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The Model of a Shared Interest Rate for a Group of Countries to Circulate a Digital Currency: Featuring the BRICS[1]

Abstract: The purpose of the research is to offer a comparative analysis of a libertarian and gradual approach to introducing a market interest rate. The topic is time-relevant since the economies of the emerging markets today face difficult challenges posed by economic, financial and health-care crises, impending price stability, future growth and money market equilibrium. A digital currency is a special issue today due to the outbreak of covid-19, which has made many central banks think about contactless means of payment. The author revealed policy tools to circulate a hypothetical digital currency for the BRICS, including a shared interest rate and the quantity of digital money in circulation needed for the penta-lateral use. The theoretical significance is that the research tries to lay the foundation for a model to launch a virtual regional money market for the countries of the BRICS as well as their partners in wider parts of Europe and Asia. In practical terms, the article recommends a number of tools for monetary policy to deal with the coronavirus crisis of 2020.

Keywords: BRICS, digital currency, virtual money market, shared interest rate, liberal and gradualist approaches, credit surplus, digital money revenue.

JEL Classification: F14, F17

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1. Introduction

Today, when some policymakers continue to endorse large-scale deglobalization and would like to see their own nations decouple from regional integration groupings, the question of national sovereignty has become a number one priority on the agenda of many political parties. It means that many countries may soon see a wave of nationalizations. Nationalization in this respect is about enforcing the national contents of manufacturing and industrial policies, monetary and fiscal policies in a country. Deglobalization is a widely misunderstood phenomenon since countries stalled by coronavirus lockdowns in 2020 are still willing to be open to the outside world, which is confirmed by Khan et al (2020), because it brings foreign capital, tourists, new ideas, know-how and technology, communications, etc. It means they will be more open to each other once they defeat the coronavirus (Salisu & Akanni, 2020). They just want more national sovereignty in a globalized world. Some of the countries are just not ready for a monetary union (Erhart, 2022).

Some prominent scholars believed that regionalization is a pre-globalization stage needed to fully achieve seamless and borderless world. However, others like Zou, Wang, Xie, & Zhou (2020) believe that regionalization has become a stampede to whole-scale globalization because it created supranational authorities with their own interests and a necessity to arbiter and intermediate individual nations' claims to other member states (Bobeva, 2021). However, they did not think that as part of larger groupings they would have much more serious problems because the lack of sovereignty would be a barrier to use traditional means of fighting crises including independent currencies (Hu, Wang, Hu & Tong, 2020).

2021 will be the year of the BRICS' 20th anniversary. In these two decades the BRICS performed quite spectacular in many respects as Tripathi & Kaur (2020) describe. Unlike the European Union, the BRICS is not an integration agreement. The integration process of the BRICS is quite difficult to accomplish due to territorial, cultural, political and economic differences of the member states. Still, the group needs a negotiation mechanism which ensures cooperation in dealing with economic, financial and health-care crises (Hou & Li, 2020). One of them is a shared economic policy which poses a very difficult question for the BRICS. Perhaps it will be something close to a conventional union adopted by the euro area member countries and stated in the EU agreements.

The argument is that although such agreements create "super states" which may challenge the world economic order, they both inspire great expectations and cause troubles for the economies involved in the longer run. This way of thinking

was confirmed, inter alia, by Younsi & Bechtini (2020). Member countries of such a union hope for getting benefits from it. Smaller and weaker economies of a union are keen to delegate the authority and management to more credible bodies hoping they will do a better job in ensuring control, price stability, order, peace and security. Bigger and stronger economies of a union expect easier cross-border transactions and trade. But nothing comes without a price. Weak countries will have to endure the leadership of superior member states of the union, and strong economies will have to increasingly take care about the smaller countries. The weak ones will end up getting rid of more and more responsibilities and delegating them to the stronger government bodies and completely giving up sovereignty in economic, monetary and social issues. The strong economies will have to always bail them out when they get into trouble (Boddin & Stähler, 2018).

The policies of the union will eventually give birth to the problems of moral hazard and free ride in financial matters. This situation will eventually lead to diminishing competition. Weaker countries will become even weaker in economic terms. Before joining the union, they were not competitive enough to rival the strong economies. Now, as a part of the union, weak countries will not even try to improve their competitiveness. They will just import better products from the strong ones in exchange for common money loaned out to them by the rich economies. The strong economies will increasingly feel like monopolies on the local market. The market, considered international before the union's creation, will simply turn into a market of a single nation. Thus, companies in the strong countries will not have to outperform anyone in the common market. They will gradually degrade and lose competitiveness themselves (Peña, 2020).

It is true that, initially, the industrial countries will have great benefits from the union because free flow of capital usually results in greater expansion. Companies in the advanced-market economies will take advantage of the classical organic growth. All this will favour advanced countries of the union and discriminate poorer member states as a result of mergers and acquisitions. But later, the industrial capacity of the enterprises from the rich countries of the union will reach its total utilization and there will not be any more opportunities for easy organic expansion. They will have to innovate and this will require more investments. But investments in smaller and weaker markets of the union will not bring much profit since there are more lucrative opportunities abroad on larger emerging markets of Asia or Latin America. At this point, the invested capital value will erode. Free movement of businesses, people, capital and goods and services as well as natural resources will eventually disturb the banking, industrial and financial systems due to disproportionate return on investment.

