
Structure of Financing Public Infrastructure Investments – The Case of Poland

Submitted 15/08/23, 1st revision 20/08/23, 2nd revision 11/09/23, accepted 30/09/23

Krystyna Brzozowska¹

Abstract:

Purpose: The aim of the review study is to analyze the structure of financing of infrastructure projects in Poland, divided into individual types of local government units.

Design/Approach: The research concerning the structure of financing in Poland for infrastructure investments in 2007- 2022 was conducted on the basis of secondary data from statistical data included in reports on the implementation of budgets of local government units published on the websites of the Ministry of Finance and the Ministry of Funds and Regional Policy were used. The subject of the study was the sources of financing for infrastructure investments, divided into investment subsidies, credits and loans, bonds, and private shares.

Findings: The extraordinary situation in the world, triggered and exacerbated by the COVID-19 pandemic, has caused negative changes in the infrastructure sector. At the country level like Poland, there is a noticeable shift in the proportion of infrastructure investment financing. The conducted research clearly confirmed the debt nature of the structure of financing investments carried out by local government units in Poland. The situation caused by the COVID-19 pandemic resulted in a reduction in the share of budget subsidies and EU subsidies in the financing structure of public investments in Poland due to the need to reallocate funds to fight the pandemic.

Practical implication: The research conducted on the financing structure of infrastructure investment in Poland may provide a rationale for expanding research in this area in another countries and regions and assessing the vulnerability of financing relationships to unexpected external difficulties.

Originality/Value: The study, in the form of a scientific contribution with a high degree of applicability, takes the form of a review using literature and published statistics and was geared towards analyzing and assessing changes in the financing structure of infrastructure investment in particular forms of local governments in Poland.

Keywords: Infrastructure investment, financial structure, funding sources, local government units, Poland.

JEL Codes: G11, H54, H72, O52, O18.

Paper type: Research article.

¹Institute of Spatial Economy and Socio- Economic Geography, University of Szczecin, Poland, ORCID: 0000-0003-1205-4332, krystyna.brzozowska@usz.edu.pl;

Acknowledgement: *The project is financed within the framework of the program of the Minister of Science and Higher Education under the name "Regional Excellence Initiative" in the years 2019-2022; project number 001/RID/2018/19; the amount of financing PLN 10,684,000.00.*

1. Introduction

The specific features of infrastructure investments resulting from their nature - high capital intensity, long payback period, public utility - increase the difficulties associated with their selection, design, implementation, and, above all, with their financing structure and obtaining financial closure (Gonzales-Ruiz, Botero-Botero, and Pena, 2022). The concept of financing structure is generally assumed to be a summary of the share of various financial instruments taking into account their importance in the entire value of the planned investment (Yifu Lin, Xifang Sun, and Ye Jiang, 2009; Esty, 2004; Gebhardt, Ziegler, and Mourant, 2022).

Infrastructure investments may be financed from own funds or external funds, most often of a debt nature. In practice, the form of mixed financing is most often used because financing highly capital-intensive infrastructure investments from own (public) funds is not possible due to tight budgets and insufficient budget surpluses of local government units, as pointed out in the studies (Soleymani, Ravanshadnia, and Montazer, 2021).

Moreover, in general, all potential creditors, when considering the possibility of financing a given investment, take into account the amount of own contribution made by the potential debtor/debtors, setting the condition of a minimum level of contributed own funds.

Infrastructure needs are constantly growing, despite the constant increase in investments. According to estimates, the infrastructure gap on a global scale reaches approximately USD 0.7 trillion. Investment needs in highly developed countries (European Union countries and the United States) result mainly from the need to modernize and renew infrastructure, and in countries at a lower level of development from the need to create new facilities and networks (Arezki *et al.*, 2016, p. 7).

Expenditure on new investments should constitute approximately 60%, and expenditure on maintaining existing facilities and networks 40% of total expenditure on infrastructure investments (Brichetti *et al.*, 2021). Regardless of the size of the investment and its importance for the economic development of the world, country or region, the issues of selecting financing sources and mitigating the risks associated with their use occur in every public infrastructure project.

The aim of the review study is to analyze the structure of financing of infrastructure projects in Poland, divided into individual types of local government units. The study was conducted on the basis of secondary data. Published statistical data

included in reports on the implementation of budgets of local government units inserted on the websites of the Ministry of Finance and the Ministry of Funds and Regional Policy were used.

