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Index of the cycle of money—the case of Poland

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Abstract: This paper aims at assessesing how a well-established theory of the cycle of money works in a real scenario like the economic system of Poland. The prior works have revealed the case of Latvia, Serbia, Bulgaria, Greece, Thailand and Ukraine according to the concept of the theory of the cycle of money. The outcomes show that Poland is over the average global value. The results confirm that Poland is a well-structured economy able to overcome an economic crisis. The current work is significant, as it verifies the strength of Poland's economy to a potential crisis. The period under analysis encompasses the years 2012–2017, i.e. a period in which the EU and other European countries counteracted an economic crisis. Therefore, the purpose of the paper is to show the condition of Poland's economy, based on that theory. The paper aims to calculate the index of the cycle of money. The hypothesis of the paper is the econometric testability of the index of the cycle of money. The general index of the cycle of money of Poland's rate is 0.62 for the above-mentioned period of crisis in the Eurozone and more generally in Europe. Poland's index is much higher than this minimum rate. This is the only published work for Poland following this theory; therefore, it provides new findings of the economy of Poland, based on on the theory of the cycle of money.

Keywords: the cycle of money, index of the cycle of money.

Introduction

Bigger and international companies in most cases save their money in external banks and economic heavens. Therefore, according to this theory, the tax authorities should put an additional tax on this kind of companies to reduce the losses to the economy. Moreover, smaller companies and freelancers should be taxed with lower tax rates. It would be plausible to increase the dynamics of the economy. Factories, know-how services of big companies, the health care system and the educational system are special cases for the economy, as they belong to those cases where taxes improve the quality of the economy (Adhikari, Derashid, & Zhang, 2006; AICPA, 2017; Cai, 2017; Maxwell, 2020; Prestianawati, Mulyaningsih, Manzilati, & Ashar, 2020; Schram, 2018). Factories and large know-how companies increase the cycle of money, in the way that they do not substitute the activities of small-medium companies and

freelancers. The educational and health care systems improve the quality of the economy, making the whole economy better. Therefore, this paper seeks to make clear how the concept of the cycle of money works in an actual case scenario, such as the economic system of Poland (Ainsworth and Shact, 2014; Boland, 2014; Nations, 2014; Waworuntu and Hadisaputra, 2016; IMF, WB and WTO, 2017; Merle, Al-Gamrh and Ahsan, 2019; Irawan, Kinanti and Suhendra, 2020; Caldara et al., 2020; Choi, Furusawa and Ishikawa, 2020; Goswami and Purkayastha, 2020). The index of the cycle of money suggests how an economic system ought to counteract a monetary crisis and examines how well-structured a country's economy is. The estimates of the index of the cycle of money for Poland are used for a comparison with the global average index of the cycle of money (Challoumis, 2018, 2020b). The results reveal that Poland is close to the average global value, and therefore could face an economic crisis, as it is a well-structured economy (Gihman et al., 1972; Kushner, 1974; Wilson, 1986; Wijnbergen, 1987; United Nations, 2012).

The concept of the cycle of money reveals that taxes return to the economy in the case of the education and the health care system (these are exclusions from the mainstream where taxes support the economy). However, the tax authorities should maintain taxes at the lowest level. For small and medium companies, the government should protect them with very low taxes, simultaneously putting greater taxes on larger companies. Still, there is a type of big and international companies that should have low tax rates, as these companies do not substitute the activities of smaller companies. These types of big companies are factories and technological know-how companies. Then, the principal idea is to have a financial system, with the best allocation of production (Helpman, et al., 1989). Larger companies should not provide similar products and services, like those of smaller companies, as they can make investments in economic fields that smaller companies cannot support. In that way, an economic system achieves its best level. Additionally, the idea of the cycle of money shows that with the appropriate allocation of production units and taxes, money is cycled inside the economy achieving the maximum dynamics of the economy. This paper is about Poland's index of the cycle of money. The research is formed on the actual case scenario of the country's economic system. Therefore, the principal hypothesis of this paper aims to estimate the index of the cycle of money of Poland and to answer the question if it is near the worldwide general index of the cycle of money, according to the simple index or the general index of the cycle of money. The cycle of money of Poland should be above or close to the worldwide general index of the cycle of money to be able to counteract potential depression. The applied approach is based totally on mathematical estimations from the relevant theory.

