Decentralization Policy in Ukraine: How Voluntary Amalgamation, Inter-Municipal Cooperation and Fiscal Incentives Impacted the Local Government System

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Abstract

This paper examines the progress of implementing a comprehensive decentralization program in Ukraine. Ukraine was practically the last country of the former Soviet bloc to undertake a comprehensive decentralization program. The decentralization program was based on three pillars: (1) a reliance on voluntary amalgamation of the local government units, (2) the use of inter-municipal cooperation, and (3) enhanced financial incentives. The authors examine how these policies were implemented as well as the impact on local governments service delivery and fiscal capacity. The analyses are based on available data and the application of statistical tests measuring fiscal resources to the population size and other variables of the local government. The study has revealed some significant flaws in Ukrainian decentralization policy implementation. The voluntary approach eventually had to be abandoned for a mandatory approach. The weak progress in inter-municipal cooperation did not establish improved service delivery across a large number of local government units. The financial incentives with greater sharing of taxes did not provide sufficient additional resources to make the units financially sustainable. Finally, the results of the local government elections held in the amalgamated units did not reveal widespread support for the new units and the decentralization reforms. These issues create significant risks for the final success of the decentralization reform.

Keywords:

Voluntary and forced amalgamation; administrative and fiscal decentralization; inter-municipal cooperation; amalgamated territorial community (ATC).

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1. Introduction: Ukraine five years after starting decentralization

The decentralization reform in Ukraine, long delayed and overdue, rose to the top of the political agenda in 2014–2015. It would be expected that after so much study and recommendations over the previous two decades and the lessons that could have been learned from other countries in the region, Ukraine would have been well positioned to implement an extensive and successful decentralization reform. It is a paradox that decentralization reform in Ukraine started in the harsh times when the nation had to stand against Russia's attempts to return Ukraine to its domain through a range of military, political and economic efforts. It seemed that such a situation called for a centralization of resources. The Ukrainian political leaders saw this as an opportunity to make the state more effective and closer to the citizens.

The intended impact of the decentralization efforts is straightforward. The small size of the great majority of local units did not allow them to even support their own executive offices and maintain budget institutions. Nearly half of the local governments were supported by state transfers of 70 % and created a very heavy burden for the public finance system. The overwhelming number of fiscally non-viable units led to a decreasing quality of local public services and hampered the equal access to them by every citizen regardless of their place of residence.

The reform objective was to amalgamate over 10,000 territorial units into 1441 amalgamated territorial communities (ATC) by the end of 2020. The Ukrainian territories in the Donetsk and Luhansk regions and the Crimean Autonomous Republic that were occupied in 2014 by Russia were understandably not included in the respective decentralization efforts. By the end of 2019, the creation of 1,029 ATCs was accomplished. There have also been 530 inter-municipal cooperation agreements covering some 1,188 local government units, primarily in the area of communal services, infrastructure rehabilitation, fire safety, and education, health and social protection. The local government revenues increased by nearly fourfold (from UAH billion 68.6 in 2014 up to 267.0 in 2019) and the amount of state support to local economic development rose by a factor of five (from UAH billion 3.7 in 2015 to 20.8 in 2019).

Given these accomplishments and after five years of decentralization support provided by the international donor community³, it is reasonable to recognize that sufficient time has passed to assess what has been accomplished and what the level of success of the reform has been. This timeframe seems to be sufficient to determine if it has met its main goals and objectives of a comprehensive decentralization reform.

3 According to the website www.decentralization.gov.ua the top five donor supported decentralization projects over the past five years provided between 150 and 200 million USD in funding.

This paper focuses on an examination of the impact of the decentralization policies on the amalgamated territorial communities. There are adequate data and information to make some conclusions as to whether their size and fiscal resources are sufficient to be sustainable and financially viable communities.

The main research questions are the following:

- Did the voluntary amalgamation approach succeed in achieving the desired change in the number and size of local government units?
- To what extent was the amalgamation process supported by expanding the service delivery responsibilities through inter-municipal cooperation within the subnational sector of Ukraine?
- Did the change in size of local governments improve their fiscal position?

2. Literature review

There is arguably no more researched area of local government and fiscal decentralization than the process of amalgamating small local government units into larger units, both in population and area. The extent of the research literature has been detailed by Tavares (2018). Whether amalgamation is the solution to the problems of fiscal capacity and service delivery is yet to be fully determined. There are significant research studies that tend to support counter points of view on this issue.

In a study published in 2019 that addressed this conflict between service delivery performance and citizen participation, the conclusion pointed in both directions (Ebinger et al. 2019). The research indicated that amalgamation did improve service delivery, but improvements in citizens participation and integration of the amalgamated communities was not definitively demonstrated.

Numerous studies have examined the impact of amalgamation in Europe from the early 2000s and have analyzed the experiences of the various countries that have undertaken amalgamation, even in several waves of territorial reform. The more comprehensive analyses of territorial reform include those by Swianiewicz (2010), Klimovský and Swianiewicz (2010), Centre of Expertise for Local Government Reforms of the Council of Europe and Swianiewicz (2017). All of these studies have presented variations in the design and implementation of territorial reforms with mixed results in most instances.

If amalgamation was not a definitive solution to territorial reform, the use of inter-municipal cooperation seemed to offer an alternative solution. There is widespread use of inter-municipal cooperation agreements with various functions and services being provided through these arrangements. There is a rich level of research and analysis on their use in the European context, much as for amalgamation.

A study by Hulst and van Montfort (2007) examining the use of inter-municipal cooperation in 8 European countries provided excellent examples of the variations and purposes of these arrangements. Bel and Sebo (2019) examined the issue of whether inter-municipal cooperation really produced the improvements in terms of economies of scale, reduction of administrative costs, and improved governance. Their conclusion was that there are cost advantages to the small local government units in joining in these agreements.

Applying statistical analysis methods to provide a more definitive and objective assessment of the impact of territorial reforms and amalgamation has been utilized in a number of studies. One of the more significant studies measuring the statistical relationship among a number of factors to financial performance was accomplished with Brazilian municipalities in the early 2000s. The study by Gomes, Alfinito, and Albuquerque (2013) utilized statistical data from 830 local government units from 2005 to 2008. Their conclusion was that larger units are more likely to (1) manage fiscal resources better than smaller units, and (2) reduce costs. They noted a strong causal relationship between population size and the fiscal capacity and financial performance among these local government units.

Further research by Zafra-Gomez and others (2009) using regression analysis demonstrated these statistical methods to be effective in relating the financial conditions of local governments to a number of social and economic factors.

Other studies that applied statistical techniques to measure fiscal capacity and financial performance include Jones and Walker (2007), Carmeli (2002), and Ramsey (2013). Perrin (2017) made a statistics-based analysis of the effects of grants and transfers from central and state governments on the levels of local government expenditures. This research measured the results of a decrease in state aid on the reduction of local government expenditures.

