



THE IMPACT OF THE RUSSIAN-UKRAINIAN CRISIS ON EUROPEAN SUPPLY OF PRECIOUS METALS

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Summary

The paper deals with the issue of the last global crisis caused by the Russian aggression against Ukraine and the disruptions it caused on the precious metals market. A global imbalance was caused accompanied by significant disruptions in the supply chains and inflation. Additionally, the consequences of such an event will be felt for many years even after the end of the war. Considering the fact that production of Russia and its export are crucial for the supply of the European market, special emphasizes has been placed on Europe. Through the work, a detailed analysis of the previous import of precious metals into the selected European countries was made, fluctuations in the prices of precious metals were analysed, as well as the reasons for price fluctuations. Also, projections of compensation plans for Russian imports, as the main distributor so far, are presented, along with projections of further price movements. The aforementioned war pointed to a series of failures in the organization and structure of business in European countries, which were forced to restructure after many years of inertia and inactivity. This is the crucial strategic way if they want to survive the crisis caused by the war. Certainly, in the most ungrateful position are the countries whose most important industries are largely dependent on the import of precious metals. Nevertheless, the

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projections are positive, and it is estimated that Europe should get out of the crisis in the short term with proper investments and carefully planned strategies.

Keywords: *Russian-Ukrainian war; Europe; precious metals market; supply; import.*

1. INTRODUCTION

Russia is an economic superpower and an extremely influential country with significant natural resources. It was these natural resources that enabled Russia to acquire enormous wealth through intensive production and export and become an important player in the global market. According to the latest data from the International Monetary Fund, Russia's GDP was 2.13 billion US dollars in 2022 (International Monetary Fund, 2023). Thus, Russia took the 11th place in the ranking of the strongest economies in the world, which is an important indicator that it really is an extremely powerful country. Focusing on precious metals, Russia is the world's largest miner of palladium (about 40% of total world production), is in second place in terms of platinum production, and is at the very top in terms of gold and silver production (U.S. Geological Survey, 2022). How important Russia is for the precious metals market is shown, for example, by the fact that out of the ten most successful companies in the world in terms of gold production, three are located in Russia (Bouckley, 2021.) Although they are already within the target according to the current annual amount of production, they are actively working on an additional increase in the production of platinum metals. It is assumed that they will become the world's leading manufacturer if they significantly improve their technology. Multimillion-dollar investments are fully justified, since the returns would be multiple, the infrastructure would meet the highest world standards, the regional economic growth of Russian deposits would be ensured, and Russia would consolidate its leading position by operating without significant competitors.

This is precisely why the Russian invasion of Ukraine caused unexpected and significant changes both on the global and European markets. An additional aggravating circumstance of Europe is its geographical proximity to Russia and Ukraine, its dependence on Russian precious metals, and on the other hand, its membership in NATO, which calls for peace and unity among its members and therefore a severe condemnation of aggressive actions. In response to the war, almost all European countries were forced to impose an embargo on the import of all Russian energy products, including precious metals, in order to show empathy for the affected Ukrainian people. From the very beginning of the invasion, the European precious metals market felt numerous shocks in the procurement processes, since the high prices of precious metals and the resulting

volatility led to the halt of production in many European industries. Disruptions in procurement and, consequently, production processes were inevitable, and will continue until Europe finds new supply routes or implement some of the other possible exit strategies. This is a crucial step since access to resources and stable trade are crucial for the sustainability and further development of the European economy.

The goals of this paper are: (i) to present and analyse Russia's role in supplying Europe with precious metals so far, (ii) to analyse the trade of precious metals between Russia and selected European countries in the last 10 years in order to show the Russian dominance on the precious metals market in more detail, (iii) to show numerically and analyse the problems that arose on the market due to the start of the war, (iv) to emphasize the dependence of certain industries on Russian production, (v) to analyse the impact of aggression on their business, and (vi) to research plans and strategies that would stabilize and strengthen the European precious metals market. According to the objectives, the work is divided into six parts. After the introduction, there is an analysis of the Russian supply of precious metals to Europe and the changes in the market due to the events of the war. This is followed by a forecast of the state of the precious metals market and proposals for solutions in order to reduce dependence on Russian resources. The paper ends with concluding remarks.

2. THE IMPORTANCE OF RUSSIA IN SUPPLYING EUROPE WITH PRECIOUS METALS

Table 1 shows the countries that imported the most precious metals from Russia. Therefore, we are talking about the countries that were most affected by the war situation. In the observed period, the Russians traded to the greatest extent with Germany, Italy, the United Kingdom, and Switzerland. These are Europe's strongest economies and global industrial leaders. Gold is the dominant import item for all the mentioned countries, except for Italy, followed by platinum, palladium and silver.

