CITIES IN EUROPE AND CENTRAL ASIA

UKRAINE

METHODOLOGY

This Country Snapshot was produced as part of an Advisory Services and Analytics (ASA) work developed by the Urban, Social, Rural and Resilience Global Practice (GPSURR). The objective of this ASA is to analyze economic, spatial and demographic trends in the urban systems of countries in Europe and Central Asia. City-level population data was obtained from the *(or validated by)* National Statistics Institute In the absence of city-level economic and spatial data over the period of analysis, night-light (NLS) satellite imaging was used to assess spatial and demographic trends of cities. In previous studies, NLS intensity has been found to be positively correlated with economic activity measured by GDP. Regional-level regressions of NLS and regional GDP were conducted to assess validity of using NLS as a proxy for economic activity in Ukraine. Results showed a very significant and positive correlation between NLS intensity and GDP levels which proved to be robust to different model specifications. In the case of Ukraine GDP to NLS elasticity was found to be 0.839 *(an increase in light intensity of 1 percent is expected to be linked with a 0.839 percent increase in GDP)*. This Country Snapshot presents urban system level results; due to measurement errors economic and spatial city-level results should be analyzed with caution, and when possible, additional city-level data sources *(i.e. satellite imagery, firm level data, etc.)* should be consulted to corroborate and confirm results. This snapshot considered all settlements (458) which are considered as being 'cities' within Ukraine. Demographic trends are available for all cities but NLS data analysis is only available for 336 cities as the remaining settlements did not produce enough light to be considered "urban" by NLS standards. Similar assessments made in other countries suggest that NLS are able to capture most settlements with 30,000 inhabitants or more. For additional information on this ASA please contact Paula Restrepo Cadavid (prestrepocadavid@worldbank.org) or Sofia Zhukova (szhukova@worldbank.org)

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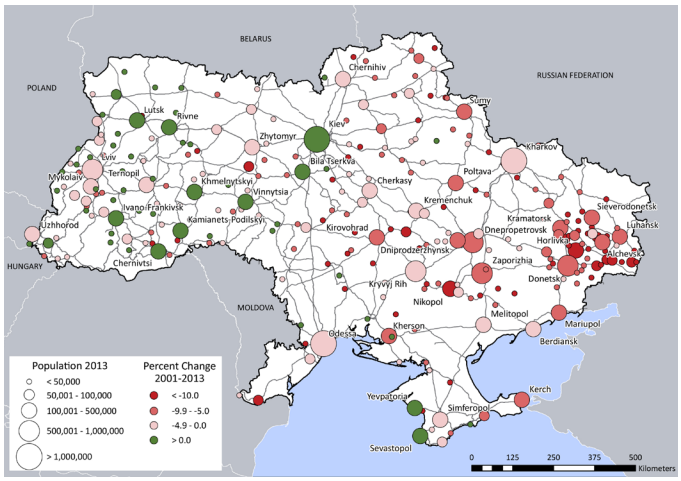
DEMOGRAPHICS

		BEFORE	RECENTLY
Fertility Rates	Ukraine	1.92[1]	1.51[2]
	ECA	1.95[1]	1.73[2]
Life Expectancy	Ukraine	70.53[1]	71.15[2]
	ECA	72.05[1]	76.77[2]
% of Population Above Age 65	Ukraine	11.72[1]	1.59[3]
	ECA	15.27[1]	15.37[3]
Population Growth (Average Annual %)	Ukraine	-0.43[4]	-0.57[5]
	ECA	0.27[4]	0.33[5]
Urban Population Growth (Average Annual %)	Ukraine	-0.34[4]	-0.33[5]
	ECA	0.04[4]	0.07[5]
Urbanization Level (%)	Ukraine	66.71[1]	69.48[3]
	ECA	67.59[1]	70.30[3]
Annual Urbanization Rate (%)	Ukraine	0.09[4]	0.24[5]
	ECA	0.12[4]	0.24[5]
City Average Population	Ukraine	66,162[1]	60,220[2]
	ECA	72,515[1]	75,132[2]
% Cities With More Than 100,000	Ukraine	10.89[1]	9.80[2]
	ECA	12.97[1]	20.02[2]
% Cities With More Than 500,000	Ukraine	2.20[1]	1.75[2]
	ECA	2.03[1]	2.27[2]
% Cities losing Population	Ukraine	80.00[4]	81.61[6]
	ECA	59.58[4]	61.58[6]