Unfortunately, there is not a substantial number of similar research studies on the process of amalgamation, inter-municipal cooperation and statistical analysis for Ukraine. As one of the first studies on post-socialist decentralization processes emphasized, the crucial issue of supporting functions in the public finance sector must be the creation of fiscally and economically viable local units (Bird et al. 1995).

Ukraine has been very reluctant to undertake a real decentralization process, even though it has been discussed over the past 20 years. The first steps in this direction were related to fiscal decentralization issues that started at the beginning of the 2000s. There have been several studies which paid attention to these early approaches and which emphasized, firstly, the reassignment of revenues and expenditures, the introduction of modern fiscal equalization mechanisms and increasing local revenues (Martinez-Vasquez and Thirsk 2010; Slukhai 2002; Луніна 2000).

The ideas of amalgamating local territorial units, the use of inter-municipal cooperation and enhanced fiscal incentives are not new policy ideas for Ukraine. In

a paper titled “Policy Options for Local Government Decision-Making Capacity” delivered at a conference in Kyiv these ideas were first identified in 1995 (Wright 1995). The UNDP Report (UNDP 2003) identified the need to merge these units and functional assignments in 2003. A WB study accomplished in 2010 (Romanyuk, et al. 2010) advocated the merging of units with incentives for merging and simplifying the intergovernmental transfer formulas. It was only in 2014–2015 that these ideas were adopted by the government for decentralization reform.

Since the reform started there have been very few comprehensive studies of the overall impact or accomplishments of the current decentralization efforts in Ukraine, even though there has been a substantial level of international donor support. Some notable research papers that have addressed the situation and progress of the decentralization effort in Ukraine include Umland and Romanova (2019), among others.

While there have been some studies related to fiscal aspects of the decentralization, these have tended to focus mostly on the aggregate and macroeconomic level and not down to some analysis of the trends within the population size of these newly formed units (Newmaier et al. 2019; Umland and Romanova 2019; Solodkyy et al. 2020).

There is some literature by Ukrainian experts that sheds light on the achievements and issues of the on-going decentralization process. One of the first studies published was a report prepared by the Institute of Economy and Forecasting (Луїна 2016) that emphasized the crucial need of securing local autonomy and clear vertical allocation of functions during the reform implementation. The most extensive country-wide studies carried out to the present date is by the National Institute for Strategic Studies (NISS) in 2018 and 2019 (Жаліло та інші 2018, 2019). These studies highlighted the key achievements and problems in the implementation of the decentralization reform. One of the important indicators of the reform success was the irreversibility of the amalgamation process and the increase in local government own revenues.

Some recent studies attempted to assess the general impact of amalgamation on local revenues. The research by Hamaniuk and Palchuk (2020) found that amalgamation led to an increase in local governments *per capita* own revenues (unified small business tax). However, this study indicated that this increase was larger in the smallest ATCs (less than 5,000 inhabitants) than in the larger ATCs. This was explained by the so-called “social ties effect”. This research was contradicted by a study of a sample of 15 ATCs of various population sizes and sponsored by U-LEAD. This study showed a positive correlation between ATC size and the amount of revenues received (Zubenko et al. 2020). The larger the ATC population the greater the correlation with increased revenues.

The study by Storonianska (Сторонянська 2018) offered a set of criteria to assess the impact of decentralization on local government finance and concluded that

the overall effect is positive with regard to public capital investments, own revenues and transfer dependency.

Some researchers foresee that these early positive results of decentralization efforts could expire rather quickly and result in increasing fiscal deficits of rural ATCs; as well as an increase of horizontal inequality concerning resource endowment (Дяконенко 2018).

3. Methodology of policy and data analysis

In order to present the results of the decentralization policy applied in Ukraine since 2014, we firstly reviewed the existing legislation that enabled the implementation of the policy and supported the approaches to its implementation. In the next step, we assessed the current progress in the decentralization process by focusing on voluntary rural amalgamation, changes in ATCs' fiscal resources, and the development of inter-municipal cooperation. After that we analyzed the changes in the financial situation of the ATCs and tried to determine which factors were significant, i.e. whether the change in the administrative-territorial landscape really contributed to making local governments more fiscally viable and autonomous.

It is often difficult to obtain sufficient and accurate data to analyze the impact of decentralization on local government units. In the case of Ukraine, a significant amount of data on the amalgamated communities is available due to the support provided by the EC and other donor countries through the Ukraine-Local Empowerment, Accountability and Development Programme (U-LEAD).

The U-LEAD project produced a report on the performance of 806 of the ATCs in 2019, which included 79.9% of ATCs at that time. The report examined 8 indicators of ATCs' budget performance, which were segmented into population categories as follows: (1) 95 ATCs with more than 15,000 residents, (2) 128 ATCs with 10–15,000 residents, (3) 268 ATCs with 5–10,000 residents, (4) 288 ATCs with fewer than 5,000 residents, and (5) 27 towns of oblast significance (U-LEAD 2019).

The detailed data from this report are utilized to analyze the change in the number of local government units into amalgamated units to determine the strength of correlations of ATC size to the fiscal indicators. This allows to test the hypothesis that voluntary amalgamation contributed to making local government units more fiscally viable. The statistical test was performed by applying ordinary least squares (OLS) to the data with regard to population segments.

To assess the changes in the overall financial situation of the ATC, the annual budget statistics of the Ministry of Finance of Ukraine was analyzed as well as the data of the national decentralization portal (decentralization.gov.ua) and the Ministry for Communities and Territories Development of Ukraine.

Understanding the limitations of these data that do not provide for more comprehensive data assessment, we believe that this data does give sufficient information on the impact of the policies and the situation in the ATCs and to see some issues arising from the current stage of decentralization policy implementation.

4. Decentralization reform strategy

The decentralization reform is considered one of the most important pillars of Ukrainian public administration system modernization (Khadzhyradeva et al. 2020). It has been considered by some national and international experts to be the most successful reform out of the many launched since 2014. Ukraine started the decentralization process from 2015 with an emphasis on territorial amalgamation of the over 10,000 local government units, which runs counter to two of the main rules of fiscal decentralization. First, Ukraine's decentralization has been based on voluntary amalgamation as opposed to the mandatory merging that has been typical in the other CEE and EU countries. Second, early on it has focused on the process of increasing the fiscal resources even before it began to fully devolve functions. The key question is whether a bottom-up voluntary approach as well as appropriate financial incentives and enhancements are key factors to succeeding in fiscal decentralization reform.

In general, the decentralization strategy of Ukraine involved important components that could support its success if implemented steadily and systematically. These include: (1) changes in administrative-territorial composition; (2) a voluntary approach to amalgamation that allows considering the interests of involved communities; (3) a reassignment of functions among the levels of government, (4) inter-municipal cooperation to provide accessibility and higher quality of public services; and (5) expanding ATC revenues sources.