The results clarified that Poland's economic system is properly established, as it follows the general international index of the cycle of money (the value of 0.5), which shows the average global case. The countries near and above 0.5

have appropriate distribution of money in their financial system. Consequently, Poland's economic system is considered as well established, based on the results of this paper. The question about the way in which the index of the cycle of money works in the case of Poland is answered on the basis of the structure of its economy and the way in which money is distributed in its economy. However, Poland needs some improvements to have an even better index of the cycle of money (Challoumis, 2020). Thus, Poland should decrease taxes for small and medium enterprises in order to achieve better reuse of money in the country's economic system and to increase taxes on big and international companies which proceed to controlled transactions (OECD, 2017a).

1. Literature review

The theory of the cycle of money is a theory that can reveal the economic dynamics of an economic system, and its potential to counteract a crisis. The reason for this is that the theory of the cycle of money depicts an economic system from a holistic view of the economy. This theory achieves that because it uses the GDP from the perspective of money and how it circulates in the economy. A metaphor for this theory could be that money is like "blood" in an "organism", and the economic units are "parts of the body". Thus, just as medical examination of "blood", money reveals possible problems of the organism. From a different point of view, the same happens during medical examination in some "parts of the body" – economic units, which check if there is some problem, so that a disfunction of the "organism" could be revealed. The theory of the cycle of money shows a complete image of the performance and the condition of an economy, determining if it can react to a potential economic crisis (the result of the index of the cycle of money in the case of Greece explained why the economy could counteract ten years of crisis when other indicators could not identify it clearly). The way in which money circulates and is distributed in an economy indicates how well-structured the economy is. If a body loses a lot of "blood" (ouflow of money from the economy), "parts of the body" will be weaker, and as a result, the "organism" (the economy), will become weaker. The opposite happens if money flows into the economy. If the "blood" (money) goes to one part of the "organism", this part will be much better; yet, from a holistic point of view, the "organism" will be weaker. This is the reason why the theory of the cycle of money is a theory which managed to "predict" that an international minimum rate of taxes should be implied for companies which proceed to international controlled transactions – F.L.P. (Fixed Length Principle) according to the theory of cycle of money (G7 decision for 15% global minimum tax rate) (Challoumis, 2019a).

Current results are based on the theoretical approach of the theory of the cycle of money, where the theory indicates that in the economy taxes return to

the society, basically in the case of the education and health systems. Besides, the authorities should keep taxes as low as possible for the medium or small economic units (meaning any kind of economic unit e.g. freelancers) and companies (Feinschreiber, 2004). In addition, the cases of Latvia, Serbia, Bulgaria, Greece, Thailand and Ukraine revealed that these countries are above the limit of 0.2 and close to the average rate of 0.5, making it possible to conclude that they can counteract a potential crisis (Challoumis, 2020a, 2021f, 2021e, 2021b, 2021d, 2021a, 2021c).

On the one hand, the fixed-length principle can enforce the cycle of money. On the other hand, the arm's length principle is the principle in which the authorities apply taxes to international companies and to groups of companies. The arm's length principle is a method that the tax authorities use to estimate tax obligations of the companies which participate in international transactions. The authorities applying the arm's length principle are tough to identify controlled transactions, as international companies offer similar data to those of uncontrolled transactions and they hide them with the purpose to avoid paying taxes. Thus, the authorities should apply the fixed-length principle. The fixed-length principle indicates that the companies making controlled transactions, manage transactions and achieve to avoid tax paying. Then, according to the fixed-length principle, international companies should pay plus a fixed amount of tax. Therefore, the cycle of money is boosted for the reason that larger companies generally receive money from society and the economy and save them in international banks. Therefore, that money is lost from society, diminishing consumption. According to the fixed-length principle, the local companies which save their money in local banks should have lower tax rates (Lerner, 1936; Mirman, 1971; Meyer and Rosenbaum, 2000; King, 2009; Ross, 2010; (ATO) et al., 2012; Ossa, 2014; OECD, 2015, 2017; McKay, Nakamura and Steinsson, 2016; Lindé and Pescatori, 2019).