2. Review of the Literature

The capital structure can be considered in terms of the type of financial instruments used, the proportion of the share of individual financial instruments, sources of financing or the content of contracts between the capital recipient and the capital provider in terms of the adopted conditions (Xueqing, 2005). Administrators of financial resources first consider the relationship between equity and external capital.

In practice, when considering the possibility of granting an investment loan, the standard ratio is 25:75 in relation to equity capital and external capital. Each of the presented cross-sections will affect the finalization of the financing structure and, consequently, the cost of financing the project. There is no doubt that the high share of equity in relation to the total cost favors lowering the interest rates on credits and loans.

Financing conditions are of key importance for the debtor's future liquidity, i.e., the ability to meet current obligations and even its solvency. The selection of the financing structure makes it necessary to find solutions to basic issues related to the organization and financing of the investment, management and control of its implementation, introducing the possibility of resolving disputes with parties participating (mainly donors of financial resources) in the implementation of the investment, and finally with the completion and acceptance of the entire investment (Finnerty, 1996, p. 159; Pociovalisteanu and Thalassinou, 2009).

The consequence of diversifying the capital structure, taking into account the specificity of the project, the amount of expenditure incurred and the long implementation period, is the inability to determine a standard financing structure that would be the best solution for all infrastructure projects and therefore could be model structure. Situations regarding infrastructure projects with the participation of the private sector (public-private partnership projects) are of particular importance in determining the financing structure (Trigkas *et al.*, 2019).

In such cases, countries with a good situation of the public finance sector have greater freedom in shaping the capital structure projects implemented with the participation of the private sector - from their point of view the advantage of public-private partnership is, above all, gaining access to new technologies brought by private partners and opportunities use of their knowledge and experience, and less access to additional funds financing planned investments (Cenkier, 2009). Situations regarding infrastructure projects with the participation of the private sector (public-

private partnership projects) are of particular importance in determining the financing structure (Pham *et al.*, 2022).

The financing structure of infrastructure projects is characterized by high level of debt in relation to the investment cost estimate (from 50% to 90% of the project cost estimate), insufficient security on the project assets. Due to the very high level of capital intensity of infrastructure investments and the long payback period, obtaining funds to finance them is not an easy undertaking. Building the financing structure in most cases takes several years and does not always end with financial closure.

The basic source of financing for infrastructure projects, apart from capital contributions from public partners in the form of budget surpluses and private partners in the form of shares or shares, are loans taken out from commercial banks. The most frequently used loans to finance public investment projects include term, revolving, stand-by and bridge loans.

The second important groups of debt instruments are loans granted by multilateral financial institutions, such as the World Bank Group, the European Investment Bank, the European Bank for Reconstruction and Development, the Asian Development Bank, the African Development Bank, the Inter-American Development Bank, and the Caribbean Development Bank.

Loans granted by commercial banks and multilateral financial institutions to cover the costs of infrastructure projects constitute an essential part of all debt resources obtainable on financial markets.

Other forms of financing, such as bond issues, share issues or equity participations, are much less important, although growing, on the international financial market (Ostrowski *et al.*, 2000; Grinblatt and Titman, 1998). Other capital market instruments - derivatives (currency and interest rate swaps, possibly options) de facto play the role of instruments securing the value of the transaction as part of hedging in such transactions (Xueqing, 2005; Grima and Thalassinos, 2020; Bull and Lethbridge, 1996).

Capital shares in infrastructure investments concern the acquisition of stocks and shares in projects classified as public-private partnerships. Equity shares most often range from 15 to 30% of the estimated cost value of the investment (Songer *et al.*, 1997), and their size is a determinant of the amount of debt that lenders are willing to grant to finance the project.

In recent years, infrastructure funds, which are private equity investment funds, have been playing an increasingly important role. The purpose of infrastructure funds is to provide medium and long-term capital by investing in equity instruments or structured capital instruments of entities involved in infrastructure development (Davis, 2008).

3. Research Methods

Statistical data for the study were obtained from reports on the implementation of the state budget for the years 2017-2022, including information on the implementation of budgets of local government units in Poland (<https://www.gov.pl/web/finanse/zestawienia-zbiorcze>).