However, the Ukrainian decentralization reform has some inherent flaws, i.e. it still lacks clarity in intergovernmental relations, which diminishes the overall positive outcomes of the reform implementation and creates further uncertainty. So, as Levitas (2020) indicated, Ukraine lacks a clear legal assignment of functions between the levels of government, which has strict implications on ATC finance. The so-called "own revenues" that comprise a key component of the local government revenues actually embrace the shared revenues (first of all PIT) which cannot be controlled by the local governments themselves. It must also be noted here that the vertical delineation of public functions is also not explicitly defined, which creates a significant "shared" expenditures assignment. This gives the upper hand to the national government that is empowered to redistribute revenues and expenditures among the levels of government on an *ad-hoc* basis, creating a situation of unfunded expenditure mandates.

4.1 Legal policy design

The legal framework on decentralization included several legal and regulatory acts passed beginning in 2014–2015. These involve the Concept of Reform of the administrative-territorial units, changes to the Budget and Tax Codes, laws concerning inter-municipal cooperation, voluntary amalgamation of communities and regional policy. These created a legal and institutional background that enabled the implementation of the policy to reach its goals.

At the heart of the reform is local government amalgamation, and it is essential to precisely understand the basic criteria which were formulated in order to achieve a more effective composition of the local government sector.

The Methodology of Formation of Capable Territorial Communities adopted by the Cabinet of Ministers, as of 8 April 2015, provided the factors, criteria and evaluation methods for determining on what basis the amalgamated units could be formed. It specified that the “able-bodied territory” should be able to provide services in areas of education, culture, health care, social protection, housing and communal services through adequate human resources, financial support and infrastructure development.

The methodology further specified a particular sequence beginning with (1) the identification of potential administrative centers and their accessibility, (2) the determination of a list of territorial communities that could be formed as part of the able-bodied territorial community, and (3) an assessment of the level of capacity that would be formed through the evaluation criteria. Annex 2 of the Methodology specified certain factors and provided for a point system to be applied to determine whether the community would be classified as able-bodied. The factors included (1) population permanently residing in the community, (2) number of students in secondary education, (3) area of the territory, (4) index of tax capacity, and (5) share of local taxes and fees in the budget. A point scale was developed and then accumulated with the designation of 1.5–2.1 points for low level, 2.2–3.8 for an average level, and 3.9–5 for a high level.

Even though these evaluation criteria were developed, they did not provide a minimum level of factors, such as number of units to be merged, or per capita service and fiscal resources, or population density factors that could have enabled a more precise definition of able-bodied communities. The criteria did not set a minimum point level that the amalgamated units had to achieve in order to amalgamate. Consequently, local government units were allowed to amalgamate if they agreed to do so.

The Law “On Fundamental Principles of the State Regional Policy” as of 5 February 2015 granted extensive governmental support for the development of infrastructure in amalgamated communities through a specially designed fund. The sources of the State Fund of Regional Development would be allocated according

to the priorities of the State Program of Regional Development. This would be on a competitive basis with regard to the fiscal ability of receivers to maintain the objects of infrastructure, co-fund their creation, and take into consideration the differences in socio-economic development of the territorial units.

There were also some legal acts passed that extended the authority of local self-government bodies and contributed to the optimization of public service provision through delegating administrative powers to ATCs (such as registration at the place of residence, issuance of national identity documents, state registration of legal entities and individuals, civil registration, registration of proprietary rights, land issues, etc.).

It must be mentioned that a full implementation of the Concept of Decentralization is preconditioned by respective amendments to the Constitution of Ukraine. These amendments concern the establishment of executive bodies of regional and district councils, functions of the local state administrations and defining the community. However, these amendments are still not passed.

4.2 Policy Implementation: Did progress in amalgamation and inter-municipal cooperation bring sufficient results?

Territorial reform and/or amalgamation has been an ongoing process over several decades in Europe (Swianiewicz et al. 2017). These have come and gone in several waves and with considerable variation in the reasons and justification for changing the number and size of the territorial units at the subnational level.

The main goal of the decentralization process in many of the EU and CEE countries has been to create more viable fiscal and service delivery units through merging the small local governments into larger units. This process has occurred in most of the countries of the region and has resulted in fewer local government units that can provide services on a more economical and efficient scale as well as enhance the fiscal base of the merged units. It has been estimated that local governments with a population of less than 5,000 are not economically viable and increase the cost of services on a per capita basis. Plato estimated that a population of 5,040 would be the minimum necessary population level that would allow a city to perform its social, economic, political and war functions (Charbit 2002).

Voluntary Amalgamation

In Ukraine, the key feature of the decentralization process from the initial stage was to rely on a voluntary amalgamation of the units. This bottom-up approach provided for more local government officials and citizen input as the basis for the merging of the units and would rise from the perceived interests of the existing local governments and their citizens.

However, as most experts in the field understand and the experience from European countries indicates, voluntary merging has never been successful in achiev-

ing the level of consolidation of local government units to a manageable number. Most countries, at some point, have had to resort to forced merging of the local government units. This was true for most CEE countries which launched decentralization reforms in the late 1990s (Swianiewicz 2002).

Ukraine is a large country in both population and area. It ranks as the 32nd most populous country in the world with an area of 603,628 sq. km and a population density of 80 per sq. km. It is the largest country in Europe with regard to territory. It is divided into 25 regions and two cities of national importance (Kyiv City and Sevastopol), 490 districts, 460 cities and more than 10,000 rural councils. The average population for these small units was approximately 1,500.

From 2015 on, these small local units have been able to merge or amalgamate into larger units on a voluntary basis. This process is unique in that it is a bottom-up amalgamation process initiated by the local towns and villages, rather than a top-down mandatory approach. It could be initiated by the mayor, one-third of the local council or by the citizens themselves under certain circumstances.

The capacity of the amalgamated territorial communities has also been increased with additional staffing of experts in the areas of education, medicine, economics, physical education, social workers and other staff in addition to the traditional managers in these units.

The voluntary bottom-up initiative and the provision for inter-municipal co-operation and appropriate financial incentives are the key factors in the amalgamation process in Ukraine. However, the sustainability of these units in terms of size and fiscal capacity is yet to be determined.

The issue here is whether the amalgamation process in Ukraine has had a significant impact on reducing the number of local government units. The growth of the number of ATCs according to U-LEAD Programme data was as follows: 2015–159 units, 2016 – 366 units, 2017 – 665 units, 2018 – 874 units, July 2019 – 925 units, July 2020 – 982 units. As is evident from this data there has been a rather slow and steady increase in the number of ATCs, but they have not reached a sufficient level to encompass the majority of the local government units.

The data from the U-LEAD study of 806 amalgamated units also relates to the percentages of the number of units in each of these population categories and the percentage of the total population. Out of the 806 units, there are 288, or 35%, that are under the 5,000-resident population. This accounts for only 11.8% of the total population of the amalgamated units. Additionally, there are 268 units in the 5–10,000 population group representing 33% of the units and 22.5% of the population. Taken together these two groupings account for approximately two-thirds of the units and only one-third of the population. This is not particularly encouraging data that would ensure amalgamated units of sufficient population size to be viable.