The example of the EU shows that free flow of things can rarely be just, because the advanced countries of the union are more capable in providing the weak ones with more innovative products with higher added value, whereas weak economies will not be able to adequately return gains to the businesses from the rich countries. The latter will gradually lose interest in investing in the weaker countries and will look for better investment opportunities elsewhere.

In the end, the supranational bodies of the union will pursue some median policy, setting standards the weak nations are unable to meet and producing common legislature imperative for all and totally ignore local laws, thus giving priority to the strongest and most competitive countries whose companies are very good at crossing national borders. Weak country residents of the union mostly benefit from regional integration agreement by immigration opportunities. They will just move to the industrial countries of the core seeking better wages. This process will further damage the economies of disadvantaged nations due to brain outflow, boosting economic growth in the advanced countries.

Common money makes it easier to travel, buy goods and services from within the grouping without the need to exchange one local currency for another. It makes easier lots of other things. However, the common or shared money will make it difficult to manage the economy because it will offer no alternatives when something of importance happens only in one country or a few countries of the grouping, and every one of them will have to follow a one-size-fits-all policy.

If the BRICS goes the EU way, the end result will be a gradual breakaway from the inside. What countries of the BRICS can share, though, is a consensual economic policy and a digital virtual currency without a monetary union agreement, used as a transactions tender.

2. Theoretical background and relevant literature review

In the past two decades we can find a few multilateral efforts on part of the BRICS' member states aimed at deeper trade and cooperation (Johnson, 2013). Russia, India and China, the core of the BRICS, have a long-standing tradition of a very broad strategic cooperation. India and China have become key markets for Russia abroad, especially after the EU and US introduced international sanctions against Russia in 2014. The Indian and Chinese markets are lucrative places for Russian businesses, because they grow much more dynamically than the market of the EU. However, in the decade of 2008–2018, despite Russia's efforts to expand the trade links with India and China, the progress has been quite slow. Things

got even more difficult after the COVID-19 outbreak in 2020. The coronavirus crisis which followed became a sort of a litmus paper to test the penta-lateral cooperation within the BRICS. The hope is that the BRICS will get out of the crisis stronger. A new period of the BRICS cooperation will bring potential benefits and opportunities for the member states as well as for the countries in close proximity. One of those opportunities may well become the digitization of the trade settlement deals in the BRICS and related countries of the region to bypass the US dollar (Yu, 2014).

The economic cooperation on the crossroads of the existing regional institutions in Europe and Asia can stimulate economic growth of many economies in the region (Vayanos & Woolley, 2013). Sustainable economic growth of these economies may in fact become the basis of financial and economic stability after the world crisis of 2020. Such cooperation is especially important for Russia since it is the link in the trans-Eurasian intercultural and inter-civilizational ground playing field, as well as the basis of crucial transport corridors and communications for the countries of the region.

The objective basis for deepening the trilateral cooperation of Russia, India and China is the escalation of the modern global and regional challenges in international trade, international production, international integration and international security (De Haas & Horen, 2011). Strategically, the three countries have very broad opportunities for joining forces. Major directions for such cooperation can be large-scale transcontinental projects of building railroads and highways, oil and gas pipelines connecting Central, East and South Asia. A large potential lies in the field of science and technology, where each of the three countries may make concrete proposals including the participation in the Chinese Belt and Road Initiative to develop infrastructure in the region.

The economies of the region may grow in a balanced way if they keep prices stable and the quantity of money in circulation changes adequately and proportionately to changes in GDP (Rousseau & Wachtel, 2011). In today's uncertainty about the health of the global economy, to maintain sustainable economic growth, many countries of the region seek to accumulate various wealth funds and reserves (Kasekende, Brixova & Ndikumana, 2010; Dorrucci & McKay, 2011). The BRICS is a world leader in continual accumulation of foreign exchange reserves, gold reserves and sovereign wealth funds running trillions of dollars (Obstfeld, 2011). They are also keen to create multilateral financial organizations such the New Development Bank to help economic growth in the region. However, the search for new sources of capital is not limited to the establishment of such multilateral financial institutions. The most important issue for a country seeking interna-

tional assistance from abroad is the optimal level of loan rates (Ostry, 2012). In this respect, this paper has a purpose to explain the need to create a model of a shared interest rate of the BRICS as a regional mechanism to finance multilateral development with an optimal cost of capital for the countries of the region.

3. Methodological approach

To meet their needs for new development loans under more favourable contract terms compared to the international financial institutions, such as the IMF and the World Bank, the BRICS and the countries of the region can potentially create a virtual regional multilateral money market with an equilibrium interest rate.

The optimal equilibrium interest rate can be determined on the conventional idea based on the money supply and the demand for money for the members of the BRICS and other countries of the region. Graphically, this can be expressed in a chart displaying two curves representing the money supply and the demand for money on the shared money market of the BRICS that may emerge in the future. The underlying research proposes a ten-year plan to achieve that by 2030 if all goes well. This market may simultaneously become the market for a new digital currency of the BRICS. As is well-known, the curves of the supply and demand intersect at a point that demonstrates the level of an interest rate at which the central bank acquires IOUs. In central bank operations, there are short-term, mid-term and long-term rates, generally known as the rates of refinancing. According to the neoclassic economics, the graph of supply of and demand for some goods, including money, is to do with the curves only in the short term. Therefore, this paper attempts to build a short-term shared interest rate for the BRICS and other countries of the region.