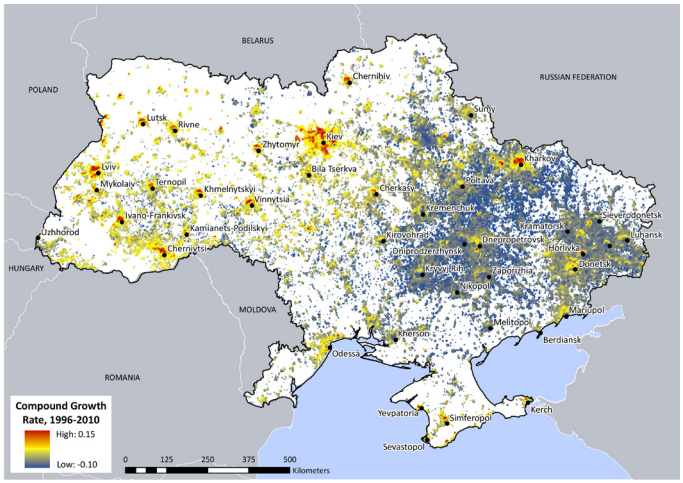
SPATIAL

		BEFORE	RECENTLY
Built Up Area (100,000km²)	Ukraine	16,476.42[7]	33,316.61[2]
	ECA	86,265[7]	163,124[2]
Built Up m² Per Capita	Ukraine	317.51[7]	732.40[2]
	ECA	186.38[7]	338.81[2]
Built Up Area Growth (%)	Ukraine	102.20[8]	
	ECA	89.10[8]	
Built Up m² Per Capita Growth (%)	Ukraine	130.66[8]	
	ECA	81.79[8]	
Number of Cities in Analysis	Ukraine	458[9]	
	ECA	2,712[9]	
Number of Identified Cities (NLS)	Ukraine	336[9]	
	ECA	3,883[9]	
Number of Growing Cities (NLS Area)	Ukraine	148[9]	
	ECA	1,645[9]	
Number of Agglomerations(NLS)	Ukraine	26[9]	
	ECA	352[9]	

This section uses data from the Global Human Settlement layer (GHSL) developed by the Joint Research Centre of the European Commission. The GHSL extracts geospatial imagery to map and report on human settlements and urbanization.

ECONOMICS

		BEFORE	RECENTLY
Average Annual GDP growth (%)	Ukraine	-5.38[4]	3.14[5]
	ECA	2.00[4]	1.59[5]
Average Annual GDP per capital growth (%)	Ukraine	-4.90[4]	1.75[5]
	ECA	4.54[4]	1.21[5]
Estimated contribution of urban GVA to GDP growth (%)	Ukraine	70.22[5]	
	ECA	–	
Unemployment Rate (%)	Ukraine	9.30[3]	
	ECA	9.45[3]	
Poverty rate (% at national poverty line)	Ukraine	8.40[2]	
	ECA	—	
Urban to rural GVA ratio	Ukraine	8.51[2]	
	ECA	—	
Urban NLS Intensity Growth (%, annual average)	Ukraine	-0.57[10]	-1.17[11]
	ECA	3.55[10]	2.03[11]
% City Economies Growing (in NLS intensity)	Ukraine	0.00[10]	85.23[11]
	ECA	21.82[10]	74.85[11]
GDP to NLS Elasticity	Ukraine	0.84[12]	
	ECA	0.37[12]	