Table 1. Import of precious metals from Russia to Europe in the last 10 years (\$)

Country	Year	Palladium	Platinum	Gold	Silver
Czech Republic	2012 - 2016	-	19.752.169	-	530.795
	2017 - 2021	10.776	98.571.069	-	12.765.212
Total:		10.776	118.323.238	0	13.296.007
Germany	2012 - 2016	957.072	1.018.179.643	143.569	24.099

Country	Year	Palladium	Platinum	Gold	Silver
	2017 - 2021	3.427.130	3.357.395.392	321.308.066	47.334
Total:		4.384.202	4.375.575.035	321.451.635	71.433
Italy	2012 - 2016	405.193	649.122.652	-	3.212.639
	2017 - 2021	2.043.906	2.571.013.898	-	1.062.625
Total:		2.449.099	3.220.136.850	0	4.275.264
Latvia	2012 - 2016	-	1.031.777	-	130.267
	2017 - 2021	-	864.822	-	85.584
Total:		0	1.896.599	0	215.851
Poland	2012 - 2016	-	10.487	-	-
	2017 - 2021	-	4.052.977	498.447	31.223
Total:		0	4.063.464	498.447	31.223
United Kingdom	2012 - 2016	1.367.736	832.336.283	3.659.876.549	823.821.459
	2017 - 2021	579.192	5.528.997.975	39.184.905.070	630.312.270
Total:		1.946.928	6.361.334.258	42.844.781.619	1.454.133.729
Switzerland	2012 - 2016	541.723	607.654.257	8.828.929.028	648.385.869
	2017 - 2021	227.796	823.693.266	1.856.482.586	159.608.894
Total:		782.114	1.431.347.523	10.685.411.614	806.994.763

Source: Compiled by the authors according to the World Bank and Trading Economics database

In the Czech import of precious metals, platinum dominates, and more intensive cooperation regarding all precious metals (except gold) occurred in 2017. However, the pandemic caused a decrease in demand, especially for platinum. The import of gold from Russia to the Czech Republic is zero because the Czechs mostly import gold from Germany and Slovakia, which in this case will have an indirectly negative effect on the Czech economy, given that Russia supplies Germany. On the basis of the above, it can be clearly concluded that these are extremely long, mutually dependent supply chains that have been affected by the Ukrainian-Russian war.

Since the largest European car industry is located in Germany, it is not surprising that for the last 10 years, Germany and Russia have been actively trading precious metals. Palladium is an indispensable raw material for automobile production, so Germany imported an average of about 200 thousand dollars of palladium until 2018, and then increased the demand by more than 200%. The import of Russian platinum is even more important. However, trade relations are suffering precisely because of the political disagreements that arose after Russia decided to occupy Crimea and Germany to provide full support to Ukraine.

The progressive growth of palladium trade between Italy and Russia indicates the increasing need of Italian industries for Russian palladium. Statistically speaking, a growth of 367% was recorded comparing 2015 and 2021. Furthermore, Italy is the eighth largest importer of platinum in the world which indicates the great needs that the Russians, along with the USA, China, Switzerland, and Germany, satisfy. Even though it looks as if the Russian gold did not find its way to Italy from the presented table, actually this is not completely true. Although there really is no direct gold trade between Russia and Italy, the Italians imported Russian gold in enormous quantities, but through Switzerland, which is Italy's second largest supplier, after the United Arab Emirates, and the situation is the same when it comes to importing silver (OEC, 2020).

As far as Latvia is concerned, a smaller quantity of platinum and silver imports is visible for the purpose of investment and further trading in them. The situation is similar with Poland as far as the intensity of cooperation is concerned. However, the reasons are the absence of the need for direct imports since sufficient quantities are imported from neighbouring European countries (primarily Germany). Also, Poland is the country with the largest European silver reserves so there is no need for imports (Polish Geological Institute, 2016).

As for the United Kingdom, along with Switzerland, it is the country most dependent on Russian production and export of precious metals, considering that extremely large quantities of platinum and gold are imported from Russia every year. To be more precise, 90% of the total Russian gold production was imported in UK in 2020. It can be seen that palladium and silver are also actively traded, but the two key precious metals for maintaining the power and stability of the British economy are still platinum and gold. Namely, gold is the key factor that enabled the British economy to rise from every crisis and maintain the value of its currency. In the United Kingdom, more precisely in the Bank of England, there are the largest amounts of gold in Europe and beyond, and the only major world reserve is in New York (Bank of England, 2020). Therefore, it is not surprising that the import of gold from Russia is increasing every year. One of the reasons for the massive purchase of gold is the need for financial insurance in connection with leaving the EU.

Last, but not least, is Switzerland, which also dominates in the import of Russian precious metals. While other countries imported precious metals for the needs of industry, Switzerland, just like the United Kingdom, imported Russian precious metals for the purpose of strengthening the state's wealth and its own economy. The aforementioned is not surprising considering that it is an extremely rich nation and one of the leading European countries. The Swiss, buying Russian gold and reselling it to other countries in Swiss francs, strengthened their currency and maintained their own prosperity. For a decade now, they have held the first place in the ranking of world suppliers of gold, exporting an average of 60 billion US dollars per year. In addition, Switzerland is a home to the largest gold refining centres (Mariani, 2012). Although Switzerland did not approve of Russia's occupation of Crimea, it did not want to interfere in international relations and disrupt close cooperation with Russia. However, the cooling of trade relations is inevitable, and additionally intensified by the current war.

3. CHANGES IN THE EUROPEAN MARKET OF PRECIOUS METALS DUE TO THE RUSSIAN INVASION OF UKRAINE

The outbreak of war on the Russian market and the imposed sanctions significantly tightened the available quantities and caused disruptions in prices. Many factors are involved in the formation of prices of precious metals. Direct factors are industrial demand, the interest of private investors, the geopolitical situation in the world, the economy and political situation of the world's leading countries, of which it is important to point out Germany, Switzerland, Russia, and China. Indirect factors include the price of oil, the price of precious metals on other world markets, the value of the US dollar and stock indices of the world financial markets (Zhavoronkova et al., 2021). In order to show how important indirect effects are in the formation of prices, it is worth emphasizing that, for example, the change in oil prices in 80% of cases in the last 50 years caused a change in gold prices, that is, studies have shown that in 80% of cases when the price of oil rose, the price of gold was falling (Huang & Wu, 2021).