To simplify the model constructed here, the research supposes that the supply of money on the potential virtual multilateral market of the BRICS digital currency in the short run must take shape of a vertical line. This is motivated by the fact that the supply of money can potentially be absolutely inelastic and determined depending on the character of a shared or consensual monetary policy. In turn, the demand for money will intersect with the curve of money supply at a point which will reflect the shared interest rate for the BRICS. This rate will be higher in comparison with the rate of the People's Bank of China at whose expense the supply of money is supposed to be provided as this paper recommends.

4. The Model

4.1. The liberal model of the shared interest rate for the BRICS

Since the countries with the world reserve currencies usually pursue loose monetary policy (Milesi-Ferretti & Tille, 2011), a central monetary authority of the BRICS will also have to do that. The central monetary authority will have to expand the money supply of the BRICS digital currency in case of an increase in the demand for it on the hypothetical virtual money market. As a result, the local inter-bank offer rates in the high-interest-rate members of the BRICS will decrease, and the money supply and the demand for the digital currency will be set at a new equilibrium level which will be optimal for them.

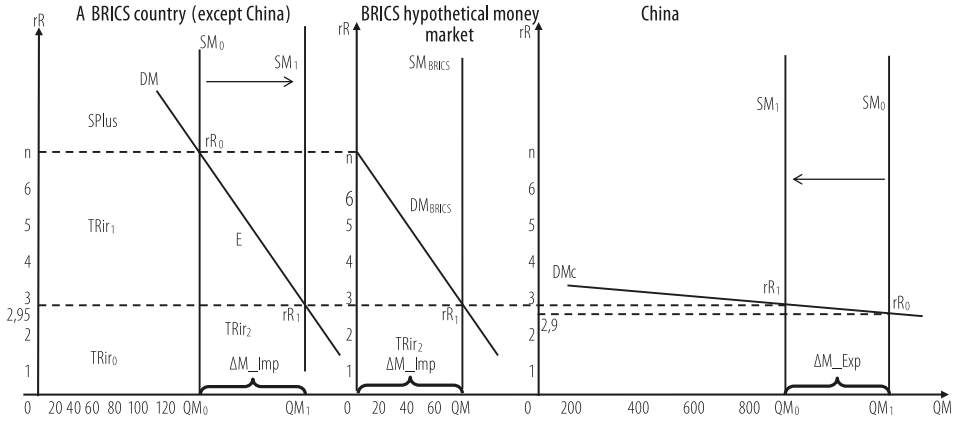
Once the shared interest rate is established on the BRICS hypothetical virtual money market, the member states of the BRICS will be faced with a problem of having to adjust their local rates of refinancing. According to the hypothesis introduced in the research, Brazil will have to do with the biggest drop in its local rate of refinancing because it had the highest rate of refinancing in the BRICS in the period 2016 – 2019. In case of China, the rate of refinancing is going to be set at a level a bit higher compared to the domestic rate in China.

The liberal model of price building was originally supposed to be used for the world market of goods such as grain, crude oil, natural gas, etc. These commodities are usually traded at world prices. This paper proposes this model to be used also to determine the shared interest rate for the BRICS. This is done because, generally, interest rate is the price of money at which commercial banks get loans from a central bank. This model is applicable for this purpose since, as the term "liberal" in its name implies, it poses no constraints for cross-border transactions. And since the world money market is a virtual place which works in total absence of any barriers, the liberal model is going to be the optimal mechanism to set up the shared interest rate for the BRICS.

The basic ingredients of the liberal model of the BRICS' shared interest rate, besides the initial rate rR_0, include the interest income of commercial banks of the countries in question (Figure 1, area $TRir_0$ + area $TRir_1$), credit surplus and the unmet supply of money. These categories are defined in the paper in a way similar to the neoclassical economics. In this model, the neoclassical notions of a regular market are taken over and applied to a new economic phenomenon. Thus, similar to the consumer surplus of Alfred Marshall, in the liberal model of the BRICS' shared interest rate, the amount of interest payments or debt service which households and firms manage to keep to themselves after the equilibrium

rate is set up on the market as a result of a reduction in local loan rates and, therefore, equal to the losses of commercial banks, can be named a credit surplus. On the chart of the liberal model, S_{plus} stands for the credit surplus of the BRICS residents. Graphically, the credit surplus finds itself within the borders of an area on the chart shaped in the form of a square-angle triangle whose bottom line is the shared interest rate, its vertical side line is the difference between the maximum possible rate and the equilibrium rate of the market, and the hypotenuse shows the amount of the demand for credit on part of households and manufacturing firms in the BRICS which is found further to the left and higher than the shared interest rate or the equilibrium rate of the national monetary system (Figure 1).

Figure 1: The liberal model of the shared interest rate for the BRICS



Source: Constructed by the author

Unmet demand for credit usually happens in countries with high local loan rates and represents the sum of households and manufacturing firms that are not able to get a loan at the current market interest rate. On the chart of the liberal model of price building (Figure 1), for each member of the BRICS the unmet demand for loans is the fraction of the money demand curve which is found right to the initial point of equilibrium of the national monetary system, i.e. rightward to the established current interest rate.

Finally, the excessive supply of credit is the amount of money which can be brought to circulation by an entity that has significant credit facilities it is able to provide at a lower interest rate than others, which is depicted on the chart of liberal interest-rate building as a fragment of the aggregate money supply curve above the initial equilibrium of the national monetary system.

