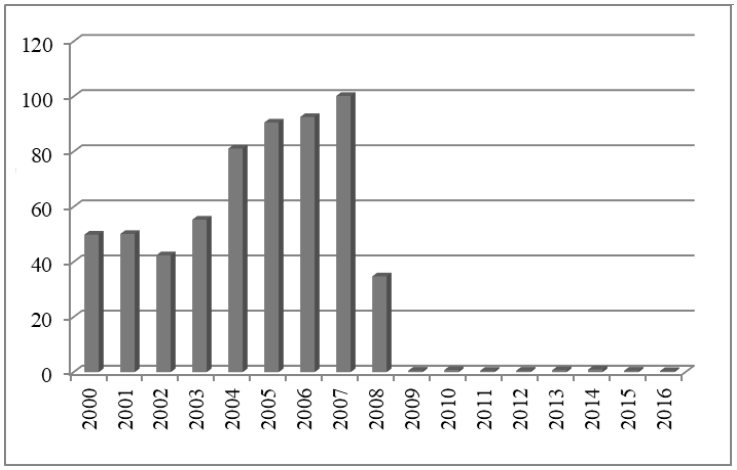
It is noteworthy that the import of iron ores and concentrates has practically faded after 2008. By time, it coincided with the closure of the largest metallurgical plant in Bulgaria, which in recent years has operated mainly with imported iron rods. At the same time, the highest value is recorded in 2007, when imports in value terms reach almost 100 million EUR. Since 2009, the values are minimal.

When reporting imported quantities, the average annual unit price is obtained (Figure 28).

The cost per kilogram of imported iron ores and concentrates shows a steady upward trend. Due to the episodic nature of the deals after 2008, it is not possible to analyze the unit price for this period.

Figure 27

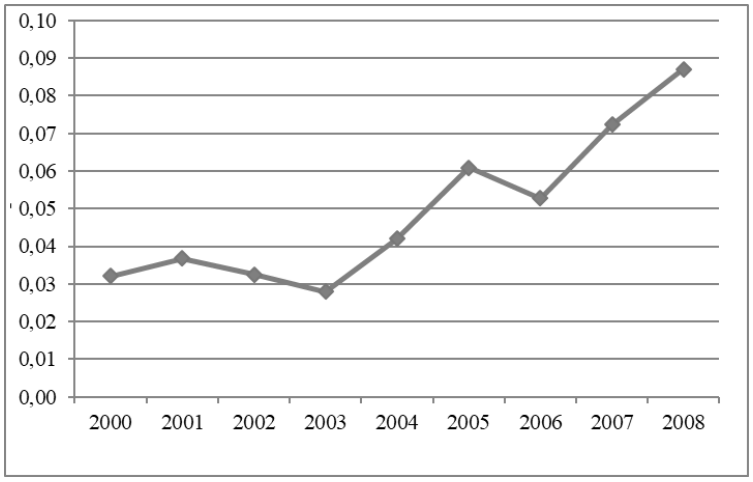
Imports of "Iron ores and concentrates" in 2000-2016 (million EUR)



Source: Constructed by the authors using NSI data, 2017.

Figure 28

Average annual price of iron ores in the import of Bulgaria (EUR/kg)



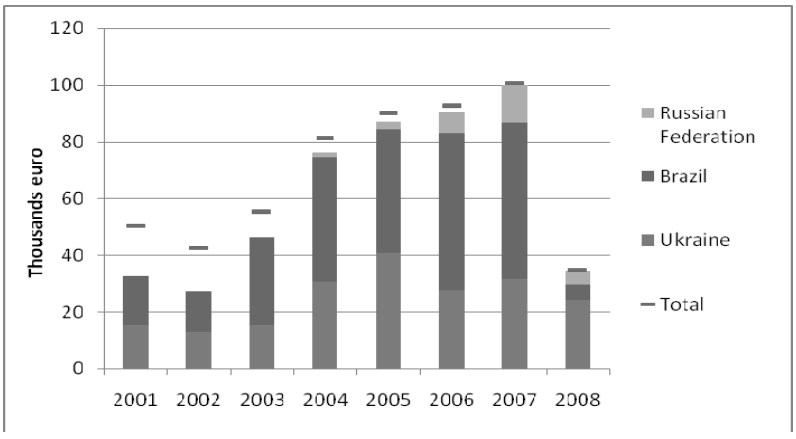
Source: Constructed by the authors using NSI data, 2017.

The geographical distribution of the deals has also a significant impact on the dynamics of imports of iron ores and concentrates.

Figure 29 presents the distribution of deals with iron ores and concentrates by partner countries during the studied period. The data show that Brazil and Ukraine are the main trading partners. After 2004, there are deals with the Russian Federation.