Table 1 presents the results of the voluntary amalgamation process based on the data as of June 2020. It is broken down by the population categories that were defined by the U-LEAD project for analysis.

Table 1
Regional cross-cut of amalgamated local governments with regard to size,
as of 2019

Region	<5,000	5–10,000	10–15,000	>15,000	Average number of merged units
Vinnitsia	19	15	5	7	3.4
Volyn	18	27	5	4	4.4
Dnipropetrovsk	30	15	13	13	3.2
Donetsk	4	2	2	5	5.7
Zhytomyr	21	19	6	10	7.4
Transcarpathian	1	8	5	3	3.6
Zaporizhzhia	29	14	4	9	3.6
Ivano-Frankvisk	6	17	8	8	4.5
Kyiv	6	5	3	10	5.9
Kirovohrad	14	7	5	1	3.0
Luhansk	11	2	4	1	4.2
Lviv	11	18	7	5	4.2
Mykolaiv	18	15	5	4	3.5
Odessa	8	14	10	5	4.3
Poltava	26	13	10	4	3.7
Rivne	13	21	6	5	3.3
Sumy	14	11	4	9	4.9
Ternopil	25	13	7	9	5.8
Kharkiv	1	11	4	7	5.0
Kherson	17	8	4	4	3.5
Khmelnysky	15	20	5	11	7.3
Cherkasy	31	18	4	4	3.9
Chernivtsi	8	13	13	3	3.6
Chernihiv	20	11	8	11	7.5
Total	366	317	147	152	4.6

Source: www.decentralization.gov.ua.

This table reveals that there were 982 merged units from 4,487 with average of 4.6 units per merged unit. 366 of these 982 units have a population of less than 5,000, or 37 percent. 317 of the 982 units have populations between 5 and 10,000,

or 32 percent. Therefore, 69 percent of the 982 units have populations of less than 10,000. Of the remaining units, 147 of the 982 have populations between 10 and 15,000, or 15 percent and 152 of the 982 have populations over 15,000, or 15 percent.

The distribution of the average merged units for the 24 regions is presented in Table 2.

Table 2

Distribution of ATCs according to the average number of merged governmental units

Average number of merged units	Number of regions
3 Units Merged	11
4 Units Merged	6
5 Units Merged	4
6 Units Merged	0
7 Units Merged	3

Source: authors' calculations based on data in Table 1.

Table 2 indicates that there are a small number of units that are merged in most of the regions. On average 3 units were merged in 11 of the 24 regions. This again lessens the potential of the merged units to be viable and have a broad-based economic base to be fiscally sustainable. This fact was indicated by some Ukrainian researchers showing that voluntary amalgamation in these Ukrainian conditions could not allow forming ATCs that are large enough to be fiscally viable (Сторонянська 2018, 12).

Overall, there was still a predominance of local government units with populations of less than 5,000. If we project this same ratio of local government merged units further, we can see in the final analysis that there will still be a large number of units that would not be considered viable. With still approximately 6,000 units that could be merged, there would be roughly another 1,000 merged units. Unless these can be merged on the basis of larger number of merged units and greater populations, the percentage break-downs of the population categories will likely remain the same. This might mean there will be too many small units with too little fiscal resources to be a viable economic and service delivery unit.

The voluntary approach reached a plateau and largely stalled at these levels. To some extent these results could be attributed to resistance from the larger and wealthier urban communities to merging with poorer and more rural areas (Udovychenko et al. 2017). In addition, the resistance from the existing district level officials was also substantial as they could see that their territorial area and functions would be made redundant by the amalgamated communities. In some instances,

the district boundary and the amalgamated territorial community were identical. Therefore, there were two governments encompassing the same area and functions.

As is evident from the above, the number of amalgamated units did not achieve the level the government had initially targeted. At one point, the target was to reduce the 10,000 units to 1,200, this was later modified to 1,600–1,800 in 2018, and then in 2020 the target was again set to be 1,470, although it is not clear how this number was determined.

It was declared in 2020 that the remaining units not yet merged will be forced into “administratively initiated mergers.” This was done in order for all of the merged local government units to be formed prior to the scheduled local government elections in October 2020. However, this merging and forming of the units into political and electoral boundaries seems unclear.

It seems clear that the voluntary approach to amalgamation applied in Ukraine was not sufficient to create the number and size of local government units that would have made this effort a success. The experiences of the European countries that had gone through this process was not fully appreciated by the Ukrainian authorities and they persisted on this voluntary approach for too long. Eventually, they realized that they would have to resort to a mandatory amalgamation of the local government units to achieve the reform that was envisioned.

Some public opinion surveys indicate that the amalgamation has had a positive impact on the citizens’ views of their local governments and the services that they are receiving under the new arrangements. According to a tracking survey from 2015 onwards, 19 % of those surveyed indicated that budgetary decentralization had been positive; in 2018 this rose to 39.5 % (KMIC 2019a).

Other public opinion surveys carried out in 2019 demonstrated that people generally support the amalgamation approach implemented by the state. However, the increasing share of citizens also has begun to understand the limitations of the voluntary amalgamation. In the survey, 75 % of ATC inhabitants assumed that ATCs were formed on the basis of the amalgamation process. Fifty-four percent supported the amalgamation action. Another 71.5 % think that amalgamation must be voluntary. Interestingly, the percentage of supporters for voluntary amalgamation has decreased quite significantly (by one-third) after three years of the amalgamation process (KMIC 2019b).

Inter-municipal cooperation

One of the key features of the decentralization reform has been the use of inter-municipal cooperation agreements among these units to provide more service delivery in certain service sectors, such as in areas of local social service access for pensioners and the opening of administrative service centers to obtain passports and register children for schools. Previously, citizens would have to go to a larger local government unit or several offices in order to access these services. This required

inconvenient travel arrangements and long waits once they arrived at the proper office.

The use of inter-municipal cooperation was a strategic feature of the decentralization process. It was hoped that this would allow for the economy of scale and cost efficiency for the delivery of the functions assigned to the new ATCs. This is one of the key actions that those local governments with limited fiscal resources could employ to ensure that the additional services that they are required to provide could be effectively delivered. However, the inter-municipal cooperation approach seems to be a concept that is not familiar or well developed in the service culture of Ukraine. A report described the view toward inter-municipal cooperation as follows, “this kind of cooperation is some theoretical toy of Europeans, and had no sense in our hard life” (Proshko 2015).

Nevertheless, with governmental and international support, there have been 530 agreements covering 1,188 territorial units, approximately 10% of the total number of units. The areas of communal services, education, health, and social protection, and the “other” category have the largest number of inter-municipal cooperation agreements projects. There is great variation on a regional basis in the use of the inter-municipal cooperation agreements.

There is little evidence at present that the inter-municipal cooperation agreements have achieved some economies of scale in the services where these arrangements were made. Further analysis will be needed to determine whether this is the case.