Since the BRICS currently is not an integration grouping of countries in the real sense of the word with a traditional or classical institutional basis, then it would be incorrect to talk about a common interest rate and common monetary policy, which is characteristic of the euro area, for example. Instead, these things may be better called a coordinated or consensual or agreed-upon monetary policy and a shared or multilateral or consensual interest rate. A hypothetical central bank of the BRICS, therefore, would be stylistically better called, when choosing an optimal name, a central clearing authority, or a shared clearing centre of last resort. Anyway, this monetary institution or authority must have the functions of a supranational central bank.

Since the liberal model allows to analyse simultaneously only two countries and one common or multilateral market in between (in this particular case this is any two countries responsible for currency issue chosen as part of the BRICS and the shared or multilateral money market of the BRICS), then to determine a shared interest rate for the BRICS as a single entity, the calculations should be carried out through at least two stages, namely, at first, it is necessary to build the charts or graphs for the combinations of all country pairs of the BRICS, and later – the charts or graphs for the entire grouping.

At the initial stage, to determine the required interest rate, it is proposed that each time we take a country with a high domestic interest rate – Brazil, Russia, India and South Africa – and a country with a low interest rate which is China. In this case, according to the principles of the liberal price-building, Brazil, Russia, India and South Africa will have to give up supplying money at the domestic rate rR0 and accept the loans provided at the rate established on the shared hypothetical interbank money market of the BRICS, i.e. rR_1 (Figure 1).

This rate will be higher than the Chinese local rate and lower than the local rates in Brazil, Russia, India and South Africa. As a result, making use of the graph method and parallel shift, on the chart of the shared money market of the BRICS it is possible to depict the curve of the unmet demand for credit on part of the residents in Brazil, Russia, India and South Africa and the curve of the excessive supply of credit from China. Besides, it should be taken into account that a potential drawback of the graph analysis is expressed in the circumstance that the amount of money supply of the hypothetical digital currency of the BRICS on the hypothetical shared market may not graphically meet the needs of Brazil, Russia, India and South Africa in credit and China's capability of providing it. In this case, the curves must change their elasticity at the established interest rate and at the adjusted quantity of digital money supply. It is proposed that the interest

rate, being set on the basis of the market economy principle, be called a shared interest rate.

With the initial stage completed, similar charts with the country pairs of the BRICS are constructed, where one country has a local interest rate higher compared to its counterpart. The model used the following combinations: Brazil – China, Russia – China, India – China and South Africa – China. In this paper, these combinations are reduced down to a universal chart where Brazil, Russia, India and South Africa represent the side of demand for hypothetical digital money expressed in the BRICS' hypothetical digital currency at a shared interest rate, and China would represent the supply side of the equation.

When choosing an optimal combination, the author assumed that it is quite unlikely that South Africa, India and Brazil would take loans from Russia, or Brazil would take them from South Africa due to a simple fact that in the BRICS the strongest competitive advantage in terms of interest rate level and credit volume belongs to China. Therefore, on the right-hand side of the graph there will always be China, and on the left-hand side of the graph there will appear one of the four other BRICS's nations.

After the interest rates in all four country combinations have been determined, they are to be drawn on the chart of the hypothetical shared money market of the BRICS. Once linked, the points representing interest rate level form the curve of the demand for the hypothetical digital currency of the BRICS which can be used for multilateral transactions. If we draw the curve of the excessive money supply of China on the same chart, then the curves of supply and demand will intersect at a point expressing the shared interest rate for the BRICS.

The curves of domestic supply and demand for the hypothetical digital currency of the BRICS are formed depending on the loan rates of the major commercial banks and local supply of money which were used to determine the level of the shared interest rate. The obtained curves of money supply are shown as vertical lines, whereas the curves of demand for money are built with varying elasticities. To simplify the model of the shared interest rate for the BRICS, we use trend lines which flatten the deviations of the loan rates set by individual commercial banks. In the BRICS, the money demand curve is least elastic in Brazil and it is most elastic in China. In turn, India and South Africa have elasticities of demand for money a bit larger than in Russia.

The result of equilibrating varying interest rate levels in Brazil, Russia, India and South Africa, on the basis of the liberal model, shows that the values of local rates rR_0 go from 13.75%, 10.00%, 6.75% and 7.00%, respectively, down to 2.95%,

which is the shared interest rate for the BRICS[2]. In China alone, according to the liberal model of the shared interest rate, the rate will grow from 2.90% to 2.95%. The quantity of digital money which China could potentially provide to Brazil at the shared interest rate level would amount to 41.1 billion U.S. dollars. According to this model, Russia could be provided with 75.6 billion U.S. dollars of China's credit. By the same means, India would get 94.8 billion U.S. dollars, and for South Africa this figure would be 5.2 billion U.S. dollars. Thus, the total money supply in Brazil, Russia, India and South Africa would have amounted to 319.2 bln U.S. dollars provided via the hypothetical money market of the BRICS. In the latter it would have totalled 1,127.0 bln U.S. dollars. Both these volumes of money supply in circulation differ by a factor of 10. Therefore, it is quite difficult to draw them on the chart within the same scalability. Adequately, it could be done only on the individual graphs for Brazil, Russia, India and South Africa as well the hypothetical shared money market of the BRICS.

The capital outflow from the Chinese monetary system may have certain implications for the economy, namely relative shortage of money in circulation, reduced credit for households and manufacturing firms. To overcome this problem, the People's Bank of China may increase money supply to achieve equilibrium. This issue of money would not lead to inflation in China's economy, since the export of credit abroad amounts to sterilization. However, there would be a proportionate increase in the external government debt to the same amount.