Concluding, the fixed-length principle serves the theory of the cycle of money, where small and medium companies must pay lower taxes than larger companies which substitute their commercial activities. On the other hand, the arm's length principle estimates taxes standing on the methodologies provided by the companies that make international transactions. Hence, the large companies cover the activities of the smaller companies. Finally, small and medium companies robust the distribution of money to the country's economy, as usually they do not save their money outside the country's economic system, and reuse the money inside the economy. Therefore, the money distributed inside the economy a number of times increases the cycle of money (Challoumis, 2018, 2019b, 2020b, 2021b, 2021a).

The reason why money increases the cycle of money is obvious according to eq. (4) of the general index of the cycle of money. An implication of appropriate tax policy hinged on the theory of the cycle of money is expressed in two steps. The first step is about levying higher taxes on bigger companies that sub-

stitute the activities of smaller companies. Along these lines, bigger companies should be led to the sector of manufacturing and high know-how technological units. Hence, the country's economy could achieve a better structure, as smaller companies will be able to reuse and distribute money widely, and through the applied tax policy, bigger companies will invest in the manufacturing sector. Hence, the application of the cycle of money permits the improvement of the economy's structure, which is reflected in the distribution and reuse of money in the economy. The bigger companies, in particular, use the arm's length principle to achieve better allocation of profits and losses, through international banks and tax heavens, making the local banking systems weaker.

2. Methodology

This work utilises the mathematical background of the theory of the cycle of money. Based on the work "Mathematical background of the theory of cycle of money" the following mathematical equations have been defined:

$$c_y = c_m - c_\alpha \tag{1}$$

$$c_y = \frac{dx_m}{dm} - \frac{dx_m}{da} \tag{2}$$

$$i_{cy} = Y \cdot b_d \tag{3}$$

$$g_{cy\ Country} = \frac{c_{y\ coyntry's}}{c_{y\ Average} + c_{y\ coyntry's}} \text{ or } \frac{i_{cy\ coyntry's}}{i_{cy\ Average} + i_{cy\ coyntry's}} \tag{4}$$

$$g_{cy\ Average} = \frac{c_{y\ Average}}{c_{y\ Average} + c_{y\ Average}} \text{ or } \frac{i_{cy\ Average}}{i_{cy\ Average} + i_{cy\ Average}} = 0.5 \tag{5}$$

The c_m is the velocity of financial liquidity, c_α is the velocity of escaped savings and c_y is the cycle of money. The i_{cy} is the index of the cycle of money, Y is the national income or GDP, and b_d is the bank deposits of the country. In addition, $g_{cy\ Country}$ symbolizes the general index of c_y of the country, $i_{cy\ coyntry's}$ or $c_{y\ coyntry's}$ is the index of c_y of the country, and $i_{cy\ Average}$ or $c_{y\ Average}$ is the global index of i_{cy}. Concluding, $g_{cy\ Average}$ is the general global index of c_y, and is obtained as a global constant (Challoumis, 2019a, 2021d, 2021a, 2021c). The proper aim is to establish the connection between the index of global average c_y, the bank deposits and the GDP per capita, with an econometric approach. Then, the initial hypothesis is confirmed, namely that the cycle of money of the real case scenario is above the global average index of the cycle of money. The eq. (4) and (5) mean that an economy near to the value of 0.5 can face an economic

crisis immediately. Results close to this value represent an appropriate index of the cycle of money, revealing an adequate economic structure of the society and appropriate distribution of money between the citizens – consumers. Equation (1) is the term of the cycle of money used to define the $c_{y\ coyntry's}$ and $c_{y\ Average}$ of eq. (2).