Furthermore, in their research, Pestova et al. (2022) claim that the economic sanctions imposed in the US, Europe and elsewhere suggest that Russia's economy will contract significantly and that this may be the greatest hit to the global economy since the Global Financial Crisis (GFC) of 2008, and it may exceed the impact of COVID-19 pandemic given the prominent exporter status of the two countries.

Table 2. Descriptive statistics of precious metals

	GFC			COVID-19			WAR		
	Mean	Range	SD	Mean	Range	SD	Mean	Range	SD
Gold	2.481	2.670	0.828	1.289	1.969	0.527	1.142	1.130	0.228
Silver	4.535	7.363	1.968	2.220	3.958	1.039	1.766	1.313	0.290
Platinum	3.507	5.102	1.280	2.389	4.210	1.151	2.080	2.780	0.539
Palladium	3.893	6.011	1.655	3.607	7.843	1.872	3.723	5.330	1.169

Source: Izzeldin et al. (2023)

Table 2 presents the key descriptive statistics for the conditional volatility of selected commodities – precious metals – during the three dominant crisis periods expressed in annual percentages. This research was conducted by Izzeldin et al. (2023). Based on the same, gold showed the lowest average conditional volatility during the period of the GFC and the Russo-Ukrainian war. These observations show that gold has shown considerable resilience and perceived stability during economic and geopolitical turbulence. As a result, investors and market participants often regard gold as a relatively secure asset that can serve as a potential hedge against volatility and uncertainty. The comparatively lower average conditional volatility of gold during the Global Financial Crisis (GFC) and the Russia-Ukraine war further underscores its perceived value as a safe-haven investment during periods of adversity.

Table 3. Synchronization, duration, and intensity measures – precious metals

		Gold	Silver	Platinum	Palladium	Median
Panel A. GFC	<i>Sync (days)</i>	3	2	-3	3	2.50
	<i>Duration (days)</i>	16	4	10	4	7.00
	<i>Duration (%)</i>	23.88	5.33	13.33	5.41	9.37
	<i>Intensity</i>	29.31	10.29	17.74	23.36	23.53
Panel B. COVID-19	<i>Sync (days)</i>	2	5	-1	5	3.50
	<i>Duration (days)</i>	6	5	3	8	5.50
	<i>Duration (%)</i>	8.00	6.76	4.00	10.67	7.38
	<i>Intensity</i>	25.69	23.36	10.79	53.32	24.53

		Gold	Silver	Platinum	Palladium	Median
Panel C. WAR	<i>Sync (days)</i>	-5	-5	-4	-5	-5.00
	<i>Duration (days)</i>	4	11	5	13	8.00
	<i>Duration (%)</i>	5.80	15.49	7.04	18.57	11.27
	<i>Intensity</i>	13.08	17.07	25.25	19.64	18.36

Source: Izzeldin et al. (2023)

Table 3 presents the measures of synchronization, duration and intensity for the precious metals that are the subject of our research. It can be seen that the early reaction was largely driven by precious metals which reacted faster than some other commodities. Regarding precious metals intensity, which was measured by "intensity of use", higher values were observed during the GFC and COVID-19 compared to the wartime period. This suggests a greater level of active and intensive utilization of commodities during the GFC and COVID-19, possibly driven by heightened demand or specific market dynamics. These findings emphasize the significant role played by precious metals in driving the initial response of commodities during times of crises. The duration and intensity of commodity impacts vary across different crisis periods, reflecting the distinct characteristics and dynamics inherent in each crisis event.

Figure 1. Palladium and Platinum Prices in EUR per Troy Ounce in the period from January 2022 to January 2023



Source: Bullion by Post (2022)

The highest price growth of palladium was recorded shortly after the beginning of the invasion, and the highest price was reached on March 7, 2022. This is also the highest price of this precious metal in the past 10 years. Oscillations are visible on a daily

basis, and the drop in prices was preceded by a drop in car sales since palladium is most often used in the car industry for the production of catalysts. Namely, the countries of the European Union voluntarily decided to stop the import of Russian palladium. Therefore, the demand for it dropped significantly, and most of the interest was redirected to the investments in gold and silver. High inflation and a slowdown in global trade also played a significant role in the price decline. The already critical palladium market once again experienced a strong blow in terms of the amount of availability since palladium stocks have been in a significant deficit for years, which was mainly caused by the tightening of the European Union's measures regarding harmful gas emissions in car engines. Manufacturers were forced to use larger quantities during production in order to meet the prescribed standards and comply with the prescribed laws. Hence, based on its properties, platinum could become a substitute for palladium in the future, which is even more likely due to the large price difference. For example, palladium has an average price of around 2,000 euros per ounce, while the average price of platinum is around 900 euros per ounce (Figure 1). In any case, it is necessary to search for substitutes in order to achieve market equilibrium and maintain the price.

