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Economic Aspects of Shrinking Cities in Poland in the Context of Regional Sustainable Development

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Abstract: Two trends are observed in contemporary cities around the world: whereas some urban areas develop rapidly and experience population growth, a steady population decline is noted in other cities. Demographic changes in urban areas are also accompanied by economic changes. These changes constitute a very serious challenge for sustainable regional growth. However, these problems have not been sufficiently investigated to date, including in Poland. The aim of this study was to identify shrinking cities in Poland and the phenomena that are related to the economic aspects of urban shrinkage in Poland. Empirical research relied on analysis of the population growth rate in Polish urban municipalities, and the phenomena related to the economic aspects of urban shrinkage were identified by multiple linear regression analysis. The period of research was 2003–2019. Thirty-three Polish cities experienced a steady population decline. The economic phenomena related to urban shrinkage included changes in own-source revenues, proportions of government transfers in municipal budgets, unemployment, migration, municipal spending on education, transport, communications, and social welfare. Population decline was not related to changes in the age-dependency ratio, public spending on housing, the number of companies, or the number of vacant homes in cities. The research results can be a source of important information for regional sustainable growth policies used not only in cities and regions in Poland, but also in other Central and Eastern European countries where this phenomenon occurs.

Keywords: urban shrinkage; demographic crisis; population aging; urban economy; sustainable development; sustainability; Central Europe

1. Introduction

Cities play a special role in sustainable economic development. According to UN data, urban dwellers accounted for more than 55% of the global population in 2018, and this percentage is projected to reach 68% by 2050 [1]. In Europe, 74% of the population currently lives in cities. However, some cities, in particular in Central European countries (Poland, Romania, Russia, Ukraine), have experienced a steady and significant population decline since the beginning of the 20th century. These processes resulted largely from economic transformations that catalyzed urban depopulation, economic crisis, loss of jobs in industry, poverty, reduction in birth rates, and labor migration. In these cities, the above processes compromise sustainable economic development. Economic growth is significantly influenced by social factors such as the demographic balance between generations, social capital, social cohesion, high employment, fair distribution of income, education, attractive public spaces, housing equality, and good housing standards [2] (pp. 290–291). These factors contribute to social stability and promote microeconomic and macroeconomic sustainable growth.

Demographic problems in selected urban areas and their impact on regional and national economies constitute a timely and important challenge in research. These issues are part of the debate on the determinants of sustainable development and economic

productivity in Central and Eastern Europe. The role played by cities, in particular in the provision of basic and essential public services, is one of the key challenges for sustainable urban development [3] (pp. 443–444), [4] (pp. 15–16).

The gradual decrease in the population of a city is referred to as urban shrinkage. Depopulation has affected cities not only in Central Europe, but also Western Europe, North America, Australia, and Asia, and this phenomenon has been widely researched since the late 20th century. In the past, these cities were major industrial hubs. In recent years, the depopulation of Central Europe cities has been dwarfed by studies on shrinking cities in the US and the UK or Eastern Germany [5] (p. 306). Urban shrinkage has not been studied extensively in the postsocialist cities of Central and Eastern Europe, including Poland. It was investigated by, among others, the authors of [6–10] and remains a pressing problem.

Urban shrinkage can proceed differently on a regional than on an international scale, whereas the causes and effects of depopulation have not been fully elucidated. In Western countries, this process is different than in the East. In the East urban shrinkage was determined by the political and economic priorities of centralist governments. After the collapse of the Soviet Union and the opening of the Iron Curtain, these cities faced enormous problems in transforming themselves into a market economy [11] (p. 1461). Nowadays, urban shrinkage poses a significant problem in Poland. According to Statistics Poland, 98% of the Polish cities will experience a population decline by 2050 [12] (p. 110).

Current research into urban shrinkage often involves interdisciplinary studies. Population decline affects many areas of social, economic, and political life in cities. The causes and effects of urban decline have a complex and multidimensional character, and they are often difficult to distinguish. In many research studies, depopulation and adverse economic changes are regarded as complementary elements of urban shrinkage [13] (p. 88). However, Hartt [14] (p. 38) observed that very few authors had relied on quantitative methods to determine the correlations between demographic and economic variables related to urban decline [15]. According to the author, economic factors undoubtedly play a key role in urban shrinkage, but they are a part of a larger and more complex system characterized by numerous interdependences and feedback. As a result, factors with a strictly economic nature may be difficult to distinguish from factors that exert only an indirect effect on the urban economy or regional development.