Since the elasticities of the demand for money in Brazil, Russia, India and South Africa are lower than in China, the credit line ceilings will increase at the shared interest rate of the BRICS (this is shown by the shift of money supply curves SM_0 into new position SM_1 in Figure 1 above). There will also be an increase in household debt and corporate debt, or the private sector debt. However, the government debts of Brazil, Russia, India and South Africa will rise only when Chinese loans are given to their state-owned enterprises or state-controlled commercial banks. On the whole, the credit supplied to Brazil, Russia, India and South Africa at the shared interest rate of the BRICS would have amounted to 217 billion U.S. dollars. This is more than twice the core capital of the BRICS Development Bank which stood at 100 billion U.S. dollars when it was set up. It means that credit provided

[2] The covid-19 pandemic made the BRICS governments and the governments of the region take unprecedented monetary and fiscal measures. Some of the member states significantly reduced the key interest rates to stimulate the economy. However, we think that as soon as the pandemic subsides, the BRICS central banks and those of other countries of the region will have to curb the monetary and fiscal stimuli. This means they are likely to return to the pre-pandemic levels of the key interest rates. Therefore, to make the model more relevant, we decided to use the key interest rates of the BRICS which were established in the pre-pandemic world of 2018–2019.

through the workings of the liberal model via the hypothetical shared money market of the BRICS could be much more significant, more scalable and less expensive in terms of cost of capital than that of the BRICS Development Bank.

Apart from Brazil, Russia, India and South Africa, China may also provide credit at the shared interest rate to other emerging economies. And these loans may amount to the tune of up to several hundred billion U.S. dollars, expressed in the hypothetical digital currency of the BRICS. Of course, the capital outflow might lead to soaring government debt of China. However, non-residents` taking loans from China also brings benefits to its commercial banks in the form of interest revenue.

Table 1: The results of the liberal model of the shared interest rate for the BRICS

Indicator, billion U.S. dollars, unless otherwise specifically stated	Brazil	Russia	India	China	SAR	BRICS
The key interest rate (initial) – rR_0 (%)	13.75	10.00	6.75	2.90	7.00	–
The key interest rate as a result of liberalizing domestic money markets – rR_1 (%)				2.95		
Money supply (money in circulation) at the rate of rR_0	66.5	125.9	116.7	1,127.0	10.1	1,446.3
Money supply (money in circulation) at the rate of rR_1	107.8	201.5	211.6	1,071.8	15.4	1,608.1
The volume of foreign loans made as a result of changing domestic rate rR_0 up to rR_1	41.4	75.6	94.8	-55.3	5.2	161.8
The volume of loans made at the rate of rR_1 adjusted at the value of the multiplier	107.5	1,081.2	2,370.9	-425.6	183.5	3,317.5
Interest income of the domestic commercial banks before liberalization ($TRir_0$+ $TRir_1$)	9.1	12.6	7.9	32.7	0.7	63.0
Interest income of the domestic commercial banks after liberalization ($TRir_0$)	2.0	3.7	3.4	33.2	0.3	42.7
The loss of interest income of the domestic commercial banks after liberalization ($TRir_1$)	7.2	8.9	4.4	-0.6	0.4	20.3
Credit surplus of a country before liberalization (SPlus)	5.8	7.4	2.7	5.7	0.4	22.0
Credit surplus of a country after liberalization (SPlus+ $TRir_1$+E)	15.2	18.9	9.0	5.1	0.9	49.2
A change in credit surplus of a country after liberalization ($TRir_1$+E)	9.4	11.5	6.2	-0.5	0.5	27.2

Source: Author's calculations based on IMF's data

The cumulative interest revenue which China could get from Brazil, Russia, India and South Africa in case of the introduction of the hypothetical digital currency and the shared rate of interest could amount to area $TRir_2$, depicted on

Figures 1 & 2. According to the author's calculations, it could equal to 6.4 billion U.S. dollars. This interest revenue could be used to make new loans, thus sterilizing the monetary expansion in order to prevent inflation in China. The negative figures in Table 1 reflect not the Chinese banks' losses from exporting capital to Brazil, Russia, India and South Africa, but the act of withdrawing money from China's monetary system.

The new loans provided by China could perform better abroad, bringing benefits for China's economy since they are supplied at a higher interest rate than the local rate. This would result in the expansion of China's invested capital abroad. In Brazil, Russia, India and South Africa, the reduction in the local interest rates would also be followed by rising the living, which is measured by the Alfred Marshall's consumer surplus (it is called the credit surplus in the model).

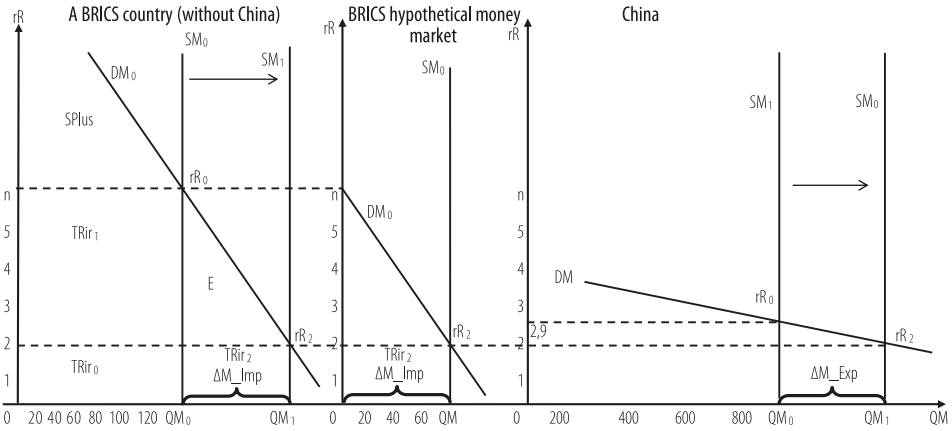
On the graph of the money market of Brazil, Russia, India and South Africa (Figure 1), the cumulative credit surplus created by means of the liberal model could have increased by 27.7 billion dollars and totalled 44 billion dollars. This sum of money would be split among the countries as follows: 15.2 billion U.S. dollars would go to Brazil, 18.9 billion U.S. dollars to Russia, 9.0 billion U.S. dollars to India and 0.9 billion U.S. dollars to South Africa according to the calculations given in Table 2. This expansion would significantly increase the potential to get new loans at lower rates. On the other hand, it may be followed by increase in debt.