Figure 2. Gold and Silver Prices in EUR per Troy Ounce in the period from January 2022 to January 2023



Source: Bullion by Post (2022)

As far as gold is concerned, the price maximum was recorded in the same period as platinum and palladium. What is important to note is that this is the highest price of that year and the second highest price in the last ten years. Figure 2 shows that gold held

a high price in 2022, leading to increased demand and massive investment in gold bars and coins for safety and protection against inflation. Europe made a series of moves aimed at weakening the Russian financial system, which relies heavily on its own gold reserves and profits from gold exports, and they succeeded in their intentions. They dealt a heavy and unexpected blow to the Russian metallurgical industry, and even Switzerland, which has not interfered in international affairs and conflicts for more than 500 years, declared an embargo on the import of Russian gold and banned the purchase, import and transport of gold and gold products produced in Russia (Isai, 2022). Furthermore, silver is equally affected by the Russian invasion. The rise in silver prices at the beginning was inevitable. Nevertheless, the European market did not experience significant disruptions in the supply of silver since Russia uses the majority of produced silver for its own needs. An additional mitigating circumstance is that silver is obtained by processing other metals or industrial recycling. In this regard, Europe can be supplied unhindered.

The fluctuations in the prices of precious metals shown above suggest that the global stock market has been significantly impacted by the Russian invasion. Precious metals, particularly gold, are widely regarded as safe-haven assets that hold their value and cannot go negative. However, according to Klein and Walther's (2022) research, gold's role in providing financial security is complex and cannot be easily generalized. It is important to state that they used ℓ_1 -trends to identify the stages of major global crises for indices such as the American S&P 500, the German DAX30, and the British FTSE 100. By combining the DCC and MIDAS statistical models, the authors found that gold and silver prices react quickly to market downturns. That was especially evident during the European debt crisis, which Europeans remember as the greatest financial crisis in the last few decades. Although interest rates and prices are generally correlated in the long term, research shows that gold may serve as a financial hedge rather than a completely secure investment vehicle.

Behavioural mechanisms for the role of gold as an instrument of protection indicate that during a crisis, most investors run to safety. In accordance with that, they avoid any other financial investment and rely on the safety of gold, which consequently stimulates a greater demand for gold. Finally, that causes an enormous increase in its prices. According to Baur and McDermott (2016), another mechanism shows that gold is preferred over other investments due to past biases that portray gold as a safe haven in times of financial crises. Exactly the aforementioned mechanisms emerged during the Ukrainian-Russian crisis when a large number of investors turned to gold as a means of achieving financial security in response to the inflation caused by the rising prices of goods and services. This was partly due to the disruption of trade relations between Europe and Russia, which led to a decrease in the availability of certain goods and services and prompted investors to seek alternative investment options.

In addition to the price changes, the war also caused changes in transport routes. Pressure from the European Union on member states to bypass Russian territory when exchanging goods via a railway that passes through Kazakhstan, Russia, Belarus, Poland, Germany, Belgium, and France has led to disruptions in the trade exchange of precious metals between Europe and China. Namely, about 100,000 trips are made by this railway annually, and it transports 3% of the total container trade between China and Europe (Koh & Park, 2022). Given that ores and final products made of precious metals are transported by land, more precisely by trains or trucks, the route change led to an extension of delivery and an increase in transportation costs. Transport by this railway takes about two weeks, while the journey of goods by ocean route would take about four weeks. Germany, Poland, and Austria felt the biggest negative impact of disruptions in transport because they supply the largest quantities of precious metals from China via the mentioned railway.

Given that precious metals are key to the sustainability and development of very important European industries, such as the automotive, chemical, electrotechnical and electronic industries, it is clear that the interruption of trade with Russia will have consequences for the aforementioned sectors. Precious metals are irreplaceable industrial goods that are widely used in the listed sectors due to their unique properties. Therefore, it will not be easy to find new sources or substitute materials. The importance of precious metals in the economy of the European countries is confirmed by the fact that the European Union included palladium and platinum in the list of critical raw materials (European Commission, 2020).

The biggest damage of the Russian-Ukrainian war was experienced by the automotive industry. Not yet recovered from the Covid pandemic, during which production facilities were closed, production and sales were suspended, as well as a shortage of microchips, semiconductors, and other components necessary for successful assembly of cars, it faced a war that caused new market shocks and activated and intensified all market and environmental risks. For example, BMW was the first to come out publicly and announce a ban on production and sale, and the same example was followed by Mercedes, Volkswagen Group, Jaguar Land Rover, Aston Martin, and Renault (Boston, 2022). How serious these consequences are and how difficult and harmful this decision is, is clearly indicated by the fact that the largest manufacturers such as BMW, Mercedes-Benz, Volkswagen Group and Renault have their production facilities in Russia (Bellan, 2022). Production chains further slowed down and became overloaded. In short, the war caused production chains to slowdown and become overburdened. The impossibility of meeting production and delivery deadlines led to an extreme volatility in car prices and thus slowed down sales. Why is monitoring the automotive industry so important? Because it accounts for 7% of the total GDP of the

European Union, 11,5% of EU manufacturing jobs and almost 7% of all personnel in Europe are found in the automotive sector (ACEA, 2020).