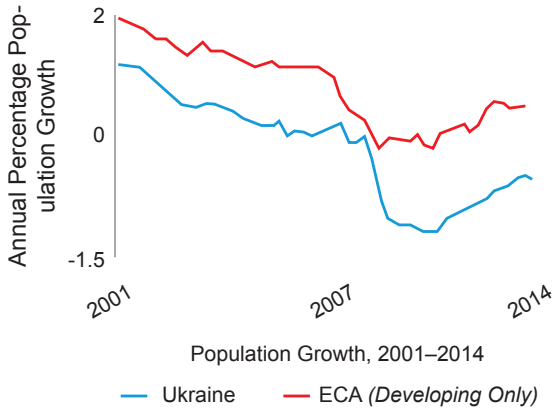


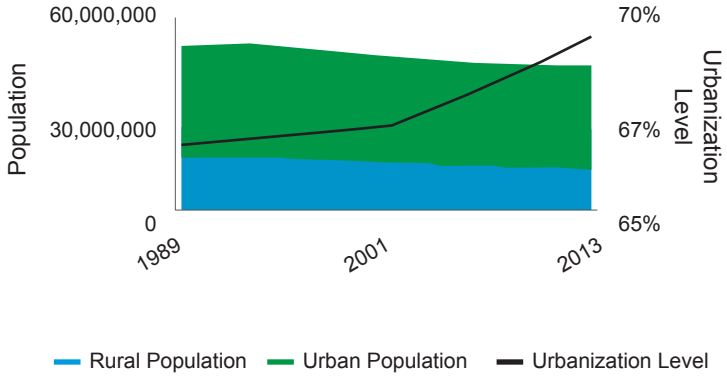
[1] 1989, [2] 2013, [3] 2014, [4] 1989–2001, [5] 2001–2014, [6] 2001–2013, [7] 1990, [8] 1990–2013, [9] 1996–2010, [10] 1992–2000, [11] 2000–2012, [12] 2002–2010.

URBANIZATION TRENDS

Over the past two decades Ukraine has experienced strong population decline. Between 1989 and 2013 the country lost 12 percent of its population. The degree of decline in Ukraine population is significant, even when compared to the ECA regional average. The sharp decline in population after the fall of the Soviet Union is largely linked to an overall aging trend of the population and a significant decline in fertility *(fertility rates have recovered slightly since 2009 but remain below replacement levels since 1962)*. Outmigration is also thought to be an important contributor to population decline.

The country continues to urbanize despite an absolute decline of urban population, as urban areas are declining at slower rates than rural areas. Between 1989 and 2001, the rural population decreased from 17.2 to 15.9 million (a 7.5 percent decline) while the urban population decreased from 34.5 to 32.70 million *(a 5 percent decline)*. The interaction of these dynamics resulted in an increase of 1 percent in the urbanization levels to reach 67 percent in 2001. Between 2001 and 2014, the rural population further declined to 13.9 million *(a 12 percent decline)* while the urban population went down to 31.5 million *(a 3.6 percent decline)*. As a result, in 2014 urbanization levels were at 70 percent.