The aim of this study was to identify shrinking cities in Poland and the phenomena related to the economic aspects of urban decline (not only economic phenomena). Shrinking cities were identified by analyzing the population growth rate in Polish urban municipalities. The studied period was 2003–2019 due to the availability of the relevant data in the Statistic Poland—Local Data Bank [16]. Cities whose population declined steadily in the analyzed period were classified as shrinking cities. The phenomena related to the economic aspects of urban shrinkage were identified based on a review of the literature. The variables that were significantly correlated with depopulation were determined by multiple linear regression analysis.

The article consists of five sections. The first section contains a review of the literature analyzing the phenomena related to the economic aspects of urban shrinkage. The second section presents the research methodology and the rules of inference for formulating reliable conclusions. The third section presents the results of the empirical study, including a list of shrinking Polish cities and the variables that are significantly correlated with urban depopulation. In the fourth section, the results are discussed and confronted with the findings presented in the literature review. The conclusions are formulated and recommendations for future research are made in the last section.

2. Literature Overview

Research into the economic phenomena that accompany demographic changes often focuses on employment, income, consumption, and savings which influence national income and its determinants [17] (pp. 7–85). National income is determined by human capital resources, namely the supply (quantity) and efficient allocation (quality) of human

labor [18,19]. As regards the supply of labor, urban shrinkage can be related to a decrease in the size of the working-age population and the population of children and young adolescents, with a simultaneous increase in the size of the elderly population [20] (pp. 161–162). These changes increase the age-dependency ratio because fewer people of working age have to support the dependent population, which depletes human capital resources. Urban shrinkage can also decrease labor efficiency due to the lower performance of an aging population. These phenomena can ultimately decrease the national income generated by shrinking cities and disrupt the sustainable development of these cities and regions where they occurred. However, cities can implement specific policies to address these issues by replacing human capital with physical capital and by relying on the professional experience of older workers [21] (p. 16).

Urban shrinkage can also affect the demand for selected goods and services as well as labor. Population aging and changes in consumption patterns can decrease the demand for some goods and services, such as education [22] (pp. 495–496) or private transport [23] (p. 363). These markets will offer fewer employment opportunities, and job seekers will migrate to rapidly developing urban areas where the demand for labor is high. However, urban shrinkage can also increase the demand for education and training services. The above can generate additional employment costs, and in the long term, it can encourage companies to transfer their business operations to regions with lower employment costs and a higher supply of better-educated workers.

Urban shrinkage can also be accompanied by selective migration, a process that is widely observed in highly developed countries which hire qualified workers from other countries. This phenomenon is referred to as the "battle for the brain" [24] (pp. 26–27); [25] (pp. 346–347), and it can change the social structure of a city or region which exports its workforce. The result is an increase in the proportions of less well-educated workers, unemployed, and the elderly. Even a small outflow of skilled and qualified workers can have highly negative consequences for cities and their sustainable development, and it can deepen inequalities between regions and countries [26] (pp. 7–8, 13–14); [27], (pp. 174–175).

The described phenomena influence the budgets and financial performance of cities. Many researchers have addressed these problems [28–30] by identifying local budget revenues that are highly sensitive to adverse demographic processes. Urban population decline has a particularly negative influence on own-source revenues by compromising the cities social potential, material resources, and business activities conducted by natural persons and legal entities [31] (pp. 21–29); [32] (pp. 21, 29); [33] (pp. 21–29). These processes can decrease the fiscal autonomy of municipal authorities, making them more dependent on external transfers [34] (pp. 27–29). According to some researchers, the fiscal autonomy of local governments is correlated with an increase in GDP [35], (pp. 405–406) and greater fiscal autonomy can also increase the effectiveness of local services. Demographic changes and the loss of skilled workers can also compromise the central budget and, consequently, decrease government transfers to cities [36] (pp. 222–223).