The cycle of money to a quantity value is expressed by GDP, which is basically an expression of $\dfrac{\partial(\text{GDP})}{\partial(S+I+X)}$, according to $\dfrac{dx_m}{dm}$ and $-\dfrac{\partial(\text{GDP})}{\partial(S'+I'+M)}$ based on $\dfrac{dx_m}{da}$. Then, $c_y = d(GDP) = \dfrac{\partial(\text{GDP})}{\partial(S+I+X)} d(S+I+X) - \dfrac{\partial(\text{GDP})}{\partial(S'+I'+M)} d(S'+I'+M)$,

formed on $c_y = \dfrac{dx_m}{dm} - \dfrac{dx_m}{da}$, of eq, (2), where S is savings, I is investments and X is exports. Then, S' is the savings which are oriented to banks outside the country's economy, I' is the investments which are oriented to banks outside the country's economy, and M are the imports. Therefore, the cycle of money expresses the GDP as the following: $Y = S_T + I_T + (X - M)$, or $Y = (S - S') + (I - I') + (X - M)$ or $Y = \Delta S + \Delta I + (X - M)$. According to the theoretical background, for the lost money from the economies, the problem of controlled transactions could be administrated if an organisation could identify money transitions between the economies, comparing the global economies by ΔS, ΔI, and $(X - M)$.

$$\text{Thus, } c_{ytotal} = \sum_{i=1}^{n}\sum_{t=1}^{m} c_{yi,t} = \sum_{i=1}^{n}\sum_{t=1}^{m}\left[\frac{\partial(\text{GDP})}{\partial(S+I+X)} d(S+I+X) + -\frac{\partial(\text{GDP})}{\partial(S'+I'+M)} d(S'+I'+M) \right]_{i,t}.$$

Because data from an organisation for these activities do not exist, the application of the index of the cycle of money is necessary. The cycle of money is an expression of the minus between the differential equations of the volume of money that is used in an economy and the volume of money that is lost from the economy. This is the reason why the theory of the cycle of money supports higher taxes for companies that make controlled transactions and, in general, bigger companies for the reason that smaller companies use an amount of money multiple times. There is an exemption for high technology companies and factories whose activities cannot be substituted by smaller companies (Mackean, Fisher, Friel, & Baum, 2020; Maxwell, 2020; Schram, 2018). Thus, if bigger companies substitute smaller companies, they should be taxed higher. As a result, bigger companies should be directed by the authorities to activities that cannot be offered by smaller companies, like factories and high technological units with beneficial, low tax rates. Thus, money is reused multiple times in the economy (Constantinos Challoumis, 2021g). Concluding:

$$c_y = d(GDP) = \frac{\partial(GDP)}{\partial(S+I+X)} d(S+I+X) - \frac{\partial(GDP)}{\partial(S'+I'+M)} d(S'+I'+M) \quad (6)$$

or $$c_{ytotal} = \sum_{i=1}^{n}\sum_{t=1}^{m} c_{yi,t} \quad (7)$$

$$c_{ytotal} = \sum_{i=1}^{n}\sum_{t=1}^{m}\left[\frac{\partial(GDP)}{\partial(S+I+X)} d(S+I+X) - \frac{\partial(GDP)}{\partial(S'+I'+M)} d(S'+I'+M)\right]_{i,t} \quad (8)$$

Equations (5)–(8) are the proof of eq. (1)–(2). Moreover, eq. (3)–(5) for the indexes of the cycle of money express that the money of local banks comes from the whole economy, which in more than 90% of cases come from small and medium enterprises as well as freelancers. For this reason, the substitution of smaller companies transfers huge earnings of money out of the economy to tax heavens and international banks, outside the country. Hence, bank deposits indicate the amounts of money distributed and reused in an economy. In addition, the GDP is the derivative of the characteristics of the economy, giving its structure. The relation between the GDP and bank deposits is an expression of the index of the cycle of money.