The subject of the study was the sources of financing for infrastructure investments, divided into investment subsidies, credits and loans, bonds, private shares, taking into account the detailed legal solutions introduced, aimed at, among others, limiting the impact of the effects of the pandemic (funds received by local governments in the part intended for investments in 2020-2022 from the COVID-19 Counteracting Fund). Investment subsidies are included in two groups, subsidies from the state budget and subsidies obtained under programs financed from EU funds.

In particular, investment subsidies were taken into account: for tasks related to government administration, for own tasks, for tasks carried out on the basis of agreements between local government units, due to financial assistance granted between local government units to co-finance their own tasks, received from earmarked funds, under programs financed with European funds, under programs financed with European funds in the 2014-2020 financial perspective.

The last two groups concern investment funds obtained by local government units from European funds. Data on loans and advances for investment purposes were obtained in total amounts; it was not possible to obtain data on loans granted by commercial banks and loans granted by development banks. Data on bond issues was also obtained in general amounts without division into municipal bonds, Catalyst listed bonds and revenue bonds.

As part of the COVID-19 Counteract Fund additional funds were provided for local government units². In total, over PLN 13 billion was allocated to support local government units (Kostyk-Siekierska, 2021; Report, 2023). Data on private capital involved in financing infrastructure investments was obtained from the database of concluded and signed PPP projects in 2017-2022, published on the PPP Platform website (<https://www.ppp.gov.pl/baza-zawartych-umow-ppp>) with the estimated cost value assumed as private capital project. The amounts included in the study are of an overview nature, indicating only the approximate amounts of private capital involved.

The study covered 4 types of local government units, in accordance with the classification adopted in the statistics of the Ministry of Finance, i.e., communes,

²The grants could be used for investments serving local communities, including: modernization and renovation of schools, kindergartens, water supply and sewage systems, construction of nurseries and roads (Kucia-Guściora 2020; Łubina, 2021; Uścińska, 2021).

cities with poviats rights, poviats and local government voivodeships. As of January 1, 2023, the administrative division of Poland included (Division, 2023): 16 voivodeships, 314 counties and 66 cities with county rights, 2477 communes (including 302 urban communes, 677 urban-rural communes and 1,498 rural communes). The time scope of the research covered the period of 6 years 2017-2022.

4. Findings

The investment outlays of municipalities systematically increased during the period under study, reaching approximately PLN 43,310 million in 2022 compared to PLN 27,824 million in 2017, which translated into a growth dynamics of 55.65%. The dynamics of cities with county rights amounted to 27.6% in the ratio of PLN 26,750 million in 2022 to PLN 20,960 million.

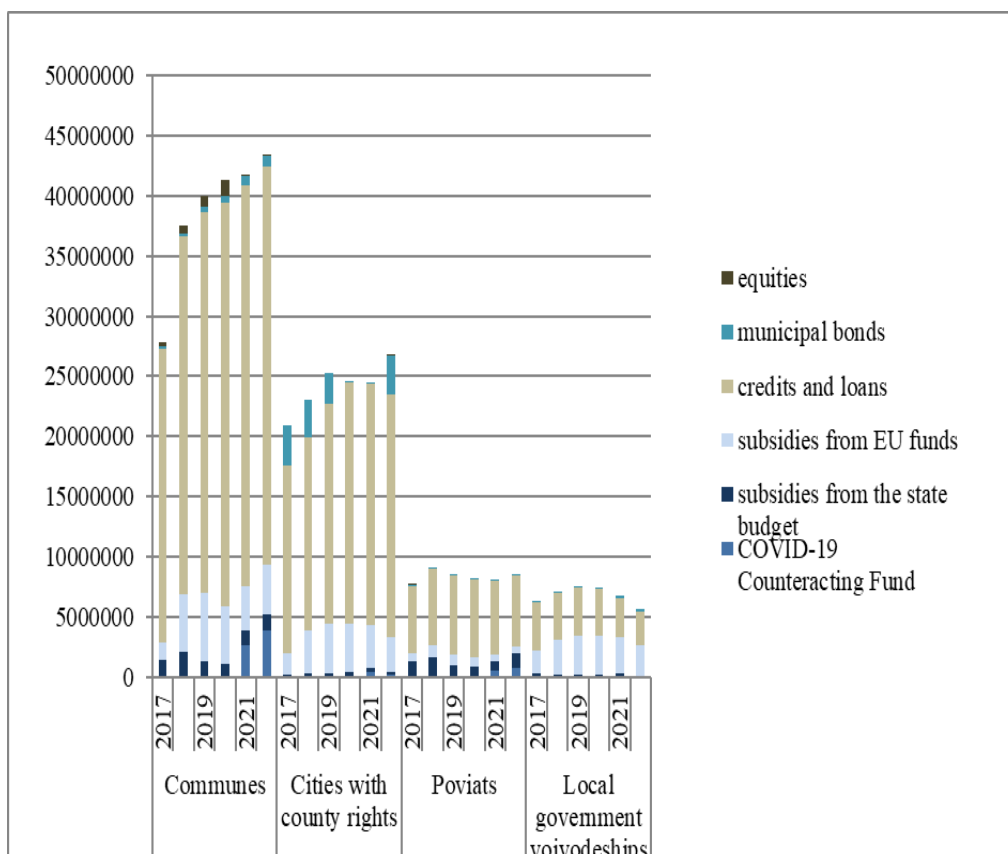
A lower dynamics of growth in investment outlays occurred in poviats at the level of 10.11% in the ratio of PLN 8,514 million in 2022 to PLN 7,732 million in 2017. In local government voivodeships, investment outlays have been decreasing since 2018, and the dynamics of changes in 2017 / 2022 was -8.54%. The amounts of investment expenditure divided into sources of financing are presented in Figure 1.