In the context of municipal expenditures, urban shrinkage can increase local government spending due to a decrease in birth rate and a longer lifespan. Urban decline compromises the local governments' ability to finance health care services, social welfare, and care services for the disabled and elderly which can exceed the mandatory scope of public services [37] (pp. 112–113). The profitability of care services can decrease in shrinking cities, which can deepen the local deficit and increase local governments' dependence on state transfers [30] (p. 14). Growing expenditures and the scarcity of funds can increase local debt, as described by Bengtsson & Scott [38] (pp. 168–169) on the example of Sweden. However, an increase in certain types of expenditure can be accompanied by a decrease in other costs, such as education or road infrastructure, as a natural consequence of demographic changes.

Urban shrinkage decreases competitiveness, which also influences local budgets. Selective migration and a decline in the operating profits of selected industries can impair the competitive advantage of shrinking cities [39] (pp. 133–149). Thus, a vicious cycle

is established because low competitiveness is both the cause and the consequence of migration and depopulation. Low competitiveness can decrease the demand for goods, labor efficiency, and the effects of economies of scale [40] (pp. 226–229). These factors compromise production and sustainable resource use. The resulting decrease in municipal revenues prompts municipal authorities to raise local taxes and fees, which can exacerbate the decline in competitiveness and decrease the city's appeal for investors.

Urban shrinkage leads to the loss of innovative capabilities due to selective migration of better-educated workforce and lower spending on innovation, both by businesses and local governments experiencing a fiscal deficit. Innovative potential is also directly linked with population size and density which, if high, promote the effective use of the existing innovations to increase production when resources are limited. It is worth emphasizing that human capital is the carrier of knowledge and innovation, constituting the basis of the so-called knowledge-based economy which is closely related to sustainable development [40,41], [42] (p. 831), (pp. 238–239); [43] (p. 125).

Migration flows, including workforce and business migration, affect the spatial distribution of population and increase population density near the urban core where infrastructure is more readily available. The above leads to changes in infrastructure and the expenditures associated with the construction and maintenance of infrastructure. Migration to downtown areas is intensified in cities characterized by an aging population and low population mobility because elderly residents are more likely to opt for locations with better access to public services [44] (pp. 5–6). Depopulation leads to the under-utilization of the existing infrastructure in shrinking cities, whereas in rapidly developing regions that are targeted by migrants, the demand for infrastructure can increase, which necessitates new investments in infrastructure. The availability and quality of infrastructure pose a considerable challenge in this context. Due to the population shift to downtown areas, transport and communications infrastructure may be under-utilized in other parts of the city. The above can indirectly affect local budgets because low demand for new infrastructure decreases capital expenditures. At the same time, the costs associated with maintaining the existing infrastructure increase. For example, water supply and sewer networks deteriorate more rapidly when they are less frequently used. The performance of district heating companies can also decline. These processes have adverse environmental impacts, which can increase the demand for public spending on environmental protection (green investments and innovations) and health care [23] (pp. 18, 21–23); [45]; [46] (pp. 360–363); [47].

In addition to the depreciation of infrastructure and higher infrastructure maintenance costs, urban shrinkage also influences the real estate market and leads to changes in the availability of housing. Real estate prices generally decrease, and vacant homes become a permanent feature of the urban landscape. Population decline decreases the demand for housing, but changes are also observed in the quality of demand for residential property. The above leads to the fragmentation of the housing market, with high-standard homes in downtown areas that are less affected by depopulation, and low-quality homes in peripheral districts where the consequences of urban shrinkage are more severe [48] (p. 446). Lower incomes and high vacancy rates drive down real estate prices. Home and commercial rents can also decrease. In the long-term, these processes reduce residential investments, which decreases neighborhood quality and, consequently, drives migration. In declining cities, some homes have to be demolished and land has to be recultivated [49] (pp. 71–72).