There are many industries that use precious metals as input, and each has its own specifics. Therefore, in addition to the automotive sector, we will also analyse the jewellery industry, which is completely different from the automotive industry by its characteristics. It is an industry that has not experienced such drastic changes. Nevertheless, there was a noticeable increase in the prices of final products, but not a decrease in demand due to inflation. Given that this is a price inelastic change that is typical for products of existential importance, it is important to explain the reason for such an unusual change. If we consider that we are talking about jewellery that is made of precious metals, more precisely, of gold and platinum, it is clear that the mentioned products were never available to the general, mass, population, but affluent people who will very likely continue to buy with the same intensity as before the war. Geographically, it is important to note that the majority of exclusive distributors have based their production in Switzerland, through whose refineries enormous amounts of gold from all countries around the world pass. It is the location that makes the procurement process much easier for jewellery distributors because the supply chain is extremely short. Also, there should be no difficulty due to lack of inventory as these types of industries do not deal with mass production. Furthermore, production companies prioritize the quality of the offer, while the quantity is secondary. Namely, they produce in accordance with the demand and even less than the requested quantity in order to make their product scarce and therefore more luxurious. As for the jewellery production sector, it is important to note that European distributors and jewellery manufacturers are the biggest demanders of gold on the market. Statistics show that the European jewellery market reached a value of 32.43 million US dollars in 2021, and according to analysts' estimates, this value will grow even more in 2026, more precisely to 37.93 million US dollars (Statista, 2022).

Regarding the topic of inflation, it is crucial to highlight that gold exhibits a noteworthy historical correlation with inflation. The aforementioned price trends unequivocally suggest that gold prices are poised to continue their ascent if the embargo on importing precious metals from Russia persists. This kind of scenario will definitely have a significant impact on global inflation, not just the one that is currently present in Europe. The relationship between gold and inflation has been the subject of numerous empirical studies over the past few decades. While some experts argue that investing in gold is an effective hedge against inflation, others disagree with this point of view. By observing gold as means of protection in times of economic crises and analysing gold prices and inflation rate in the period from 1945 to 2006, and from 1973 to 2006, Worthington and Pahlavani (2007) concluded that gold really is a useful protection against inflation, especially in the post-war period. The empirical findings ratify the

notion that both, direct and indirect, investment in gold can efficaciously serve as a hedge against inflation.

In the latest study published in March 2023, Caporale and Gil-Alana conducted an empirical analysis based on the concept of fractional integration to examine whether gold and silver can truly serve as a safe haven against inflation. Their analysis involved a comprehensive evaluation of the long-term relationship between these precious metals and all 13 stock price indices. Their findings have shown that gold can play a dual role as both a hedge and a safe haven, but it is crucial to underscore that the results significantly vary across countries.

Considering the inherent price inelasticity that often characterizes essential goods, it becomes imperative to provide a comprehensive rationale for this distinctive shift. When examining the context of jewellery crafted from precious metals, specifically gold and platinum, it becomes evident that these items have historically remained beyond the reach of the general populace and instead catered primarily to affluent individuals. Consequently, it is highly probable that this privileged demographic will persist in their purchasing behaviour with unwavering enthusiasm, largely unaffected by the ramifications of the war.

Precious metals are also used for investment purposes in order to generate profit from sales. However, the investment sector has undergone certain changes due to the war events on the territory of Ukraine. As with the previously mentioned sectors, the demand for precious metals has also increased in the investment sector, and among them one precious metal stands out in particular – gold. The demand for gold is particularly pronounced among customers who value the tangibility of the metal and therefore buy precious metals exclusively in the form of bars and coins. Meanwhile, investing in precious metals, especially during events such as the Ukrainian-Russian war, is an unfavourable time to invest considering that precious metals are extremely subject to volatility. But for those who own stocks of precious metals, it can provide financial protection, especially in the event of an increase in interest rates by European central bank, which is not uncommon in extraordinary geopolitical situations. Gold is transferable and serves as lifelong insurance precisely in case of crises because it can always be exchanged for cash. Given that the market is extremely sensitive and subject to frequent changes, investing in precious metals is a serious undertaking that requires thorough market research and an assessment of the profitability of the investment.

This claim is further supported by a study conducted in January 2022 by esteemed Turkish academics Kangalli Uyar, Uyar, and Balkan. Their research aimed to analyse the movement of precious metals stocks during two significant crises preceding the current war: the Global Financial Crisis (GFC) and the COVID-19 pandemic. The results of their meticulous investigation demonstrated that gold, amidst financial turmoil,

does not universally function as an impregnable sanctuary. However, it emerges as the most prominent and dependable investment option when compared to other precious metals.

It is crucial to acknowledge that the attributes of precious metal havens vary not only based on the specific crisis but are also influenced by market conditions, the severity of the crisis, and its duration. The research underscored that the GFC unleashed sudden and unforeseen shocks on the financial market, whereas the COVID-19 pandemic exhibited a more pronounced adverse impact on the global economy, allowing for some predictability regarding its effects on the financial market. Therefore, prudent investors should consider these factors when seeking safety when investing in precious metals. Despite gold's reputation as dominantly safe and stable, it should not be relied upon indiscriminately as a fool proof financial investment during periods of economic turmoil.

4. PRECIOUS METALS TRADE FORECASTS IN EUROPE

The supply of the market has been usurped and a series of imposed sanctions have significantly tightened the available quantities of precious metals. However, from the previously analysed data, it is obvious that the availability of precious metals is a key factor for the further development of important European industries whose growth and development directly affect the European economy and the economies of individual countries.