In absolute values, the largest investment outlays were incurred in communes, followed by cities with poviats rights, poviats and local government voivodeships. If the values of infrastructure investments are presented in the form of average expenditures per number of units belonging to a given type of local government units, the obtained values (Figure 2) will allow the proportion to be reversed - the largest expenditures on infrastructure investments were incurred by voivodeships (ranging from over PLN 390 million in 2017 to over PLN 357 million in 2022) and cities with county rights (ranging from over PLN 317 million in 2017 to over PLN 405 million in 2022, while the averages for communes were many times lower than the average in voivodeships and cities with county rights (range from PLN 11 million in 2017 to over PLN 17 million in 2022) and counties (range from over PLN 24 million in 2017 to PLN 27 million in 2022).

Average results in individual types of local government units should be treated only as an overview, but there is no doubt that they more clearly indicate the position and importance of given local government units in the implementation of tasks resulting from the territorial division of the country.

Municipalities, treated as basic units of local government, have the smallest area and scope of tasks regarding the area of their operation, cities with poviats rights are the largest cities in the country and for this reason their investment needs are much greater and require much higher outlays, and local government voivodeships are identified with regions, and their tasks concern the development of the entire region.

Figure 1. Value of investment outlays on public projects in Poland in 2017-2022 according to the sources of their financing (in PLN thousand)

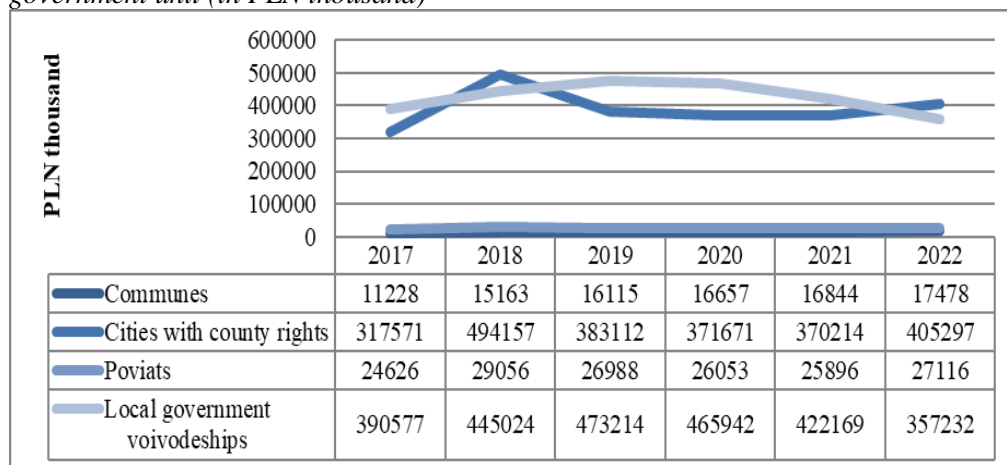


Source: Own study based on Information on the implementation of municipal budgets for the 4 quarters of 2017-22. <https://www.gov.pl/web/finanse/sprawozdania-budzetowe>.