Finally, a few words should also be said about the specific context of urban shrinkage and the related economic changes in Central-Eastern European countries. The years that followed the collapse of socialism constitute an important backdrop for the conducted analysis because low wages and economic hardship prompted many urban and rural residents to emigrate to Western Europe [50] (p. 155), [51] (pp. 127–130). These processes had a particularly negative effect on people who were unemployed, homeless, and strongly attached to their cities [52]. The transition to a market economy and the attempts to catch up with Western Europe in economic development took a heavy toll on employees and households. Corruption was widespread. In political terms, the period of economic

transition was a time of uncertainty and instability for most Central-Eastern European countries. This period witnessed the establishment of free markets, the implementation of democratic processes, and integration with the European Union [53,54]. Bytom, Wałbrzych, Donetsk, Resitia, Petrosoani, and Ostrava are only several examples of shrinking cities which experienced population decline during political transformations after the collapse of socialism. In the literature, these cities have been analyzed in case studies of urban areas in Central-Eastern Europe [10,13,55].

3. Materials and Methods

For the needs of this study, shrinking cities were defined as urban municipalities that experienced a steady population decline in the analyzed period [56]. The study covered the period of 2003–2019 due to the availability of the relevant data in the Statistic Poland—Local Data Bank [16]. The population growth rate in Polish cities was analyzed.

The following research hypothesis was formulated: the phenomena related to the economic aspects of urban shrinkage in Poland are significantly correlated with urban depopulation. The phenomena that both cause and result from urban shrinkage were identified with the use of multiple linear regression analysis. Standard linear regression models support the determination of statistically significant linear relationships between the dependent variable and explanatory (independent) variables [57] (p. 86). However, it should be stressed that the results of linear regression analyses have limited applications. They provide information about relationships between variables [58], but not about cause-effect relationships, therefore, they are not highly suited for inference.

The dependent variable was the percent change in urban population in the analyzed period. The explanatory variables were selected based on a review of the literature. Most of them are not formal economic indicators, and they were linked with the economic and financial consequences of urban shrinkage. The selection of the explanatory variables was limited by the availability of the relevant data in the Statistic Poland—Local Data Bank [16]. Percent changes in the following explanatory variables were analyzed in the evaluated period: own-source revenues (X_1), percentage of own-source revenues in total municipal revenues (fiscal autonomy) (X_2), general subsidies (X_3), state transfers (X_4), number of unemployed persons (X_5), number of employed persons (X_6), proportion of the elderly population per 100 working-age population (X_7), age-dependency ratio (X_8), internal migration per 1000 population (X_9), foreign migration per 1000 population (X_{10}), total migration per 1000 population (X_{11}), total expenditure on education, (X_{12}), expenditure on early childhood education (X_{13}), expenditure on primary education (X_{14}), expenditure on secondary schools of general education (X_{15}), expenditure on transport for public school students (X_{16}), expenditure on housing policy (X_{17}), expenditure on transport and communications (X_{18}), expenditure on social welfare (X_{19}), expenditure on environmental protection (X_{20}), proportion of investment expenditures in total expenditures (X_{21}), length of the water supply network (X_{22}), length of the sewerage network (X_{23}), length of the gas supply network (X_{24}), total number of companies (X_{25}), number of companies in the agriculture, forestry, hunting, and fishing sector (X_{26}), number of companies in industry and construction (X_{27}), number of companies in other sectors of the economy (X_{28}), number of vacant homes (X_{29}).

The validity of linearity assumptions was checked with the following tests: the model's linearity was checked by the Ramsey RESET test [59] (pp. 552–555); the homoscedasticity of the random variable was determined by the White test [60] (pp. 523–544); the normal distribution of the random variable was checked by the Doornik–Hansen test, [61] (pp. 927–939), and multicollinearity was determined by calculating the variance inflation factor (VIF) [62] (pp. 1515–1541). The quality of the model was evaluated by determining the overall significance of the parameters in the F-test; the significance of individual parameters was determined by Student's t-test and by calculating the coefficient of determination R^2 [57]. All calculations were performed at a significance level of $p = 0.05$. Regression analysis was conducted in the Gretl v. 2020d program.