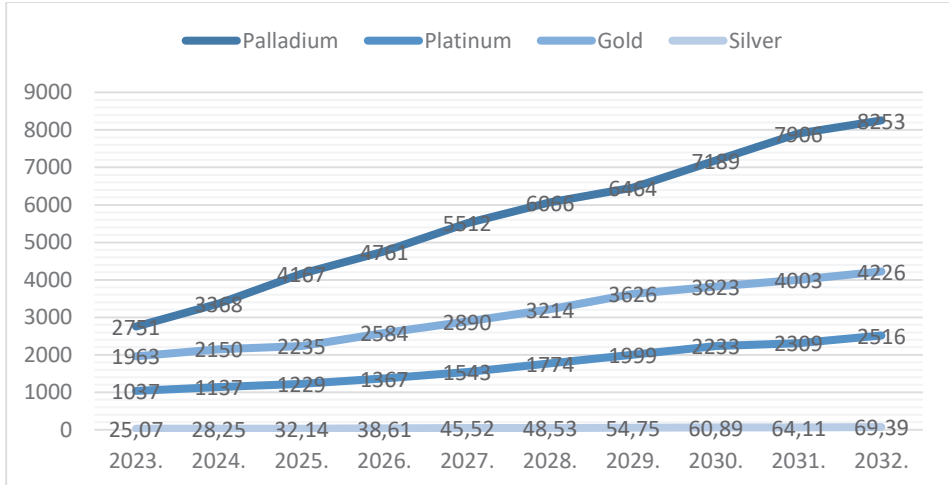
It is predicted that prices will continue to rise significantly because it will be necessary to find new sources. If India, Venezuela, Brazil, and China form an alliance with Russia, they will be in a position to form a price according to demand. It is expected that the prices of all precious metals will record constant growth in the next ten years without significant oscillations in the growing trend (Figure 3). Predictions for the year 2032 compared to the year 2022, estimate that the price of palladium will record a growth of almost 300% and the price of silver of 230%. According to forecasts, the price of platinum should increase by 167%, while the smallest, but still significant, increase of 133% is estimated for gold.

A substantial rise in prices is anticipated as the search for new sources becomes imperative. The formation of an alliance between India, Venezuela, Brazil, China, and Russia would grant them the ability to establish prices in line with demand. Projections indicate that the prices of all precious metals will consistently experience significant growth over the next decade, following a steady upward trend. Forecasts for the year 2032, in contrast to 2022, indicate an exceptional surge in prices, with palladium expected to undergo an astonishing growth rate of almost 300% and silver projected to rise by

230%. On the other hand, Platinum is anticipated to witness a substantial increase of 167%, while gold, though comparatively smaller in magnitude, is still predicted to experience a notable rise of 133%. While these projections may initially suggest a positive outlook for the precious metals market, it is important to note that such significant price increases can have adverse implications for market dynamics and overall economic stability. Therefore, careful consideration should be given to manage and mitigate the potential consequences of these substantial price hikes across the board.

Another reason for inflation is certainly the fact that an increasing number of investors are looking for precious metals in order to invest money and realize profit from sales at key moments. The fact that 80% of the world's palladium is produced in South Africa and Russia justifies the expected price increase because there are almost no other sources in such quantity in the world. As far as platinum is concerned, this growth is expected because upcoming innovations in technology, such as electric cars and hydrogen fuel cell cars, require large amounts of platinum to produce their engines. Although changes in platinum prices are not as pronounced as in the case of palladium, the platinum market could find itself in less favourable conditions in the coming years. With the introduction of innovations in the automotive industry, the demand for palladium should be significantly reduced and redirected to platinum. Given that palladium is largely used for filtering and destroying exhaust gases, its demand should decrease with changes in technology and the introduction of innovations (Pakiam, 2021).

Figure 3. Palladium, platinum, gold, and silver price projections per ounce until 2032 (\$)



Source: Created by the author according to the Coin Price Forecast database, <https://coinpriceforecast.com/> (14.09.2022.)

Once Russia completely diverts its platinum production to other suppliers, the European market will again find itself in a situation where it will be forced to pay a higher price in the absence of other sources. The increase in the prices of palladium and platinum is further exacerbated by the fact that the production of palladium and platinum in South Africa varies (Du Venage, 2020), and it is questionable whether it will be able to meet the needs of Europe, or whether the European precious metals market will once again depend on Russian production, which is growing year by year and slowly but surely takes over the monopoly over the precious metals market. Furthermore, the primary reason for the predicted rise in gold prices is that the US dollar is predicted to fall over the next ten years due to the US economy entering recession and the Federal Reserve raising interest rates (Saphir & Dunsmuir, 2022). Finally, it is predicted that silver will be bought exclusively for investment purposes in order to realize a profit from the sale, and less for industrial purposes (Pistilli, 2022).

As for further purchases and supplies, Europe plans to look for alternative sources of palladium and platinum in Australia and South Africa. However, they will be logistically very challenging given the distance between Europe and potential suppliers. Geographically, it would be more profitable to import South African palladium and platinum than Australian, but the problem arises with the availability of the required quantities. Intensification of African production quantities is possible, but it will certainly take years. In addition, the fact that Russia is intensively working on establishing new partnerships and redirecting exports to South America, China and India, Europe will be forced to choose new sources according to the most suitable conditions of the new Russian partners.