The presented Figures indicate that the structure of financing public investments in Poland is based mainly on debt instruments, with the largest shares relating to loans and credits. Figure 3 contains a graphical representation of the shares of individual financing sources across types of local government units.

The share of debt funds in communes and cities with county rights remained at the level of approximately 80% (in communes from 87.8% in 2017 to 76.6% in 2022). In poviats and local government voivodeships it was at slightly lower levels - in poviats from 69.7% in 2018 to 78.7% in 2020, and in voivodeships from 47.4% in 2021 to 63.5% in 2017.

The share of loans and credits in cities with county rights ranged from 74.1% in 2017 to 82.5% in 2021.

Figure 2. Average value of infrastructure investments in Poland per local government unit (in PLN thousand)

Source: Own study based on *Information on the implementation of municipal budgets for the 4 quarters of 2017-22*. <https://www.gov.pl/web/finanse/sprawozdania-budzetowe>.

Local government units also incurred debt in the form of issued municipal bonds, the share of which in the financing structure was relatively small, ranging from 0.9% to 3.4%. Larger shares concerned local government voivodeships - in the amount of 3.4 - 4.0% and in cities with county rights, where municipal bonds participated at the level of 10.3 - 16.3% of the entire structure of financing public investments.

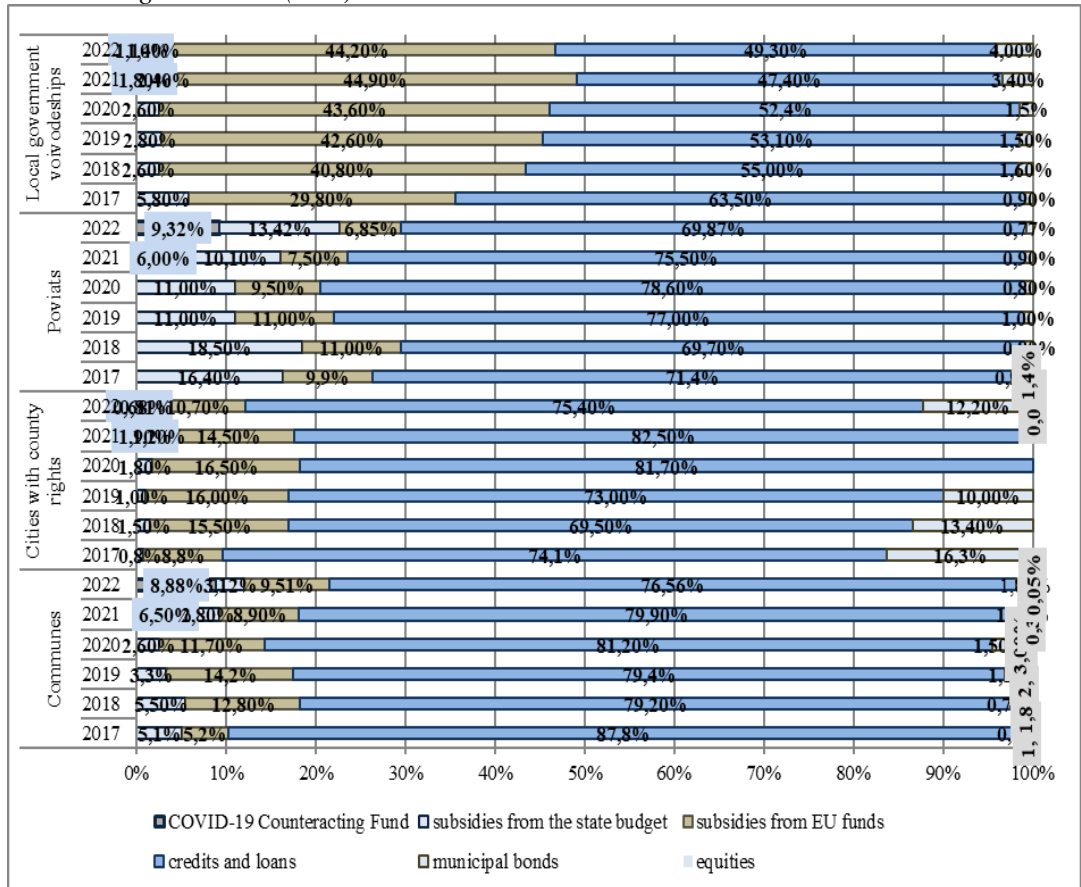
The highest shares of investment subsidies from the state budget in the structure of financing infrastructure investments were obtained by poviats at the level of 16.4% and 18.5%, respectively, in the analyzed years; 11.1%; 10.1% and 13.4%. The share of municipalities was relatively small - from 5.2% in 2017, 14.2% in 2019 and in the following years a reduction to 9.5% in 2022. The share of cities with county rights did not exceed 1.8%, and the share of local government voivodeships amounted to less than 3% per year on average, and in 2022 obtained the level of 1.4%.