4. Results

In 2003–2019, urban shrinkage affected 33 Polish cities, i.e., nearly 11% of the total number of the 306 Polish urban municipalities. Average annual depopulation exceeded 0.5% in most shrinking cities (22 urban municipalities), and it was below 0.5% in the remaining cities (11). The above parameter was lowest in Bielsko-Biała (−0.24%) and highest in Bytom (−0.9%). Urban shrinkage affected the highest number of urban municipalities in the Silesian Voivodeship (14 cities), followed by the Łódź Voivodeship (6 cities) and 10 other voivodeships (1 or 2 cities in each voivodeship). In the studied period, depopulation was not observed in four voivodeships: Lublin, Podkarpacie, Podlasie, and West Pomerania. Shrinking cities and average depopulation in the analyzed period are presented in Table 1.

Table 1. Shrinking Polish cities in 2003–2019 and average population decline per voivodeship.

Average Annual Population Decline	Shrinking Cities in Polish Voivodeships and Average Population Decline	Number of Shrinking Cities in Poland
0–0.5%	Lower Silesia: Legnica (−0.43); Łódź: Radomsko (−0.50); Mazovia: Płock (−0.44), Radom (−0.48); Opole: Brzeg (−0.50); Silesia: Racibórz (−0.44), Bielsko-Biała (−0.24), Chorzów (−0.45), Jaworzno (−0.37); Świętokrzyskie: Kielce (−0.49); Warmia and Mazury: Elbląg (−0.43)	11
0.5–1%	Lower Silesia: Jelenia Góra (−0.67), Kuyavia-Pomerania: Włocławek (−0.59); Lublin: Chełm (−0.64); Łódź: Bełchatów (−0.59), Kutno (−0.62), Łęczyca (−0.72), Łódź (−0.85), Piotrków Trybunalski (−0.60); Małopolska: Tarnów (−0.56); Opole: Kędzierzyn-Koźle (−0.56); Pomerania: Słupsk (−0.56); Silesia: Bytom (−0.90), Częstochowa (−0.77), Dąbrowa Górnicza (−0.60), Gliwice (−0.75), Jastrzębie-Zdrój (−0.52), Piekary Śląskie (−0.57), Siemianowice Śląskie (−0.59), Sosnowiec (−0.87), Świętochłowice (−0.76), Zabrze (−0.72); Wielkopolska: Konin (−0.66)	22

Source: own calculation based on the Statistic Poland—Local Data Bank [16].

The multiple linear regression analysis revealed that twelve variables were related with economic phenomena in shrinking Polish cities: own-source revenues (X_1), state transfers (X_4), number of unemployed persons (X_5), number of employed persons (X_6), internal migration per 1000 population (X_9), foreign migration per 1000 population (X_{10}), total expenditure on education, (X_{12}), expenditure on secondary schools of general education (X_{15}), expenditure on transport for public school students (X_{16}), expenditure on transport and communications (X_{18}), expenditure on social welfare (X_{19}), and the length of the water supply network (X_{22}).

Based on the calculated value of the coefficient of determination, the above variables explained 70.1% of the variance in depopulation in shrinking cities. The remaining variance of the dependent variable (approx. 30%) was not explained by the results of the regression analysis, but by random factors as well as factors that were not considered in the study. These results should be regarded as satisfactory in view of the spatial dispersion of the analyzed data. Detailed results of the regression analysis and tests validating the goodness of fit of the regression are presented in Table 2.

Table 2. The results of multiple linear regression analysis—variables explaining changes in population in shrinking Polish cities in 2003–2019 and information about the conducted statistical tests.

Independent Variables	Coefficient of Regression	p-Value in Student's Test	F-Test	Reset Ramsey' Test	Doornik-Hansen's Test	White's Test	R^2
own-source revenues (X_1)	0.18	1.22×10^{-5}					
state transfers (X_4)	−0.033	0.0045					
number of unemployed persons (X_5)	−0.03	0.0062					
number of employed persons (X_6)	−0.08	0.0032					
internal migration per 1000 population (X_9)	−0.0025	0.0141	F(12 20) = 4.05 with p-value = P (F(12, 20) > 4.05) = 0.0028	F(2, 18) = 0.68 with p-value = P(F(2, 18) > 0.68) = 0.52	Chi-square (2) = 2.68 with p-value = 0.26	LM = 15.85 with p-value = P(Chi-square (24) > 15.85) = 0.89	70.86%
foreign migration per 1000 population (X_{10})	−0.0008	6.57×10^{-5}					
total expenditure on education (X_{12})	−0.10	0.0393					
expenditure on secondary schools of general education (X_{15})	0.021	0.0319					
expenditure on transport for public school students (X_{16})	−0.01	0.0002					
expenditure on transport and communications (X_{18})	0.0067	0.0058					
expenditure on social welfare (X_{19})	0.0082	0.0494					
length of the water supply network (X_{22})	0.16	0.0189					

Source: own calculation based on the Statistic Poland—Local Data Bank [16].