4.2. The gradualist model of the shared interest rate for the BRICS

Since the liberal model of the shared interest rate for the BRICS implies no constraints, the loans provided through the described mechanism ought to be consumed in one year's time. It means that Brazil, Russia, India and South Africa are to consume virtually all credit provided by China at the moment the loans are granted. Such quick consumption of loaned money in Greece, for example, when the euro had first been introduced, led to the outbreak of the debt crisis in the country and later to a technical default (Reinhart & Rogoff, 2011; Beetsma, Giuliodori, De Jong & Widijanto, 2016).

Contrary to that, if the shared interest rate for the BRICS were to be set up step-by-step, over several years according to the gradualist approach, it would have reached the level of rR_2, or 2%, in correspondence with the model built, and the respective volumes of additional external loans provided by China would have increased to 44.7 billion dollars in Brazil, 83.7 billion dollars in Russia, 118.1 billion dollars in India and 6.4 billion dollars in South Africa (Figure 2 & Table 2).

Figure 2: Gradualist model of the shared interest for the BRICS



Source: Constructed by the author.

Table 2: The outcomes of the gradualist model of the shared interest rate for the BRICS

Indicator, billion dollars, unless specifically stated	Brazil	Russia	India	China	SAR	BRICS
The shared interest rate (rR_2), %				2.00		
Money supply (money in circulation) at the rate of rR_2	111.2	209.7	234.9	2,151.7	16.6	2,723.9
The volume of foreign loans made as a result of changing domestic rate rR_0 up to rR_2	44.7	83.7	118.1	1024.6	6.4	1,277.6
The volume of loans made at the rate of rR_2 adjusted at the value of the multiplier	116.1	1,197.3	2,953.6	7,889.7	225.5	12,382.3
Interest income of the foreign (Chinese banks) after liberalization ($TRir_2$)	1.2	2.2	2.8	-1.6	0.2	4.8
Credit surplus of a country after the introduction of the shared interest rate for the BRICS	22.7	29.0	16.6	30.3	1.5	100.1
A change of credit surplus of a country after the introduction of the shared interest rate for the BRICS	16.9	21.6	13.9	24.6	1.1	78.1
Interest income of the domestic commercial banks after the introduction of the shared interest rate for the BRICS	1.3	2.5	2.3	22.5	0.2	28.9
Interest income of the foreign commercial banks after the introduction of the shared interest rate for the BRICS	0.9	1.7	2.4	20.5	0.1	25.6

Source: Author's calculations based on IMF's data.

The gradual-model volumes, contrary to the liberal model, would be allocated relatively evenly over the entire period of monetary and financial harmonization of the BRICS, which would be less painful for them, and this would allow them to gradually adapt to the transformation of the national monetary systems and their consequent joining the common monetary system. At the same time, the credit surpluses in each of the BRICS would also increase gradually: in Brazil – by 16.9 billion U.S. dollars, in Russia – by 21 billion U.S. dollars, in India – by 13.9 U.S. billion dollars and South Africa – by 1.1 U.S. billion dollars, without causing consumer boom, although these volumes would exceed credit surpluses received by Brazil, Russia, India and South Africa as a result of forced liberalization.

The cumulative loans provided to Brazil, Russia, India and South Africa, according to the gradualist model built, would amount to 253 billion U.S. dollars by 2030 and, just like in the case of the liberal model, would significantly exceed the capacity of the BRICS Development Bank.

A next stage of the calculations is supposed to determine the cumulative volume of loans provided at the shared interest rate for the BRICS as a single entity. The initial hypothesis about the shared money market for the BRICS and the shared interest rate supposed that its level could settle at a level that would be unfavourable for China and significantly higher than the initial rate. However, the resulting shared interest rate for the BRICS would distinguish from the initial equilibrium of the national monetary system in China by a mere 0.05%. Nevertheless, the increase in the local loan rate in China by this small amount, according to the model built, would lead to a decrease in the quantity of money in the country's economy circulation by 55.3 billion U.S. dollars.

In turn, the money loaned out at the new shared rate of interest for the BRICS as a single entity at 2% in accordance with the gradualist model would have a deeper impact on the respective national economies than as a result of decreasing domestic rates at the initial stage of the calculations, i.e. based on the liberal model. Thus, in addition to the initial supply of money loaned, the money in circulation would increase to 111.2 billion U.S. dollars in Brazil, 209.7 billion U.S. dollars in Russia, 234.9 billion U.S. dollars in India and 16.6 billion U.S. dollars in South Africa without the money printing presses. The cumulative influx of the money loaned out to these four countries would equal to 253 billion U.S. dollars.