5. PROPOSALS TO REDUCE THE IMPACT OF THE RUSSIAN INVASION ON INCREASING PRICES AND THE AMOUNT OF AVAILABILITY OF PRECIOUS METALS

According to data from economic analysts of the European Union, it is estimated that Europe has the highest demand for precious metals compared to the rest of the world. European claims depend on a number of different sources that have turned out to be unreliable. The European Union must come up with a strategy to equitably diversify its sources of precious metals as soon as possible in order to reduce the constant gap between supply and demand caused by geopolitical and unexpected situations such as the COVID-19 virus pandemic and the Ukrainian-Russian war. Potential new supplier markets are Australia, South and North America, South Africa and China. This is confirmed by numerous studies, including the research by Li et al. (2023).

The mentioned research was conducted at the Institute of Mineral Resources in Beijing in order to explore the geographical concentration of the platinum mining industry. Their research focused on analysing the concentration of supply at the country level, considering mines, mining companies and owners of platinum mining companies. Examining the situation from a geographic perspective, it was observed that approximately 71% of platinum mine production originates from South Africa. Similarly, around 82% of platinum company production is concentrated in this country. However, when considering platinum mining company shareholders, South Africa's share accounts for only 39%. The United Kingdom holds a significant share of 35%, while the United States holds 6%. These findings suggest that although South Africa has a monopoly in the global platinum supply chain, the United Kingdom and the United States possess substantial platinum resources that can potentially be the more adequate source of platinum group metals. Still, in such moments of crisis, Europe would not be dependent on a single country and would be able to redirect sources of supply adequately and in time without a significant interruption in supply chains.

From a geographical perspective, South Africa has the largest advantage due to its location and production quantity as the primary source of palladium and platinum. Proximity to major ports (such as Durban) provides logistical advantages. This makes shipping from South Africa to Europe potentially more cost-effective compared to Zimbabwe and the US. The port of Durban is directly connected to important European ports such as Rotterdam, Antwerp, Hamburg, and Marseille, which form a vital network for international trade in Europe. Rotterdam, known for its large warehouses and infrastructure, would be an ideal choice.

While the United States is a viable option for transporting palladium and platinum to Europe, it is important to consider several factors when evaluating its cost-effectiveness. One advantage is the remarkably short shipping time of approximately 10 to 20 days by sea. American ports, notably those in New York and New Jersey, maintain excellent connectivity with the aforementioned European ports. However, there is a possibility that supply via this route could be comparatively more expensive due to the greater geographical distance between the USA and Europe compared to South Africa. Additionally, when considering the volume of exports and production, it is likely that imports from South Africa could offer more competitive shipping prices owing to economies of scale derived from substantial export volumes. South Africa's prominence as a primary source of palladium and platinum, coupled with its proximity to European markets, contributes to favourable pricing and lower logistics costs. These factors should be carefully considered when evaluating the most cost-effective transportation option for palladium shipments to Europe. As for the latter option, despite being listed as a potential supplier by the EU Commission, Zimbabwe presents certain transportation challenges

due to its landlocked status. This geographical limitation requires additional logistics and costs when transporting palladium and platinum to European destinations. To overcome this hurdle, land transport to the nearest seaport for onward shipment is likely to be required. This scenario entails additional considerations and coordination to ensure the smooth and efficient flow of goods from the landlocked country to the seaport, adding complexity and potential costs to the overall transportation process.

Reducing the gap between supply and demand on the market of platinum group metals is possible through the discovery of secondary materials that could adequately replace palladium and platinum and thus stabilize the situation on the market. The possibility exists in increasing the recycling of waste material from which usable precious metals could be obtained again. There is a whole spectrum of mass consumption products that contain large amounts of precious metals in their composition that can be reused. Furthermore, recycling itself would contribute to sustainability, environmental protection, and demand reduction significantly. Research by the European University KU Leuven showed that Europe could compensate for more than half of the required amount of critical raw materials through recycling (Borthakur & Singh, 2019). In this way, the consistency of the existence of these materials in key industrial European sectors such as the automotive industry would be ensured and the dependence of European industries on global supply chains would be reduced.

It is necessary to create and devise a plan to reduce the high percentage of dependence of certain industries on precious metals. The above can be achieved through investment in qualified staff who will find adequate replacement materials through innovation, mutual cooperation and know-how. Emphasis on environmental efficiency will also indirectly contribute to finding alternatives. The discovery of sustainable technologies and the implementation of the green transition, especially in one of the strongest European industries, the automobile industry, would greatly contribute to reducing the demand for precious metals, especially palladium. This entails the threat of an increase in the unemployment rate. However, by investing in personnel education, the popularization of electric cars, the construction of supporting infrastructure and other related activities, this would be avoided.

When it comes to gold, based on the last released data in January 2023, by the Chinese Ministry of Customs, it is evident that China is poised to play a central role in the global gold trade. According to the published data, in 2022, China made a purchase of 6.6 metric tons of Russian gold in worth of US\$368.9 million. Prior to the imposition of sanctions, the United Kingdom held the position of the largest buyer of Russian gold, having purchased 266.1 metric tons, which accounted for 88% of total exports, valued at US\$15.4 billion in 2021. As China seeks to reduce its dependence on the US dollar, it is no wonder that they are increasing their gold purchases. This strategy helps protect them

against potential global crises and strengthens their overall financial position. However, determining which countries could become new gold suppliers to Europe is challenging. The gold market is highly sensitive and plays a crucial role in safeguarding economies. Identifying potential suppliers in this complex market is a task that requires careful analysis and consideration.