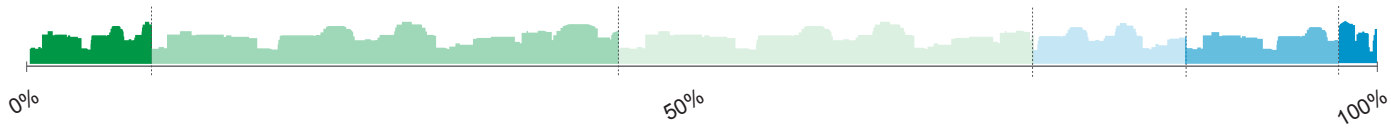


DEMOGRAPHICS OF THE URBAN SYSTEM

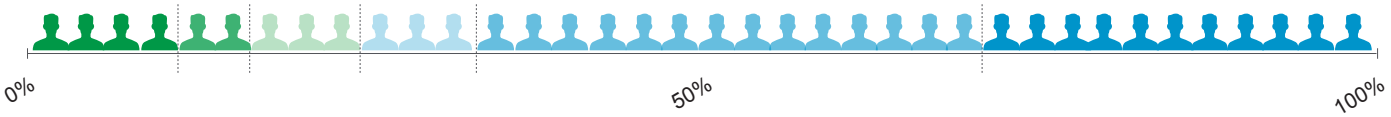
Ukraine's urban system is mainly composed of a large number of small towns and cities but most of the urban population lives in cities with more than 100,000 inhabitants Many cities in the urban system are shrinking, with 1 percent of cities losing population over the last decade. However, city population growth and decline is not homogeneous across the country. While most small towns and mid-size cities are declining, some large cities, such as Kiev and Vinnytsia have grown in population. The population growth is also not homogeneously located in space. Most of the population growth is observed in the West and Center of the country, while the largest industrial cities in the East, have experiences larger declines. The agglomerations of Kiev and Chernivtsi have shown an important growth. However, most of the agglomerations, just like the single cities, have followed a declining trend.

As mentioned before, a spatial pattern is also visible, with most of the cities located in the West growing while most of the cities in the East are declining. However, this might be explained by a catching up-effect. At the fall of the Soviet union the West was mainly rural while the East had largely urbanized.

DISTRIBUTION OF CITIES BY CITY SIZE: **2013**



URBAN POPULATION DISTRIBUTION BY CITY SIZE: **2013**



Small Town (<10k) | Mid-Size Towns (10k–20k) | Large Towns (20k–50k) | Small Cities (50k–100k) | Mid Size Cities (100k–500k) | Major Cities (>500k)

LARGEST CITIES BY POPULATION

CITY	POPULATION 2013	% CHANGE 1989–2013
Kiev	2,800,000	7.58
Kharkov	1,500,000	-6.25
Odessa	1,000,000	-9.09
Dnepropetrovsk	997,754	-16.85
Donetsk	953,217	-13.34
Zaporizhia	770,672	-12.81
Lviv	730,272	-7.67
Kryvyj Rih	656,478	-11.18
Mykolaiv_M	496,188	-5.01
Mariupol	461,810	-11.01
Luhansk	425,848	-14.28
Vinnytsia	371,698	-0.70
Makivka	353,918	-17.73

LARGEST URBAN AGGLOMERATIONS

AGGLOMERATION MAIN CITY	POPULATION 2013	% CHANGE 1989–2013	CITY COUNT
Kiev	3,213,933	7.96	11
Kharkov	1,619,808	-7.96	8
Donetsk	1,506,202	-15.13	8
Dnepropetrovsk	1,439,989	-15.70	5
Odessa	1,059,718	-8.24	2
Lviv	765,901	-6.79	4
Luhansk	432,483	-14.28	2
Sevastropol	354,565	-3.80	2
Horlivka	353,497	-26.23	3
Cherkasy	303,168	-2.42	2
Kramatorsk	297,665	-15.50	4
Sieverodonetsk	289,650	-18.32	5
Alchevsk	284,281	-23.57	7