The outflow of capital from China at the 2% interest rate would exceed 1 trillion U.S. dollars. It means that China could, in fact, generate additional money supply for other countries of the region to the amount of almost 772 billion U.S. dollars loaned out in the new shared digital currency of the BRICS. Thus, the

equilibrium of the monetary system of the BRICS based on the liberal model of the shared interest rate could be achieved by injecting 217 billion U.S. dollars. The gradualist model could do that by injecting 253 billion U.S. dollars. Hence, the resulting equilibrium differs from the initial one in the liberal model by almost 40 billion U.S. dollars.

The liberal and gradualist models built by the author to determine the shared interest rate exhibit the hypothetical money market equilibrium, namely the amount of credit exported from China must equal the amount of capital received by Brazil, Russia, India and South Africa, i.e. the influx of capital to Brazil, Russia, India and South Africa and the outflow of capital from China are one and the same figure. Alongside this, when the needs of Brazil, Russia, India and South Africa in loans exceed their initial capacity, China would have to create additional supply of money expressed in the new digital currency at the shared interest rate both for the hypothetical money market and for other countries' purposes.

If there were no equilibrium, this would mean that there is an error in the model built. The point is that if in the course of calculating loan rates for Brazil, Russia, India and South Africa it turned out that more loans could be provided at them in Brazil than, for example, in India although according to the law of demand it must be vice versa since the demand elasticity for money in the latter were bigger than in the former, then it might be because of a statistical error in the calculations. Therefore, since the loan rate is determined for each of the BRICS on an individual basis with regard to the potential needs in loans and the capacity of a country to efficiently absorb them with no implications such as high inflation, it is necessary to introduce respective adjustments to the model built.

First of all, the liberal model of the shared interest rate for the BRICS did take into account that on the hypothetical shared money market, the curves of supply and demand might alter their elasticity. At this point the rate itself might not change, but what would necessarily have to change is the quantity of money provided as loans. It must either increase or decrease. If this is true, it is critical to step back to the stage of determining the rates and the volume of new digital money supply on the charts representing Brazil, Russia, India and South Africa and make adjustments for the amount of money supplied, this time taking into consideration a principle according to which the higher the shared interest rate, the less the amount of credit and vice versa.

Secondly, since the shared interest rate is formed on the hypothetical digital money of the BRICS, it is important to exclude a possibility of an error in the amount of the interest rate in general since the use of the same equations in each

of the cases is going to produce a universal system of functions, and it will end in the universal methodology and a common approach to carrying out the calculations. As to the possibility of an arithmetic error, the model still stays true even at this point because the amount of loans made in the economy is directly dependent on its capacity to fully and efficiently absorb the money loaned out. Oversupply of loans, in turn, may lead to hypertrophied expenditure by households, manufacturing firms and the economy at large. It may also cause a credit boom, overheat and an eventual sharp recession.

However, since the liberal model was initially used to set the rates, it supposes no restrictions. Therefore, the amount of money loaned out cannot be constrained by anything. Hence, the demand for loans on part of the BRICS at the shared interest rate does not change. What changes is the amount of loans made at that rate. Hence, it is important to adjust the elasticity of the respective curves. As a result of referring the new curve of the demand for loans to the curve of money supply on the shared market of the BRICS, there emerges the required shared rate of refinancing for the BRICS as a single entity.

5. Results

A final stage of building the model of the shared interest rate for the BRICS is to estimate the implications of introducing the new rate for the banking sectors of the BRICS. Achieving such a result could be particularly significant for the member states of the BRICS when looking for ways aimed at helping economic recovery after the coronavirus crisis of 2020. At this point, it is necessary to estimate the potential costs and benefits for specific industries as a result of a deeper recession and the abolition of restrictions for the activities of foreign financial institutions on the domestic market after the lockdowns have been lifted. The model built allows to find out the impact of the shared interest rate in the BRICS.

The impact on the financial services sector of the BRICS as a result of introducing the shared interest rate can be described by changes in the volume of money loaned out by either the liberal or gradualist approaches. The gradualist approach assumes that the shared interest rate is set at the level below the rate found based on the liberal model. Hence, the losses for the local financial services sectors of Brazil, Russia, India and South Africa would be quite significant, namely the interest income of Brazilian local banks would decrease from 2.0 to 1.3 billion U.S. dollars, that of Russian banks would fall from 3.7 to 2.5 billion U.S. dollars, that of Indian banks would fall from 3.4 to 2.3 billion U.S. dollars, and that of South African banks would fall from 0.3 to 0.2 billion U.S. dollars.

The model also shows a decrease in the interest income of Chinese banks. Thus, in Brazil, Chinese banks' interest income might fall from 1.2 to 0.9 billion U.S. dollars, in Russia – from 2.2 to 1.7 billion U.S. dollars, in India – from 2.8 to 2.4 billion U.S. dollars and South Africa – from 0.2 to 0.1 billion U.S. dollars. Nevertheless, despite a bigger drop in the interest income in case of the gradualist model in contrast to the liberal one, the reduction in the former happens over a longer period of time whereas in the latter this might be done during a single year.

Therefore, the gradualist approach might allow domestic banks to adapt to the new business environment. The alternative is the liberal model's shock therapy, meaning that many of them could go bankrupt and leave the market altogether. It is also worth mentioning that the capital flight from China to Brazil, Russia, India and South Africa via the liberal model may cause losses for the Chinese banks of up to 1.6 billion U.S. dollars due to the rising cost of capital. The gradualist approach would actually help Chinese banks gain 20.5 billion U.S. dollars as a result of a reduction in the shared interest rate down to 2%.