Figure 29

Foreign trade partners of Bulgaria in the import of "Iron ores and concentrates" in 2000-2009 (thousand EUR)

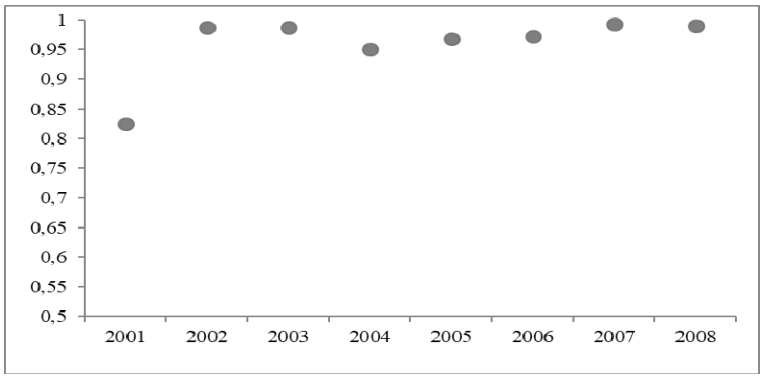


Source: Constructed by the authors using NSI data, 2017.

The Geographic Concentration rate is calculated for determining the concentration in the import of "Iron ores and concentrates" (Figure 30). It shows variations ranging from 0.55 to 0.95 in the different years. These values are very high and indicate a high level of concentration and low degree of diversification.

Figure 30

Values of Geographic Concentration rate of imports of "Iron ores and concentrates"



Source: Authors' calculations.

It is clear that the values of the rate for each year are close to 1, with the exception of 2001. This shows a very high concentration of deals in the import of "Iron ores and concentrates", the list of foreign trade partners being limited to very few countries. Its average value for the entire period is very high (0.96), indicating persistently high concentration.

On the other hand, the degree of sustainability in partner countries is estimated by the specific Geographic Sustainability rate, with a value for the period of 0.88, i.e. a strongly sustainable geographic structure is formed.

Conclusion

The two new proposed rates – *Geographic Concentration rate* and *Geographic Sustainability rate of exports/imports* – allow the geographic structure to be determined and its leading characteristics to be specified. The rates have an analytical and cognitive value and are applicable both to a particular commodity class and to a certain country's foreign trade. They provide adequate results that can be used for foreign trade and economic analyses to track the geographic direction of deals and relations.

The obtained values of the rates of the export of "Ores and concentrates" suggest that during the period 2000-2016, there is a highly concentrated (copper and lead ores and concentrates) and concentrated geographic structure (precious-metal ores and concentrates). This shows serious dependence on a few partner countries, increasing risks and limiting export prospects. At the same time, on the average, there are rather balanced or sustainable

geographic structures for the period, which indicates a lack of serious dynamics in the foreign trade partnerships of Bulgaria.

The values obtained in the import of ores give grounds to assert that in the same period there is a very high concentration with significant sustainability to the geographic structure. Similar to exports, there is a serious dependence on few partner countries, indicating a rather unfavourable foreign trade situation. There is also no serious change regarding the foreign trade partners of Bulgaria.

In comparison, the average concentration and sustainability of the geographic structure is higher for imports than exports. In this sense, one of the main directions for future development of the country's foreign trade with ores should be in limiting the concentration in the geographic direction of the deals and achieving greater diversification.

In the conditions of global and regional trends and prospects, the importance of the mining industry has continued to strengthen over the last 16 years. Today's global economic development imposes an ever more pressing need to use more, diverse and higher quality raw materials and energy. Globalization, internationalization and economic integration do not allow us to stay away from dynamic and complex processes. In the context of increasing foreign trade and the significant openness of the national economy to a globalizing global economy, it is necessary to maintain and expand foreign trade relations. Active participation in international trade is one of the real opportunities for rapid development of strategic sectors, especially export-oriented ones. As a component of GDP, exports contribute to economic growth. In this sense, export-oriented development is one of the opportunities for increased economic progress.

The mining industry also contributes to the country's total exports. The output of mining enterprises is largely made for highly competitive international markets where it finds a good realization. That is why the expansion of exports of ores and concentrates is an alternative path for development in the context of a severe decline in commodity prices in the last four years. According to World Bank forecasts, their demand and consumption are expected to shrink both nationally and globally, along with a worsening international market situation. Based on this statement, the export of concentrates is a real opportunity to earn extra revenues and realize economic benefits. On the other hand, this is a possible direction of the business development of companies and investors in the industry. The full use of the potential of foreign markets, in the context of increased raw materials needs, is a way to boost them and achieve even better financial and economic results at a micro level. Also, the priority development of the sector would help to increase the economic well-being of certain regions and boost the associated industries and therefore the overall economic development.

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Annex 1

List of positions from Section 26 – "Ores, slag and ash" of the combined nomenclature

26	CHAPTER 26 – ORES, SLAG AND ASH
2601	Iron ores and concentrates
2603	Copper ores and concentrates
2604	Nickel ores and concentrates
2605	Cobalt ores and concentrates
2606	Aluminium ores and concentrates
2607	Lead ores and concentrates
2608	Zinc ores and concentrates
2609	Tin ores and concentrates
2610	Chromium ores and concentrates
2611	Tungsten ores and concentrates
2612	Uranium or thorium ores and concentrates
2613	Molybdenum ores and concentrates
2614	Titanium ores and concentrates
2615	Niobium, tantalum, vanadium or zirconium ores and concentrates
2616	Precious-metal ores and concentrates
2617	Other ores and concentrates