Ultimately, all countries dependent on Russian precious metals in their national strategies should emphasize accelerated growth of domestic or alternative capacities, increased cooperation with more international partners and improvement of international relations through greater stability, transparency, and responsibility. It is necessary to encourage entrepreneurship in the spectrum of recycling, invest and strategically position new production facilities so that they provide the basis for an economical transport infrastructure.

6. CONCLUSION

The Russian-Ukrainian war is a global humanitarian crisis that has caused enormous disruptions in global supply chains. The strongest consequences were felt by the European market, whose most important industries are largely dependent on the import of precious metals from Russia. The decision to embargo imports of Russian precious metals caused global changes in prices and available quantities. Therefore, Europe is forced to diversify sources of supply, invest a lot, and carefully plan further moves in order to replace losses as soon as possible.

The European Union is a prominent global actor dedicated to promoting conflict prevention and resolution, with the ultimate aim of fostering peace and prosperity worldwide. Despite the EU's concerted efforts in preserving peace and stability, it regrettably failed to prevent the outbreak of this war. This failure underscores a significant shortcoming in the crisis management strategies employed by the European Union, as it failed to devise a comprehensive strategy to safeguard the European economy in the face of potential repeated Russian attacks (given that this is not the first instance of Russia's aggression towards Ukraine).

While the European Community demonstrated unity in its decisions regarding sanctions imposed on the Russian invasion, there are evident shortcomings in the strategies aimed at preserving national economic stability. The current situation highlights the urgent need for swift and effective market-driven changes to decrease the reliance of European countries on Russian sources. The Ukrainian-Russian war has exposed a series of oversights and weaknesses in the organization of the European Union's supply chains, serving as a stark warning that substantial changes are imperative.

The European Union is a global actor that promotes conflict prevention and resolution in order to support peace and prosperity around the world. However, despite all the efforts made to preserve peace and stability, the EU was unable to prevent this war. However, it is a clear failure of the crisis management of the European Union, which did not devise a strategy to protect the European economy in the event of a possible repeated Russian attack (because this is not the first time that Russia attacks Ukraine). Although the European Community showed unity in the decisions on sanctions against the Russian invasion, numerous failures are visible in the strategies for preserving the stability of the national economy. The provoked situation indicates that quick and efficient changes are needed in the market in order to reduce the dependence of European countries on Russian sources. Actually, the Ukrainian-Russian war pointed to a series of omissions and weaknesses in the organization of the supply chains of the European Union, which warned that changes are very necessary.

The long-term effects of Russian aggression will depend on the moves and decisions of European leaders, that is, on how and in what way they will adapt to such geopolitical risks. The war led to a direct blow to the European economy, hitting sectors that rely on Russian resources. European companies also felt an indirect blow due to plant closures and reduced sales in Russia and Ukraine. This is an indication of how it is always necessary to invest in new markets and have more sources, regardless of currently good trade relations with a country, in this case with Russia. Namely, with the existence of an alternative, it is possible to continue business quickly and efficiently. In that case, supply, further production, and trade would pass without significant disruptions on the market. The European Union should understand the war situation as a timely warning that it is time to restructure and diversify sources, invest in internal trade, and modernize mines in Europe in order to increase domestic production. It will also be necessary to invest in professionally trained staff who should be able to find new technologies and materials. The discovery of novelties will also contribute to the preservation of the environment and the reduction of the gap between the supply and demand of precious metals.

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UTJECAJ RUSKO-UKRAJINSKE KRIZE NA OPSKRBU EUROPE PLEMENITIM METALIMA

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Sažetak

Rad se bavi problematikom posljednje globalne krize uzrokovane ruskom agresijom na Ukrajinu i poremećajima koje je ista izazvala na tržištu plemenitih metala. Globalna neravnoteža popraćena je značajnim poremećajima u opskrbnim lancima i inflacijom. Dodatno, posljedice ovakvih događaja osjećat će se dugi niz godina i nakon završetka rata. S obzirom da su ruska proizvodnja i izvoz ključni za opskrbu europskog tržišta, poseban naglasak stavljen je na Europu. Kroz rad je napravljena detaljna analiza dosadašnjeg uvoza plemenitih metala u odabrane europske zemlje, analizirana su kretanja cijena plemenitih metala, kao i razlozi oscilacija cijena. Također, prikazane su projekcije kompenzacijskih planova za ruski uvoz, kao dosadašnjeg glavnog distributera, te projekcije daljnjeg kretanja cijena. Spomenuti rat ukazao je na niz propusta u organizaciji i strukturi poslovanja europskih zemalja koje su, nakon dugogodišnje inertnosti i neaktivnosti, prisiljene na restrukturiranje. To je krucijalni strateški izbor ako žele preživjeti krizu izazvanu ratom. Svakako, u najnezahvalnijoj poziciji su zemlje čije najvažnije industrije uvelike ovise o uvozu plemenitih metala. Ipak, projekcije su pozitivne, te se procjenjuje da bi Europa, uz odgovarajuća ulaganja i pomno planirane strategije, nezadugo mogla izaći iz krize.

Ključne riječi: *Rusko-ukrajinski rat; Europa; tržište plemenitih metala, nabava; uvoz.*