3. Results—the case of Poland

According to the prior methodology, the following results have been obtained. This table includes the parameters of bank deposits, GDPs and the indexes of the cycle of money. This section reveals the dependence of Poland's index of the cycle of money using bank deposits and the GDP per capita (based on Poland's economy). The bank deposits of the global average and the global GDP per capita are used for the comparison of Poland's economy, its GDP per capita and the country's bank deposits.

The same conclusions come from an econometric point of view, with the dependent variable to be the index of the cycle of money:

The hypothesis is about the index of the cycle of money as a dependent variable with the factors presented in the above table; moreover, it offers an econometrical point of view in the current study. In addition, the Durbin-Watson has a value of approx. 2.5. Following the above table, the value with two asterisks symbolizes the case that the coefficient is below the 0.05 significant level. The values with three asterisks are for the coefficients that are below the value of 0.01. Thus, the indexes reveal Poland's distribution of money and the form of its economic structure (see Table 2). The first three rows of the table reveal that the *p*-value is important, and therefore the initial hypothesis has been rejected and the model is accurate. The fourth row is expected to be above the

Table 1. Poland's OLS analysis

Variable	Coefficient	Standard error	*p*-value
Constant	−1.35898e+06	32524.2	0.0006 ***
Poland's financial deposits	26009.3	1301.10	0.0025 ***
Poland's GDP per capita	55.8946	1.41381	0.0006 ***
Global index of the cycle of money (log)	19515.6	3342.13	0.0455 **

Source: Own compilation.

0.1 *p*-value, as the global index of the cycle of money is independent of any country's rate, since in most cases, the country has a very small amount of the aggregate value. Hence, based on the estimations and the theoretical background it the condition of the economic structure of the country may be determined as well as the fact whether Poland belongs to the group of very good economies. According to these results, it is possible to clarify the condition of the cycle of money in Poland.

Table 2. Poland's index of the cycle of money

Year	Financial Deposits Global Average per GDP (%)	Financial Deposits Poland per GDP (%)	Global GDP per Capita ($)	Poland's GDP per Capita ($)	Index of Global Average Cy ($)	Index of Poland's Cy ($)
2012	52.48	48.84	16,653.01	25,457	873,949.96	1,243,319.88
2013	53.96	50.39	17,266.62	26,650	931,706.82	1,342,893.50
2014	55.81	51.92	17,159.02	27,797	957,644.91	1,443,220.24
2015	59.38	53.57	15,295.71	28,683	908,259.26	1,536,548.31
2016	60.77	55.75	15,330.03	30,065	931,605.92	1,676,123.75
2017	60.07	55.69	15,082.49	31,674	906,005.17	1,763,925.06
Results					5,509,172.04	9,006,030.74

Source: Globaleconomy.com and author's compilation.

Figure 1 presents the situation of financial deposits of Poland's financial system, as a percent of GDP, for the period of 2012–2017. Next, Figure 2 presents Poland's GDP.