Funds allocated from the European Union were an important component of the financing structure. The largest shares in the financing structure were held by local government voivodeships - at the level of approximately 45% compared to 10-14% of shares of other types of local government units. Such a high share results from the function of the main beneficiary of EU programs assigned to voivodeships as entities dealing with the development of a given region.

The share of counties was from 9.9% in 2017 through 11% in 2018 and 2019 to 6.85% in 2022. The shares of cities with county rights were at a higher level - from approximately 9% in 2017 to 14.5% in 2022. Subsidies from EU funds in municipal investments had a slightly lower share - from 5.2% in 2017 to 9.5% in 2022. The average level of the share of EU subsidies in municipal investments in the analyzed

period was 10.4%. The shares of private capital in the structure of financing infrastructure investments under public-private partnership (PPP) transactions were very low in voivodeships and poviats (1.4% in 2017), and throughout the entire research period they occurred only in municipalities - from 1.3% in 2017 to 3% in 2020, and in subsequent years only in trace amounts.

Figure 3. Structure of financing public investments in Poland by type of local government (%)



Source: Own study based on Information on the implementation of municipal budgets for the 4 quarters of 2017-2022 <https://www.gov.pl/web/finanse/sprawozdania-budzetowe>

It should be emphasized that the lower shares of budget subsidies and EU subsidies in 2021-2022 were the result of an unprecedented shift of financial resources to fight the COVID-19 pandemic. At the same time, a new instrument was introduced in the form of the COVID-19 Counteracting Fund, which was used by all types of local government units, mainly municipalities and poviats, which resulted from the statutory tasks assigned to them in the field of health protection.

The Fund's share in the financing structure of infrastructure investments in 2021-2022 was 6.5 and 8.9% in communes, 1.9 and 0.7% in cities with poviats rights, 6 and 9.3% in poviats, and 11.8 and 1.1% in self-government voivodeships.

5. Conclusions

In the years under study, the largest increase in public investments occurred in communes and cities with county rights, while in self-government voivodeships they decreased. The conducted research clearly confirmed the debt nature of the structure of financing investments carried out by local government units in Poland.

The structure of financing public investments in Poland is dominated by debt instruments in the form of credits and loans and funds obtained under programs of the European Union. The situation caused by the COVID-19 pandemic resulted in a reduction in the share of budget subsidies and EU subsidies in the financing structure of public investments in Poland in 2021-2022 due to the need to reallocate funds to fight the pandemic.

References:

- Brichetti, J.P., Mastonardi, L., Rivas, M.E., Serebrisky, T, Solis, S. 2021. The infrastructure gap in Latin America and the Caribbean: Investment Needed through 2030 to Meet the Sustainable Development Goals. Inter-American Bank, Washington DC.
- Cenkier, A. 2009. Struktura finansowania projektów partnerstwa publiczno-prywatnego, *Studia I Prace Kolegium Zarządzania i Finansów ZN 95*. SGH Warszawa, 78, 82.
- Demirel, H.C., Leendertse, W., Volker, L. 2022. Mechanisms for protecting returns on private investments in public infrastructure projects. *International Journal of Project Management*, No. 40.
- Donkor, E.A., Duffey, M. 2013. Optimal Capital Structure and Financial Risk of Project Finance Investments: A Simulation Optimization Model with Chance Constraints. *The Engineering Economist*, 58(1), 19-34.
<https://doi.org/10.1080/0013791X.2012.742948>.
- Esty, B.C. 2004. Why Study Large Projects? An Introduction to Research on Project Finance. *European Financial Management*, Vol. 10, No. 2, 213-224.
- Finnerty, J.D. 1996. *Project financing: asset-based financial engineering*. Wiley, New York.
- Gebhardt, J., Ziegler, R.C., Mourant, A. 2022. Water infrastructure financing: The experience of the United States: Financing Investment in Water Security. *Recent Developments and Perspectives*.
- Gonzales-Ruiz, J.A., Botero-Botero, S., Pena, A. 2022. Analysis of the Capital Structure in Sustainable Infrastructure Systems: a Methodological Approach. *Sustainability*, 14, 12662. <https://doi.org/10.3390/su141912662>.
- Grima, S., Thalassinou, E.I. 2020. *Financial derivatives: a blessing or a curse?* Emerald Publishing Limited.
- Kostyk-Siekierska, K. 2021. Wpływ pandemii COVID-19 na sytuację finansową i funkcjonowanie jednostek samorządu terytorialnego. *Zeszyty Naukowe Małopolskiej Wyższej Szkoły Ekonomicznej w Tarnowie*, 51(3). DOI: 10.25944/znmwse.2021.03.2945.