The main improvements in local government services appears to have come from the U-LEAD program to support the creation of Administrative Service Centers (ASC) in many communities. These provide a number of services in one location that is more convenient for citizens to access. More than 500 ASCs have been established in various local government units where citizens can get important documents (birth and marriage certificates, residence permits, registration of business, among others) in one location.

A study of the use of inter-municipal cooperation among communities found that these arrangements had not achieved a significant level of use (Dzupin and Kolesnikov 2019). According to the study, the potential of cooperation in areas of education and healthcare were underutilized. There was a very limited use across the regions with half of the regions with ATCs not having any cooperation at all, and where there was cooperation it was of the most basic form. The study indicated that the reasons for this low use of inter-municipal cooperation was due to a low level of awareness among community leaders and a high degree of mistrust among the communities.

It could be concluded that the level of inter-municipal cooperation has not reached a critical level or mass to ensure that local government services will be

substantially improved through the use of inter-municipal agreements. There is not the widespread use, either geographically or by sector, that would indicate these co-operation agreements will reach the level of at least 50 % of the amalgamated units to be considered even moderately successful. Without further support or incentives for inter-municipal cooperation, many of the small units that have amalgamated will be left in situations where government services could deteriorate over time.

4.3 Expanding local fiscal resources

The amalgamation was incentivized by the central government through increasing the PIT share allocated to the local governments, greater transfers for social sector functions, and with access to investment grants from the State Regional Development Fund. Also a more simplified, transparent and objective-based grant transfer formula was introduced.

According to the amended Budget Code and Tax Code, ATCs were to receive the following state levies: 60 % PIT share, 25 % of ecological levy, 5 % of excise, 100 % of unified small business tax, 100 % of CIT of communal enterprises, and 100 % of the property tax. They were also receiving some local taxes and state administrative levies, among other minor sources. With the additional resources coming from different types of transfers to support decentralization, the ATCs seemed positioned to receive a much higher revenues base in comparison to the situation before amalgamation.

There have been substantial increases in the local government revenues among the amalgamated units as evidenced by the data from the Ministry of Finance. However, this data is highly aggregated for these units and does not reveal what may be significant variations across these units based on the population categories that are examined in this paper. Overall, the revenues of the general fund of local budgets have increased significantly in absolute terms since 2014, as indicated in Table 3.

Table 3
Nominal increase in revenues of general fund of the local budgets in the course of decentralization policy implementation (2014–2019)

	2014	2015	2016	2017	2018	2019
Nominal increase (UAH billion)	68.6	98.2	146.6	192.7	234.1	275.0
Year to year increase (percentage)	n.a.	43.1	49.3	31.4	21.5	17.5

Source: Solodkyy et al. (2020, 11).

The data above illustrate the great revenue increases in the early years of the amalgamation process, but as is evident from 2017, the percentage increases are

leveling off and may have effectively reached their limit based on present revenue sources. This may indicate that additional revenue sources will be needed to meet the increasing expenditure needs of the local governments from the new functions assigned to them and for the maintenance of the infrastructure that has been financed by state budget transfers.

The sharing of the PIT was considered to be one of the main fiscal incentives for the amalgamation of the units. According to sociological surveys, from 60 to 75 % of ATC inhabitants of units created in 2015–2016 admit that they feel an increase in ATC revenues after amalgamation (KMIC 2019b). While this source of revenue for the ATCs is substantial on an aggregate basis, there are wide variations in the PIT for the ATCs. This has been demonstrated in a report prepared by the U-LEAD program titled *Assessment of the Public Finance Management System of Amalgamated Hromadas*, which examined 10 amalgamated units in 5 oblasts (Newmaier et al. 2019).

The main findings of this report with regard to the PIT as a revenue source for the amalgamated units reveal some significant problems with its use. These findings were as follows among the 10 ATCs examined:

- The share of PIT in general fund revenues varies from 41 % to 60 %,
- On average, up to 20 % of the PIT is paid by local public sector employees,
- The PIT per capita varies greatly among the ATCs ranging from 1.3 to 2.5 thousand UAH,
- In 8 of the ATCs, transfers provide more than 50 % of the total revenue,
- A common problem identified in the use of PIT is that the administration is divided among separate state offices and they do not conform to the legal requirements for sharing the PIT.

The main conclusion that can be drawn from the examination of the PIT is that it is not a dependable source of revenue for many of the ATCs and cannot be considered an “own” source of revenue, which is common in Ukraine. The reasons are the following: the main Ukrainian PIT components (tax base, tax rates, tax deductions etc.) are defined by the national legislation, and the administration is highly centralized by being performed by the local branches of the State Tax Office. As the study by Newmaier et al. (2019) showed the additional revenues received by the ATC are still not sufficient for granting higher fiscal autonomy as most ATCs have been subsidized by more than half of their fiscal resources.

In order to better understand what affected the ATC revenues we performed a statistical analysis that could reveal the main factors involved.

5. Analyzing the allocation of fiscal resources of the ATCs

5.1 Does size matter?

The study by U-LEAD (2019) provides some interesting data on the revenue and expenditure levels among the ATCs grouped by population size. These fiscal indicators involve per capita general budget fund revenues and general budget fund expenditures. According to the Budget Code, the general budget fund comprises revenues and expenditures that are designated for the general government functions. The special budget fund includes targeted revenues and respective expenditures (the revenues and expenditures of the budgetary institutions), budget loans and allocations to the special fund from the general budget fund. The special budget fund is slightly less than 1/10 of the total budget revenues and expenditures.

The per capita revenue data for ATCs does not provide much encouragement for the fiscal viability of these units. For the units under 5,000 residents, there were only 108 units, or 13 %, that have per capita general budget fund revenues (further referred to as GBFR) above the average of all the 806 amalgamated units. Within the units with 5–10,000 residents, only 81, or 10 %, have GBFR above the average of all the 806 amalgamated units. Therefore, only a small percentage of these units with small populations have reached per capita GBFR above the average.

What is more concerning is that the difference between the highest and lowest amounts of per capita GBFR is very substantial within these groupings. For the group under 5,000 residents, there is a difference of 47 times from the lowest to the highest. For the 5–10,000 resident grouping, the difference from lowest to highest is by a factor of 26.

A similar pattern emerges with the indicators looking at the expenses of the per capita general fund budget (further referred as GBFE) in these groupings. For the units under 5,000 residents, there were only 97 out of the 806, or 12 %, that had per capita GBFE above the average of all the amalgamated units. For the units in the 5–10,000 bracket, there were only 55, or 6 %, that had per capita GBFE above the average.

The data for the other indicators tends to follow the same relationships among the groupings with substantial disparities among the groupings and with the weakest relationships in the lowest population groupings. If these trends continue for the amalgamated units, Ukraine will only have a modest improvement in the decentralization effort, or an even more dependent and weaker level of fiscal capacity and service delivery of the amalgamated units.