In the analyzed period, four explanatory variables had positive average values: X_1, X_4, X_{12} and X_{15}. As regards own-source revenues (X_1), this is an encouraging result which indicates that the studied municipalities were able to generate revenues despite the steady population decline and that the average increase in own-source revenues was accompanied by an average increase in the number of inhabitants (as indicated by the positive sign of the regression coefficient). Variable X_4 also increased in shrinking Polish cities, but the coefficient of regression was negative, which suggests that the average increase in state transfers was accompanied by a decrease in the number of inhabitants. Total expenditure on education (X_{12}) also increased in all shrinking cities. In this case, the coefficient of regression was also negative, and the average increase in spending on education was accompanied by a decrease in the number of inhabitants. The reverse was noted in average spending on secondary schools of general education (X_{15}): an average increase in its value was accompanied by an average increase in the number of inhabitants.

In the analyzed period, the average values of two variables, X_5 and X_{19}, decreased in all shrinking Polish cities. Unemployment (X_5) was characterized by a negative coefficient of regression, which indicates that the average increase in the number of unemployed persons was related to a decrease in the average number of inhabitants. In turn, the average expenditure on social welfare (X_{19}) was characterized by a positive coefficient of regression, i.e., an increase in its average value was accompanied by an increase in the number of inhabitants.

An increase in the average values of the following variables was noted in most shrinking cities: the number of employed persons (X_6), expenditure on transport for public school students (X_{16}), expenditure on transport and communications (X_{18}), and the average length of the water supply network (X_{22}). The coefficients of regression for variables X_{22} and X_{18} were positive, which implies that the average increase in these variables was linked with an average increase in the number of inhabitants. The reverse was observed for the number of employed persons and spending on transport for public school students.

The average value of internal migration per 1000 population (X_9) was negative in most shrinking Polish cities (excluding Chełmno, Chorzów, and Jaworzno) in 2003–2019. A negative relationship was also noted in foreign migration per 1000 population (X_{10}) in 21 shrinking cities. These variables were negatively correlated with changes in population, which implies that depopulation in those cities was caused mainly by migration, more often internal than external.

It should also be noted that changes in population were not significantly correlated with changes in the age-dependency ratio, spending on housing policy, spending on environmental protection, number of companies, fiscal autonomy, the number of vacant homes, or the proportion of investment expenditures in total municipal expenditures.

5. Discussion

The results of the presented analysis clearly indicate that the majority of shrinking cities (20 out of 33) are located in the Voivodeships of Silesia and Łódź. Mining, excavation, resource processing as well as the generation and supply of electricity, gas and water are the predominant industries in Silesia, and employment in these sectors of the economy decreased significantly in the analyzed period. The Łódź Voivodeship, the former textile manufacturing hub, had witnessed a significant decrease in employment in the textile industry since the 1990s, mainly due to the collapse of eastern markets, competitive imports, and privatization. These processes fueled migration, which was confirmed by the results of the study and literature review [10,13]. According to many authors, urban shrinkage often affects industrial regions, in particular regions where conventional industries are predominant [63]. After a period of rapid economic expansion, industrial cities often register negative growth due to the depletion of natural resources and the loss of competitive advantage in a globalized economy characterized by rapid technological progress [64]. These processes were also observed in most shrinking Polish cities. External migration, which was a natural consequence of Poland's accession to the European Union, undoubtedly contributed to these negative phenomena. As noted in the literature review,

depopulation can induce changes in the determinants of national income, namely the demand for and supply of labor [17] (pp. 7–85), [18–20]. This study confirmed the relationship between the labor market and the depopulation in Polish cities. A positive relationship was noted between urban depopulation and changes in unemployment. The above points to a cause-effect relationship between these variables: the higher the unemployment, the greater the urban shrinkage in Polish cities. However, urban shrinkage was not linked with population aging or a rise in the age-dependency ratio. According to the literature, an increase in the age-dependency ratio leads to higher municipal spending, including on social welfare [37] (pp. 112–113). However, the above phenomenon was not observed in this study.