- Kucia-Guściora, B. 2020. Fundusz Przeciwdziałania COVID-19 – antidotum finansowe na czas pandemii. *Kwartalnik Prawno-Finansowy*, nr 1. DOI: 10.34616/kpf.2020.1.26.51.
- Łubina, J. 2021. Oddziaływanie pandemii COVID-19 na finanse jednostek samorządu terytorialnego. *Prawo Budżetowe państwa i samorządu*, 4(9), 103-116. <http://dx.doi.org/10.12775/PBPS.2021.024>.
- Pham, T.H., Hoang, T.T.H., Thalassinou, E.I., Le, H.A. 2022. The Impact of Quality of Public Administration on Local Economic Growth in Vietnam. *Journal of Risk and Financial Management*, 15(4), 158.
- Pociovalisteanu, D.M., Thalassinou, E. 2009. The Structural Funds and the Economic and Social Cohesion Process. *Annals-Economy Series*, 1, 313-330.
- Podział administracyjny Polski. 2023. <https://stat.gov.pl/statystyka-regionalna/jednostki-terytorialne/podzial-administracyjny-polski>.
- Soleymani, H., Ravanshadnia, M., Montazer, M. 2021. Transportation Infrastructure Project Financing: Highways Capital Structure Design Techniques. *Hindawi Shock and Vibration*. ID 4988577. <https://doi.org/10.1155/2021/4988577>.
- Sprawozdanie z wykonania budżetu państwa za okres od 1 stycznia do 31 grudnia 2022 r. Informacja o wykonaniu budżetów jednostek samorządu terytorialnego. 2023. Rada Ministrów, Warszawa. <https://www.gov.pl/web/finanse/sprawozdanie-roczne-za-2022-rok>.
- Trigkas, S., Liapis, K., Thalassinou, E. 2019. Administrative Accounting Information to Control Profitability Under Certainty and Uncertainty of a Universal Bank. In *International Conference on Computational Methods in Experimental Economics* (pp. 53-78). Cham: Springer International Publishing.
- Ustawa z dnia 12 marca 2022 r. o pomocy obywatelom Ukrainy w związku z konfliktem zbrojnym na terytorium tego państwa, *Dz.U.* 2022 poz. 583.
- Ustawa z dnia 31 marca 2020 r. o zmianie ustawy o szczególnych rozwiązaniach związanych z zapobieganiem, przeciwdziałaniem i zwalczaniem COVID-19, innych chorób zakaźnych oraz wywołanych nimi sytuacji kryzysowych oraz niektórych innych ustaw.
- Uścińska, G. 2021. Rozwiązania ukierunkowane na przeciwdziałanie skutkom pandemii COVID-19 w zakresie bezpieczeństwa socjalnego obywateli w wybranych programach rządowych. *Zabezpieczenie Społeczne. Teoria, Prawo, Praktyka*, nr 13.
- Xueqing, Z. 2005. Financial Viability Analysis and Capital Structure Optimization in Privatized Public Infrastructure projects. *Journal of Construction Engineering and Management*, Vol. 131, No. 6.
- Yifu Lin, J., Xifang Sun, Ye Jiang. 2009. Toward a Theory of Optimal Financial Structure. *World Bank, Policy Research Working Paper*, 5038, 2.