Figure 2 presents the GDP condition of Poland's economy for the period between 2012 and 2017. Also, the next scheme presents the GDPs of Poland, for the same period.
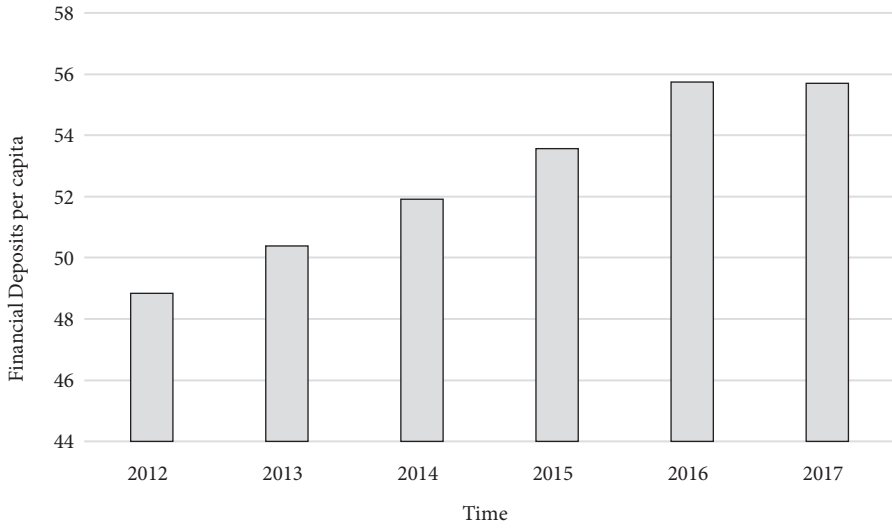
Figure 1. Poland's financial deposits
Source: Globaleconomy.com.
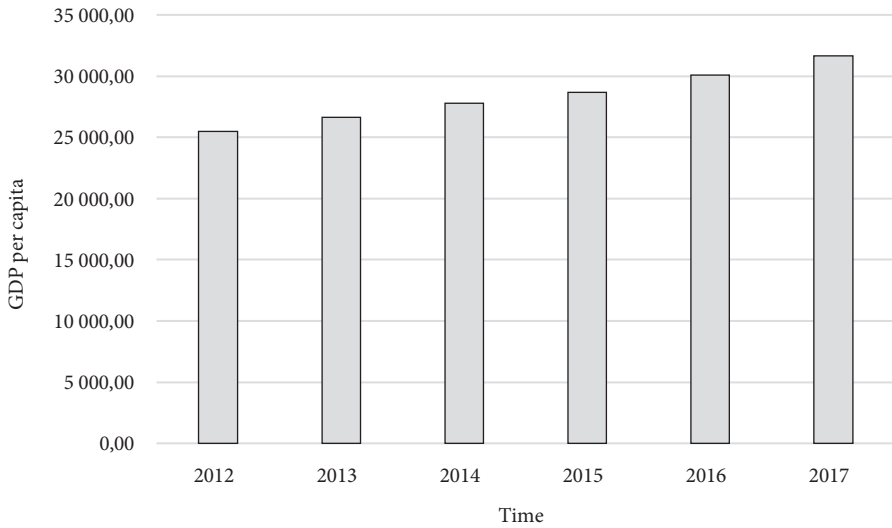
Figure 2. Poland's GDP per capita
Source: Globaleconomy.com.

According to prior results, the index of Poland's c_y is $9,007,931.18 We obtain from the results that the index of the global average c_y is $5,509,172.04.

Calculating the general index of the cycle of money both for Poland and globally, we obtain the following results:

– The general index of c_y for Poland is $g_{cy\ Country}$ = 0.62
– The general index of c_y of global view is $g_{cy\ Average}$ = 0.5

Therefore, it is concluded that Poland's index of the cycle of money is close to the global average cycle of money. Thus, the dynamics of Poland's economy complies with the global average and its structure is close to the initial hypothesis. As a result, Figure 3 may be presented:

Figure 3. The index of the cycle of money
Source: Own compilation.