An analysis of changes in the demand for selected goods and services in shrinking Polish cities revealed that urban shrinkage was not directly related to the demand for educational services. Changes in total expenditure on education were bound by a negative relationship with population change, i.e., spending on education increased despite a decrease in the number of inhabitants. However, a positive relationship was noted with expenditure on secondary schools of general education, which could be attributed mainly to numerous educational reforms and an increase in teacher salaries in the analyzed period rather than targeted policies aiming to improve educational attainment and employment outcomes.

This study also analyzed the relationship between municipal budgets and urban shrinkage. Contrary to the data presented in the literature [34] (pp. 27–29), the shrinkage of Polish cities was not related to a decrease in own-source revenues or fiscal autonomy. On average, own-source revenues increased in all shrinking cities. However, depopulation was accompanied by a rise in targeted subsidies from the state. The aim of these transfers is to improve the quality of public services and access to infrastructure in Poland; therefore, these payments play an important role in shrinking cities. Contrary to published findings, which postulate that urban shrinkage can decrease state transfers to local governments in the long term [36] (pp. 222–223), this process has not yet been observed in Poland.

No relationships were found between depopulation and higher spending on transport and communications or the length of the water supply network in shrinking Polish cities. The above could imply that, unlike in many cities around the world, urban shrinkage in Poland is not accompanied by deterioration in infrastructure.

6. Conclusions

Urban shrinkage poses a significant research challenge not only in North America, Western Europe, and Asia, but also in Poland and other former Eastern bloc countries that experienced political and economic transformations in the 1990s. According to research, urban shrinkage is also a practical concern on both the local and the macroeconomic level, which may be of key importance for the implementation of sustainable development policies in cities and regions affected by depopulation. The results of the current study pave the way to further debate and the implementation of policies targeting the adverse consequences of urban shrinkage. Population decline in Polish cities is likely to be aggravated in the coming decades. Therefore, the analysis of Polish shrinking cities, due to a similar historical context, may also be the basis for further research of this phenomenon and the implementation of identified challenges for the sustainable development policy at the central level, both in Poland and in other countries of Central and Eastern Europe, where this problem also occurs and tends to gain higher significance.

The economic phenomena that accompany urban shrinkage in Poland are not always directly and unambiguously linked with depopulation. The present study demonstrated that, in addition to financial aspects, urban shrinkage was also related to social and material variables (infrastructure). These findings confirm that urban shrinkage is a highly complex and multidimensional phenomenon, which corroborates the results reported in the literature.

The key factors related to the economic aspects of urban shrinkage in Poland were own-source revenues, state transfers, employment, unemployment, migration per 1000 population,

spending on education, transport, communications, and social welfare, as well as the length of the water supply network. Contrary to published findings, this study did not reveal correlations between urban depopulation vs. changes in the age-dependency ratio, housing expenditure, the number of companies, fiscal autonomy, or the number of vacant homes.

It should be noted that the presented analysis was a preliminary study where shrinking cities were identified based on two common factors: depopulation and location in the same country. In reality, every shrinking city can be analyzed in a separate case study. However, the research findings were generalized to identify specific factors that accompany urban shrinkage in Poland. The results demonstrated that the analyzed phenomenon proceeds differently in Poland than in other countries. Therefore, the presented findings can pave the way to a more detailed analysis of urban shrinkage, emphasizing its complex and multidimensional character, and they can provide valuable inputs for implementing national, regional, and municipal policies with the aim of counteracting the adverse effects of urban depopulation. A comparison of the causes and effects of urban shrinkage in Poland and other former socialist countries could offer interesting insights. An analysis of the links between the economic aspects of urban shrinkage in Central-Eastern Europe and the economic consequences of urban expansion in Western Europe could also pose an interesting research challenge in the future.

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