In the end, the digital money supply would gain additional 65.4 billion U.S. dollars in Brazil, 14.6 billion U.S. dollars in Russia, 139.4 billion U.S. dollars in India and 3.2 billion U.S. dollars in South Africa. Such expansion of digital money supply could certainly benefit consumers due to cheaper credit, but it might also affect domestic commercial banks, since there might be a drop in their interest income, namely it may go down by 5.3 billion U.S. dollars in Brazil, 4.5 billion U.S. dollars in Russia, 3.2 billion U.S. dollars in India, and by 0.2 billion U.S. dollars in South Africa. The interest income of the Chinese commercial banks would increase by the amount of cumulative interest income losses of the former four countries, namely 13.2 billion U.S. dollars. A positive impact on consumers' incomes may take the form of credit surpluses which could expand by 11.3 billion U.S. dollars in Brazil, 7.6 billion U.S. dollars in Russia, 7.0 billion U.S. dollars in India, and 1.0 billion U.S. dollars in South Africa.

A cumulative credible estimate of additional digital money supply in the BRICS due to the introduction of the shared interest rate, via both the liberal and gradualist models, can be obtained by means of the money multiplier. According to the general principle of the calculations conducted, the lower the reserve ratio, the bigger the money multiplier and the more digital money in circulation. Thus, the multiplication of the loans received from China via the liberal approach could result in the monetary expansion of up to 107.5 billion U.S. dollars in Brazil, 108.1 billion U.S. dollars in Russia, 237.9 billion dollars in India, and– 8.3 billion dollars in South Africa.

In case of the gradualist model, the respective figures would be 116.1 billion U.S. dollars in Brazil, 119.7 billion U.S. dollars in Russia, 295.6 billion U.S. dollars in India, and 25.5 billion U.S. dollars in South Africa. The cumulative money supply in circulation and the total amount of multiplied loans received from China via the hypothetical digital money market of the BRICS are big enough to cause inflation in both cases. The difference is that such multiplication would happen during one year in the liberal model, whereas it would be distributed more or less evenly over the longer term under the gradualist approach.

In Brazil, with its huge reserve ratio, the biggest among the BRICS, the money created is multiplied very slowly. Hence the increase in money supply in Brazil is less dangerous for price stability. In the rest of the BRICS, the risk of accelerating inflation is much stronger. The respective figure for China shown in Table 1 is not quite credible due to the fact that this country in contrast to the other BRICS experiences capital flight, whereas multiplied are only the loans that come to the country. Hence, in this respect, both liberal and gradualist models will not cause dramatic changes and will not exacerbate price stability in the economy.

To understand the workings of the shared interest rate, it is worth considering that since the capacity to produce loans in China is larger than in Brazil, Russia, India and South Africa, it will not be good for China to use higher loan rates and adopt the shared digital currency. Therefore, China might try to achieve a penta-lateral agreement which might contain the condition of possible changes in the market mechanism of setting the interest rate, and instead it could push to adopt a manageable or directive approach. Perhaps one of the conditions of the penta-lateral agreement on the digital currency will also be the redistribution of votes in the board of directors of a hypothetical monetary authority in China's favour where it would have the veto power right.

Then there is a question of a threshold interest rate as a reference point for the activity on the hypothetical money market of the BRICS. Therefore, the shared interest rate might be determined on the basis of both the market principles and direct government regulation which could potentially mean a fixed interest rate. In the end, this shared rate resulting from the proposed hypothesis may go below the level determined on the basis of the liberal model.

With the penta-lateral agreement on the digital currency for the BRICS put in place, the amount of the shared interest rate and the mechanism to set it may also be satisfactory for the Chinese counterparts. Then, the rate will not have to be renegotiated. Thus, the BRICS will be able to take advantage of the agreement since they will participate in the hypothetical shared money market on an equal

footing. Otherwise, if the rate seemed too high for the Chinese economy, there might be a need to have a political mechanism for rate renegotiation. The specifics and the significance of this mechanism could be dealing with the elections of the board of top executives or the board of directors of the hypothetical monetary authority based on the absolute majority of votes. The shared interest rate might then be established at the level which would reflect the workings of both the market forces and the political will of China with a corresponding degree of bargaining power.

6. Conclusion

Based on the research, the following outcomes can be delivered:

1. The article offers a very cautious gradualist approach in dealing with a hypothetical digital currency for the BRICS, based on a virtual platform that can be used by the countries of the related region.
2. The system of digital money circulation in the economies of the region is not perfect. However, it continually improves and, most importantly, there is no more effectively working alternative in the region today than the monetary system based on a digital currency.
3. The international division of labour, the internationalization of capital, production and labour exist only if there is highly developed money circulation. The modern architecture of money circulation and money itself gave birth to the way of human functioning of today and the organization of human labour on a highly intellectual level. In the end, technological change and industrial revolution would be impossible without such trade and dealings in digital money, cryptocurrencies and other quasi money.
4. Since the overwhelming majority of assets in the world are expressed in the U.S. dollars, the introduction of the new digital currency for the BRICS and other countries of the region will hardly influence the world market.
5. The research revealed the significance of the most important macroeconomic indicators which characterize the hypothetical digital money market of the BRICS, namely, a shared interest rate and the quantity of digital money in circulation needed for the penta-lateral use as well as for the use of the countries in close proximity.

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