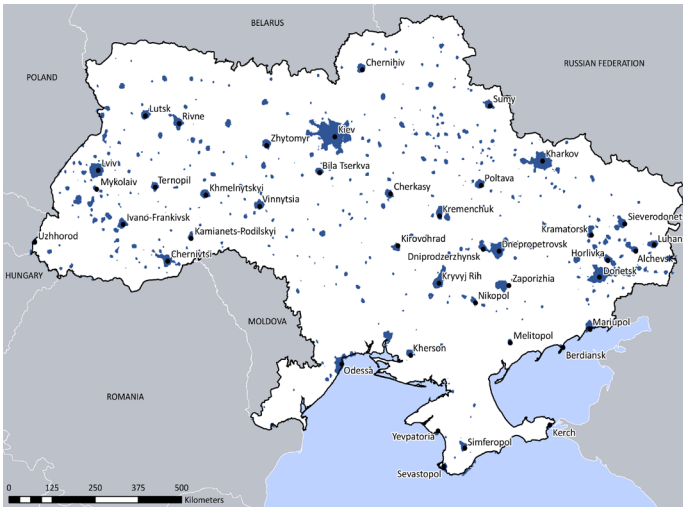
FASTEST GROWING CITIES

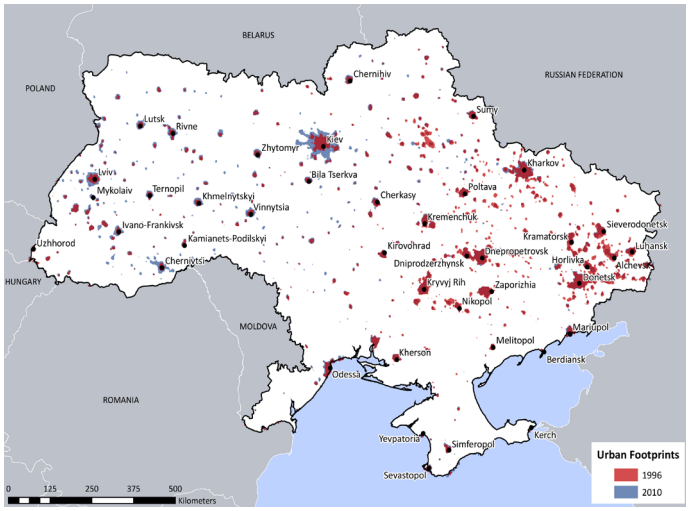
CITY	POPULATION 2013	% CHANGE 1989–2013	BELONGS TO AN AGGLOMERATION	AGGLOMERATION
Slavutych	24,826	118.46	No	N/A
Yuzhne	31,533	102.30	No	N/A
Kuznetsovsk	41,432	38.76	No	N/A
Staryi Sambir	6,446	37.50	No	N/A
Vynnyky	16,278	32.26	Yes	Lviv
Vyshhorod	26,536	28.64	Yes	Kiev
Netishyn	36,741	27.11	No	N/A
Teplodar	10,204	22.22	No	N/A
Kamin-Kashyrskyi	12,018	22.15	No	N/A
Vyshneve	37,457	22.13	Yes	Kiev
Novoiavorivske	29,580	21.63	No	N/A
Ostroh	15,725	21.11	No	N/A
Brovary	98,250	19.76	Yes	Kiev

SPATIAL TRENDS OF THE URBAN SYSTEM

Spatial patterns in the growth and decline of urban footprints are also visible in Ukraine. As shown in the two maps below, most of the cities in the East present shrinking urban footprints while many of the cities in the West and Central areas of the country present growing urban footprints. Urban footprints are measured using Nighttime lights spatial. An impressive growth in urban footprint is also visible in and around the Kiev agglomeration. Between 1996 and 2010 Kiev's urban footprint merged with many of surrounding cities. A similar pattern is observed around the Lviv agglomeration.

Note: Night-Lights are used to define urban footprints and follow their change over time. A urban threshold *(above which a certain pixel is considered urban)* is estimated for each country and used to delimit cities' footprints. Agglomerations—as defined by NLS—are composed of cities whose NLS footprint merges. Single cities are cities who do not belong to any agglomeration.