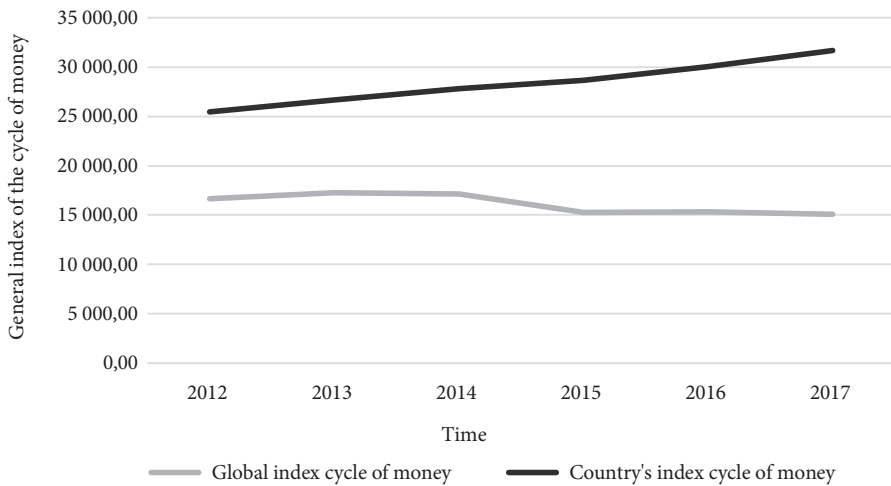Figure 3 shows that the index of the cycle of money of Poland's economy is above the global average of the index of the cycle of money, which is 0.5 (considered as a global constant). Poland's index of the cycle of money is 0.62. The countries that are close to 0.5 have a well-structured economy—based on eq. (5), using the theoretical background of the cycle of money. Thus, it may be concluded that the economic structure of Poland has an upper distribution of money to its economy. Poland could proceed to more reforms, as the international and bigger companies still substitute the local medium and small companies. The authorities should apply the fixed-length principle, then higher taxes should be implied on larger companies. Therefore, the distribution of money inside the economy will increase, and social welfare will be ameliorated. The government should protect small and medium companies more in order to avoid losing money from the transactions of larger companies.
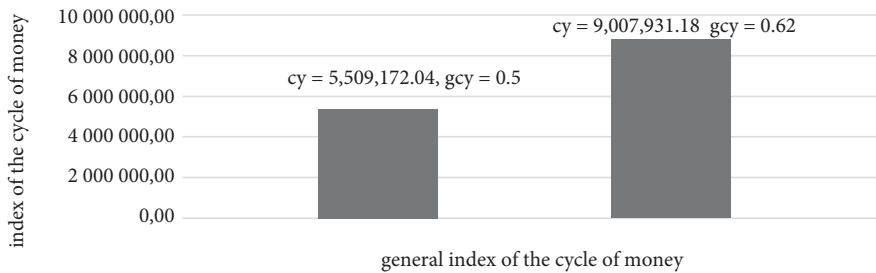
Figure 4. The cycle of money indexes
Source: Own compilation.

Figure 4 presents the general index of the cycle of money.

The previous figures have presented the combination of the index of the cycle of money with the case of the general index of the cycle of money. What is shown is the connection between the global average indexes and Poland's index. Poland belongs to a group of countries which are above the global average index of the cycle of money, both for the simple index and general index.

Conclusions

The current theoretical concept is the only one that reveals the structural characteristics of the economy by the functionality of the economy. This is the only work which presents Poland's index of the cycle of money. Additionally, the decision of the G7 for a minimum tax rate of 15% is acknowledged by the fixed-length principle that comes from the theory of the cycle of money (Challoumis, 2019a, 2019b). Poland is above the worldwide average index of the cycle of money. Figures 2 and 3 show that Poland's distribution of money is to an upper rate. The cycle of money of the country permits a very good distribution of money. The losses of the local banks are to an upper degree. Besides, the country's economy could be better due to the fact that an amount of money is excluded from the local financial system by worldwide transactions (see Table 2). The structure of the economy is directly connected with the distribution and reuse of money, which are bound, affirming the strength of an economy to a potential crisis.

The implementation of the cycle of money could be applied in two steps. Initially, the authorities must impose a low tax rate on small and medium enterprises and at the same time a high tax rate on big enterprises that substitute the activities of the smaller ones. Larger companies must invest in factories and know-how technological units. Thus, the authorities should impose a low tax rate on big companies for these activities. Furthermore, the authorities must

allow the economy to act to more appropriate perfect competition, after the implication of the first step's diverse tax policy, thus facing monopolies and oligopolies. The contribution of the paper is sufficient to the current research, as it clarifies for the first time the general index of the cycle of money of Poland. Poland can counteract an economic crisis according to its index of the general cycle of money because it is above the minimum value of 0.2 and the average rate of 0.5. Poland's financial dynamics is above the worldwide average cycle of money, as the value of 0.62 indicates that Poland's economy has an appropriate distribution of money.

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