5.2 Factors affecting the fiscal measures

How to measure the fiscal condition of local governments resulting from the impact of a fiscal decentralization process has been an ongoing area of concern in the field

(Martinez-Vazquez and Timofeev 2010). It might be assumed that amalgamation into larger units of local government would increase the fiscal resources of those units. Otherwise, there would seem to be little reason to undertake this merging effort. It might be further assumed that the larger the unit the greater would be the amount of fiscal resources that would be available. A rational assumption is that there should be some correlation of the ATC size to this level of increased financial resources. The larger the territorial unit, the stronger the correlation should be. If there is little correlation or even a negative correlation, then it would seem that the units have not been properly sized to achieve greater fiscal sustainability.

To see if this might be the case, the 2019 data for the ATCs were utilized and a calculation of the population density as the independent variable to the per capita dependent variables, GBFR, GBFE, government expenditures, and capital expenditure were made. The correlations are shown in Table 4 for the ATC segments of various population sizes.

Table 4

Correlations between population density and fiscal measures for different ATC groups, 2019

Per capita measures	Less than 5,000 residents	5–10,000 residents	10–15,000 residents	15,000+ residents	Cities of region significance
GBFR	–0.1373	–0.0117	0.1164	0.1057	0.4569
GBFE	–0.2102	–0.1605	–0.0558	–0.2601	0.3332
Governance expenditures	–0.1487	–0.1236	–0.1315	–0.2229	–0.3073
Capital expenditures	–0.0938	0.0618	0.2770	0.2478	0.0972

Source: Authors' calculations based on U-LEAD (2019).

As can be seen from Table 4, for those units with less than 5,000 residents and the units with between 5 and 10,000 residents, almost all the correlations are not very high and negative. For ATCs of a size between 10 and 15,000 residents and 15,000+ residents the correlations are slightly stronger; with GBFR being positive and GBFE negative correlations. Interestingly, the cities of regional significance (which of course have much higher population density) have the stronger and positive correlations for the dependent variables. These are larger population units, with only 5 of the 27 in this group having populations below 20,000. So, it might be concluded that the larger the population the greater the correlation to the fiscal measures. Actually, these simple correlations could mean that size really matters.

As a further test of the relationship between various dependent variables a regression analysis was run to test the variations and strengths of the relationships.

These are presented below over several dependent variables. The R^2 gives an estimation of the strength of these relationships. While there are limitations on the use of regression analysis to make predictive or definite statements about the relationships, it is being used here to test the consistency of the statistical methods used in this assessment.

The regression tested how the ATC size measured in population and territory would affect such measures as per capita GBFR and capital expenditures.

This is done to test the following hypotheses which are very common in the fiscal federalism literature:

- (1) GBFR should increase with growing ATC size;
- (2) The amount of capital expenditures should increase with growing ATC size.

If the two hypotheses tested positive, then it should be assumed that the Ukrainian decentralization reform has effectively achieved its primary goal – to have fiscally viable local governments at the basic public administration level. If not, then the reason for such a situation should be discussed and some policy measures considered that could improve the situation. In order to determine this situation, the data was disaggregated across the whole sample into clusters of similar size according to the U-LEAD approach.

Based on this methodology, two model types were constructed:

- (1) Models which explain the change in per capita revenues of the general fund:

$$GBFR = b_1N + b_2A + C$$

- (2) Models which explain the change in per capita capital expenditures of an ATC:

$$CE = b_1N + b_2A + C$$

where GBFR denotes per capita revenues of the general budget fund, N denotes population size in a respective ATC, A – area of the respective territorial unit, CE – per capita amount of capital expenditures of an ATC.

The descriptive statistics is presented in Tables 1–6 in the Appendix.

Tables 5–6 present the results of the regression analysis and indications of the variability of the relationship to the dependent variables.

The models presented in Table 5 demonstrate quite low significance with the exception of group 5, which serves as a reference group. It means that the exogenous size factors play an almost negligible role in determining an ATC fiscal endowment at this stage of the decentralization process. Moreover, the coefficients by the N variable for all groups except group 2 are negative. This fact could mean that bigger ATCs are disadvantaged in terms of population size, which calls for stronger central government interventions. On the opposite end, the area generally has a positive

(however very small) impact on revenues, which could be unexpected. This is because merging of rural locations which have much larger area, but do not provide many productive resources per unit area to increase revenues. Data in Table 5 may mean that our hypothesis # 1 (the greater the size of local government, the greater is its per capita revenue) is not sustained.

Table 5
Factors explaining GBFR

	Sample size	N	A	C	R²
Group 1 (15,000+)	95	-38.00 (-0.76)	-0.29 (-0.76)	5149.24 (9.82)	0.04
Group 2 (10-15,000)	128	384.52 (2.09)	0.22** (0.17)	-425.21 (-0.19)	0.04
Group 3 (5-10,000)	268	-177.35 (-1.24)	3.47** (2.53)	4961.89 (4.78)	0.03
Group 4 (less than 5,000)	288	-876.41* (-3.54)	8.51* (3.69)	6499.09 (7.68)	0.07
Whole ATC sample	779	-74.22* (-3.29)	1.62** (2.49)	4787.68 (23.90)	0.014
Group 5 (cities of regional significance)	27	7.32** (2.23)	-0.05 (-0.05)	4750.41 (11.51)	0.17

Notes: Confidence intervals denoted by stars: *** $p < 0.001$, ** $p < 0.05$, * $p < 0.01$. The numbers in parentheses denote t-statistics.

As the main source of ATC revenues is PIT, the amalgamation would be followed by growing budget revenues. However, this does not appear to have occurred. Generally, the size of the ATC area does not affect GBFR as its growth reflects the dispersion of productive factors.

The model for the reference group (# 5) that includes a sample of quite large cities shows size matters to some extent for urban communities: the larger (in terms of population) cities attract more productive factors that generate a larger inflow of budget revenues; the negative effect of area size is very insignificant.

Models with per capita capital expenditures (Table 6) provide a test of the financial capacity of the local government units to supply the infrastructure services that are economically important to the area of their jurisdiction.

Table 6
Capital expenditures factors

	Sample size	N	A	C	R ²
Group 1 (15,000+)	95	-8.34 (-0.55)	0.11 (0.49)	1376.90 (4.43)	0.004
Group 2 (10–15,000)	128	54.39 (0.68)	-0.83 (-1.50)	1026.58 (1.07)	0.02
Group 3 (5–10,000)	268	-50.02 (-0.73)	0.76 (1.16)	1846.84 (3.74)	0.007
Group 4 (less than 5,000)	288	-361.01** (-2.68)	3.54 (2.82)	2452.78 (5.33)	0.04
Whole ATC group	779	-38.63* (-3.41)	0.41 (1.27)	1847.10 (18.34)	0.015
Group 5 (cities of region significance)	27	5.13* (4.42)	0.68** (2.17)	728.87 (728.87)	0.49

Notes: Confidence intervals denoted by stars: *** $p < 0.001$, ** $p < 0.05$, * $p < 0.01$. The numbers in parentheses denote t-statistics.