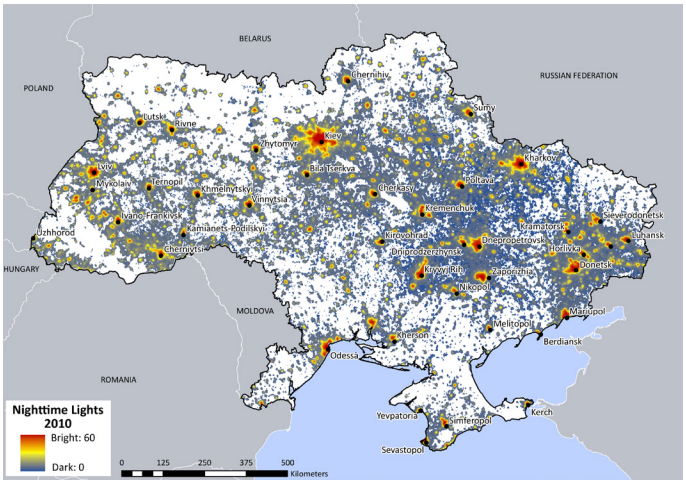


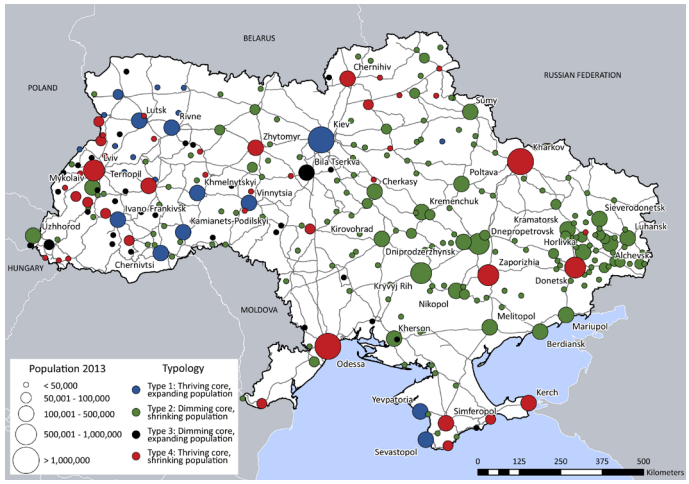


ECONOMICS OF THE URBAN SYSTEM

Urban areas in Ukraine play a fundamental role in economic growth. Estimates suggest that between 2001 and 2014 urban production was almost 9 times larger than rural production while urban population was only 2.25 times larger than rural population. This reflects much higher levels of productivity in urban areas. Distribution of economic activities across the country can be observed spatially by analyzing light intensity and changes of light intensity over time. As observed in the maps below light intensity levels are highest in the largest urban agglomerations, in particular in Kiev and other cities in the West, such as Lviv, Chernivtsi and Ivano-Frankivsk.

Note: Night-light intensity is being used as a proxy for economic activity at the city-level. For more information on the methodology please refer to page 1 of this snapshot. Gross value added (GVA) data by sector, as reported by the United Nations Statistics Bureau, is used to measure urban and rural production as a part of total production. The sectors were divided into those that are urban and those that are rural using the International Standard Industrial Classification of all economic activities (ISIC), rev. 3.





CITY TYPOLOGIES

Two city typologies were created based on the light emitted by cities in 1996-2010 and population trends *(Please refer to note below)*. These typologies are intended to shed lights on spatial, economic and demographic trends of the country's urban system.

Typology 1 divides cities depending on whether they emit enough light to be considered as urban—by NLS standards. 73.20 percent of the cities in the country were found to emit enough light to be consider urban in both periods *(Identified)*; 9.80 percent were only considered urban by NLS standards in 2010 *(Emerging)*; 2.83 percent were considered urban only in the first period; and 14.61 were not considered as urban in both periods *(Not identified)*. Typology 1 results are similar to those found in other ECA countries with mainly cities above 30,000 inhabitants being considered urban by NLS standards and most cities above 50,000 being Identified.

Typology 2 classifies Identified cities in four types based on their night light trends *(dimming or thriving)* and population trends *(growing or declining)*. 9.74 percent of the identified cities have a growing population and growing economic activity *(type 1)*. 52.81 percent of the identified cities have both a declining population and shrinking economic activity, as proxied by nighttime lights *(type 2)*. 5.62 percent of the identified cities have a completely different dynamic, a growing population but a declining estimate of economic activity identified by nighttime lights *(type 3)*. 31.84 percent of the identified cities show growth in economic activity, proxied by NLS, despite also showing population decline *(type 4)*. There is a clear spatial distribution of the types of cities classified by this typology 2. The majority of cities of Type 2, where both the NL intensity and population are diminishing, are located in the Western region, although a few can be found spread all around the country. **Type 4 cities**, those that have growing economies despite a shrinking population, are mainly located in the Center and West of the country. Finally, **type 1 cities**, which are growing in all aspects, are also mainly located in the West and Center, highlighting once again the regional differences in Ukraine.