Most models in Table 6 demonstrate that exogenous size factors cannot explain the variance in per capita capital expenditures, except for that for group 5. There is no evidence of a strong relationship of the dependent variable to the ATC size by the regression test. This may tend to indicate that the allocation of the infrastructure grants provided by the national government to the amalgamated units did not take into consideration their real needs in infrastructure objects that must be higher in the larger units. Moreover, the larger units in terms of population would have much less per capita capital expenditures, which could mean that from the point of view of the current decentralization approach the sparse rural territorial units have an advantage over the highly concentrated urban ones. And it is predicted by the positive sign of coefficients by the area variable in most cases. Our reference group (# 5) demonstrates that in urban localities both size indicators are statistically relevant; both are positive, which could mean that a larger urban unit will generally attract more capital that would be invested into different projects in comparison to the smaller unit.

6. Citizens perspective on the impact of the decentralization reforms

The above analysis has focused on the more quantitative and objective data related to fiscal analysis and changes in the structure of the local governments in Ukraine. While there is a dearth of reliable and available data that measures these features, there is a significant level of sociological and public opinion data about the citizens' perspectives and expectations concerning the decentralization reforms. Many of

the experts and the academic literature indicate that decentralization has been a major success in Ukraine. What has not necessarily been incorporated into these analyses are the broader citizen level views of the reforms. To complete this perspective a sampling of this public opinion data is presented to further detail the assessment of decentralization in Ukraine.

The finale of the decentralization process was the holding of local government elections in the amalgamated units across Ukraine in October 2020. This was the end of the decentralization process and was the first real opportunity for citizens to demonstrate their level of commitment to the changed local government system. The impact of amalgamating local government units on voters has been relatively under researched, but some research indicates negative impacts on voter participation after amalgamation occurs (Rodrigues and Tavares 2020).

The local government elections in Ukraine were hastily organized and there was not a sufficient amount of time for many citizens to get accustomed to the new territorial boundaries and know the parties and candidates well. In the first round of voting on 25 October, only 39 % of voters turned out to vote. This was an even lower turnout level than in previous elections. In the second round held in 7 cities on 15 November, the voter turnout was only 24 %. Another second round held in 11 cities on 22 November resulted in voter turnout of 29 %. This low turnout may be explained by the fact that in a survey prior to the election, 52 % indicated they expected nothing to change from the local government elections (Sociological Group Rating 2020).

While participation in the election is one measure of the commitment of the citizens to decentralization reforms, there are other surveys that indicate a lack of real conviction that decentralization reforms will improve the level of local government services.

In assessing the decentralization reform overall and over the past several years of implementation, citizen surveys demonstrate skepticism about the impact of the reforms. According to the survey conducted by the USAID project ENGAGE, 46 % of the respondents said they had not seen any consequences of the reforms in Ukraine in 2020, 25 % felt negative consequences, with only 2 % identifying positive results of the reforms (USAID 2020). However, this relates to overall governmental reform activities since 2019, but there is little doubt that there is also disappointment with the decentralization reform.

On the basis of the change in public opinion over the years of the decentralization reforms, the public opinion survey revealed some negative opinions, especially from August 2018 to August 2020. This is demonstrated in Table 7.

Table 7

How the delegation of governmental functions to local authorities has impacted citizens (in percent to total numbers of answers)

	August 2016	June 2017	August 2018	August 2020
New opportunities for citizens to engage with the governmental decision-making emerged	20.6	24.0	22.8	15.3
The process of internal migration from villages and certain cities has accelerated	14.7	15.9	21.7	22.2
The quality of governmental services has improved	21.0	17.7	12.1	13.4
Local clans took over	26.8	28.7	22.7	29.7
Other	2.4	4.4	1.2	6.7
No opinion	34	24.8	31.6	28.1

Source: Ilko Kucheriv Democratic Initiatives Foundation (2020).

The data above reveal some significant declines in the perception of the citizens of the impact of decentralization on their lives; particularly in areas of citizen engagement and quality of local government services, which should be the areas that decentralization is designed to most improve.

7. Conclusions

Ukraine did try some new approaches to implementing decentralization rather than follow the old discredited approaches that most countries have followed (Wright 2017). This, in particular, was the development of a concept of decentralization, the bottom-up approach of forming amalgamated units on a voluntary basis, attention to defining fiscal resources at the early stages of the process, enhanced fiscal incentives, and the use of inter-municipal cooperation.

Perhaps the best that can be said about the progress and impact of the long-awaited decentralization reform in Ukraine is that it appears to be **no better or no worse** than other decentralization efforts in the region and internationally. However, given that other countries in the region undertook decentralization much earlier, it is regrettable that Ukraine seems not to have learned and applied those experiences. This is probably the greatest failure of the Ukrainian implementation of decentralization.

The decentralization process lacked the necessary development of the appropriate legal framework from the beginning, and many aspects are still not appropriately addressed in legislation. This is the primary issue that was noted in an NISS

decentralization study (Жаліло et al. 2018) and by international experts (Levitas 2020). This is only beginning to be addressed after five years of decentralization.

Many of the policy flaws identified in this paper and other studies were observed early in the reform process. In 2017, the problems associated with the voluntary amalgamation approach, the failures of the PIT as a shared resource, and the distortion of the allocation of fiscal resources that favored a small segment of the amalgamated units, particularly the cities of oblast significance, were enumerated (Levitas and Djikic 2017). Even though these flaws were identified, there were no major changes in the overall approach to continuing the amalgamation process.

This assessment shows that amalgamation implemented in Ukraine brought some mixed and ambiguous results. The main problem is that most newly formed territorial units do not fulfill the criteria of being self-reliant and fiscally viable. This conclusion is supported by information published by the Association of Amalgamated Territorial Communities at the end 2019, in which approximately 50% of ATCs formed through voluntary amalgamation did not meet the criterion of self-reliance in terms of economic development. This could be illustrated by the fact that only 50% of inter-municipal projects supported by the state have been implemented (Мельничук 2020). These facts mean that voluntary amalgamation in many cases did not bring about the expected results and may have been administratively inspired by regional authorities aiming to report on successful reform implementation. The question of increasing ATCs by merging with communities that are still unwilling to amalgamate is still quite open to debate. Consequently, it seems that the time of forced merging had to come.

The emphasis on voluntary amalgamation as an approach to administrative-territorial reform was a strategic mistake and highlights that Ukraine did not learn from the experiences in other countries that tried voluntary merging and eventually had to go to mandatory amalgamation. The failure was further compounded when Ukraine did not have an alternative plan to overcome this and in the final phase reverted to a forced and unpopular amalgamation of the remaining units.

While there was a criteria and evaluation process developed for assessing the amalgamated units, it failed to provide for a minimum standard that local government units would have to achieve to be amalgamated. It appears that a number of local units that wanted to amalgamate without regard to their population size or capacity was allowed to amalgamate. This has led to the situation where the number of local governments amalgamated with populations under 5,000 is nearly one-third of the units. Another third are in the population range of 5–10,000 and are marginal at best.

Even though the number of amalgamated units with populations of less than 5,000 or less than 10,000 may have been reduced, the majority of the amalgamated units are still of too small a population size to be able to deliver services effectively.

The use of inter-municipal cooperation agreements was intended to overcome the weakness of this voluntary approach and overcome these service delivery weaknesses.

However, as is evident from the data on the number of inter-municipal cooperation agreements, this has not yielded the level or scale of agreements that would demonstrate they would be critical to overcoming service delivery deficiencies. There are still a substantial number of small local governments that are not of sufficient population size which have not joined into inter-municipal cooperation agreements to indicate this approach will be successful.

Our findings supported by modeling shows that an increase in ATC size could not make them more sustainable from the fiscal point of view. The larger an ATC, the less per capita revenues it will generate. This observation supports conclusions by Hamaniuk and Palchuk (2020) who claimed that an increase in ATC size will cause a drop in local revenues. The recent study of ATC finance sponsored by U-LEAD (Zubenko et al. 2020) delivers the opposite conclusions as this study: a positive correlation of the size of the unit to the increase in fiscal capacity is evident. However, the latter study analyzed data of merely 10 ACUs from different regions that could not be compared with our sample which includes more than 800 units.

The fiscal resources of the units were considered from the beginning, and the attention to this was commendable. However, the sharing of PIT and the basis on which the sharing takes place has proven insufficient to provide a robust fiscal base for many of the amalgamated units. The strategic mistake here was not to expand the revenue sources to a broader base. It is unlikely that the local revenue sources, as presently constituted, will be sufficient to provide the fiscal sustainability that is needed. Consequently, it is likely that these units will come to depend more and more on the fiscal transfers from the central level. This will be particularly true when the maintenance of the infrastructure projects supported by the government grants will be assumed by the local government units in the future.

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Appendix.

The samples' characteristics

Table 1
Group 1 ATCs

	GBFR	CE	N (1,000s)	A_(km²)_
Mean	4199.615	1257.883	21.06316	507.0368
Median	4028.900	1024.200	19.30000	440.3000
Maximum	7695.000	3906.400	38.70000	2010.900
Minimum	1108.600	210.9000	15.20000	22.00000
Std. Dev.	1268.932	738.6847	5.371755	356.0981
Skewness	0.388676	1.530090	1.306298	1.329575
Kurtosis	3.277202	5.155273	4.216953	5.650919
Jarque-Bera	2.696090	55.45588	32.88042	55.80638
Probability	0.259748	0.000000	0.000000	0.000000
Sum	398963.4	119498.9	2001.000	48168.50
Sum Sq. Dev.	1.51E+08	51291577	2712.441	11919749
Observations	95	95	95	95

Table 2
Group 2 ATCs

	GBFR	CE	N (1000s)	A (km²)
Mean	4326.074	1456.236	12.19766	281.5969
Median	4073.100	1092.900	12.20000	232.9000
Maximum	23702.40	8487.000	15.00000	1004.100
Minimum	905.2000	278.3000	10.10000	20.00000
Std. Dev.	2879.504	1236.538	1.398563	201.4807
Skewness	3.041063	3.250326	0.228216	1.101487
Kurtosis	18.75493	16.20535	1.851823	4.025436
Jarque-Bera	1521.120	1155.413	8.142087	31.49129
Probability	0.000000	0.000000	0.017060	0.000000
Sum	553737.5	186398.2	1561.300	36044.40
Sum Sq. Dev.	1.05E+09	1.94E+08	248.4093	5155497.
Observations	128	128	128	128

Table 3
Group 3 ATCs

	GBFR	CE	N (1000s)	A (km²)
Mean	4902.717	1801.049	3.398958	162.5462
Median	4219.350	1291.600	3.500000	136.2500
Maximum	35748.00	15398.10	5.000000	600.5000
Minimum	760.6000	242.7000	1.400000	17.60000
Std. Dev.	3686.795	1977.776	0.887838	95.43492
Skewness	4.175112	4.220713	-0.260810	1.233061
Kurtosis	28.40511	24.00832	2.131512	5.139679
Jarque-Bera	8581.752	6151.287	12.31630	127.9199
Probability	0.000000	0.000000	0.002116	0.000000
Sum	1411982.	518702.1	978.9000	46813.30
Sum Sq. Dev.	3.90E+09	1.12E+09	226.2297	2613946.
Observations	288	288	288	288

Table 4
Group 4 ATCs

	GBFR	CE	N (1000s)	A (km²)
Mean	4902.717	1801.049	3.398958	162.5462
Median	4219.350	1291.600	3.500000	136.2500
Maximum	35748.00	15398.10	5.000000	600.5000
Minimum	760.6000	242.7000	1.400000	17.60000
Std. Dev.	3686.795	1977.776	0.887838	95.43492
Skewness	4.175112	4.220713	-0.260810	1.233061
Kurtosis	28.40511	24.00832	2.131512	5.139679
Jarque-Bera	8581.752	6151.287	12.31630	127.9199
Probability	0.000000	0.000000	0.002116	0.000000
Sum	1411982.	518702.1	978.9000	46813.30
Sum Sq. Dev.	3.90E+09	1.12E+09	226.2297	2613946.
Observations	288	288	288	288

Table 5
Group 5 ATCs

	GFBF	CE	N (1000s)	A (km²)
Mean	5252.474	1239.207	70.03704	221.9259
Median	4777.900	1139.600	42.30000	113.8000
Maximum	9813.000	3438.300	371.1000	1209.800
Minimum	3098.800	215.5000	10.20000	33.50000
Std. Dev.	1494.649	675.6054	84.75440	314.0660
Skewness	1.091351	1.186269	2.394744	2.421539
Kurtosis	4.477250	5.314198	8.022300	7.300015
Jarque-Bera	7.814764	12.35751	54.18303	47.18871
Probability	0.020093	0.002073	0.000000	0.000000
Sum	141816.8	33458.60	1891.000	5992.000
Sum Sq. Dev.	58083338	11867509	186766.0	2564573.
Observations	27	27	27	27

Table 6
Whole sample

	GBFR	CE	N (1000s)	A (km²)
Mean	4566.807	1628.619	8.236842	240.6078
Median	3992.000	1206.600	6.200000	181.3000
Maximum	35748.00	16626.40	38.70000	2010.900
Minimum	760.6000	175.9000	1.400000	17.60000
Std. Dev.	3201.072	1610.131	6.050759	209.5021
Skewness	3.690302	4.674117	1.722632	2.773606
Kurtosis	25.10414	33.18470	6.529325	15.25287
Jarque-Bera	17627.03	32409.83	789.5806	5871.856
Probability	0.000000	0.000000	0.000000	0.000000
Sum	3557543.	1268694.	6416.500	187433.5
Sum Sq. Dev.	7.97E+09	2.02E+09	28483.89	34147302
Observations	779	779	779	779