Note: **TYPOLOGY 1:** Divides cities into types depending on whether they satisfy a minimum level of light brightness that is pre-defined for the settlement to be considered urban. IDENTIFIED indicates cities that have night-lights data for both periods used in this analysis *(2000 and 2010)*; EMERGING indicates cities that only have night-lights data for the second period; SUBMERGING indicate cities that only have night-lights data for the first period; NOT IDENTIFIED indicates cities that do not have night-lights data for either period.

TYPOLOGY 2: Divides the IDENTIFIED cities into types according to whether they have positive or negative growth in population and NLS brightness. Growth is calculated between 1996 and 2010.

TYPOLOGY 1

TYPOLOGY 1	DESCRIPTION	NUMBER	PERCENTAGE
Identified	City emits enough light in both 1996 & 2010	336	73.20
Emerging	City emits enough light in only 2010	45	9.80
Submerging	City emits enough light only in 1996	13	2.83
Non-Identified	City does not emit enough light in both 1996 & 2010	65	14.61

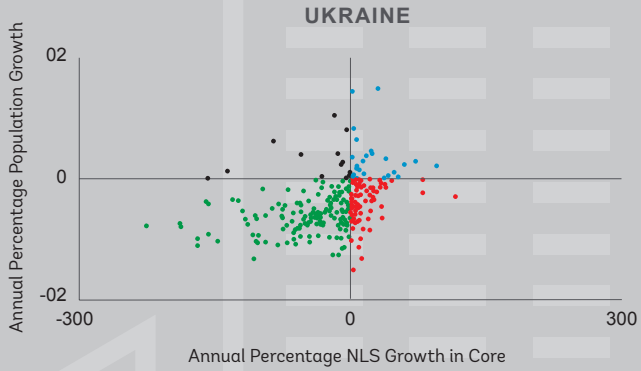
TYPOLOGY 2

TYPOLOGY 2	DESCRIPTION	NUMBER	PERCENTAGE
Type 1 (Blue)	Growing population & growing economic activity **(thriving core)**	26	9.74
Type 2 (Green)	Declining population & declining economic activity **(dimming core)**	141	52.81
Type 3 (Black)	Growing population & declining economic activity **(thriving core)**	15	5.62
Type 4 (Red)	Declining population & growing economic activity **(dimming core)**	85	31.84

	TYPE 1: Growing Population & Growing Economic Activity	**TYPE 2:** Declining Population & Declining Economic Activity	**TYPE 3:** Growing Population & Declining Economic Activity	**TYPE 4:** Declining Population & Growing Economic Activity
Population 2013 (000s)	**204.37** (621.42)	**83.58** (202.29)	**48.28** (48.86)	**98.76** (238.52)
Average Annual Population Growth (% 1989-2013)	**3.40** (0.42)	**-0.69** (0.32)	**0.63** (1.23)	**-0.44** (0.34)
Total NLS Value in 2010 (000s)	**18.19** (56.48)	**4.97** (14.49)	**4.16** (5.85)	**6.51** (19.54)
NLS per Capita (2010)	**0.08** (0.03)	**0.04** (0.03)	**0.14** (0.36)	**0.06** (0.03)
NLS Growth (% 1996–2010)	**50.06** (29.03)	**-18.42** (21.48)	**-6.64** (23.77)	**40.84** (26.81)
Examples of Cities	**Kiev, Khmelnytskyi, Ivano-Frankivsk**	**Dnepropetrovsk, Donetsk, Zaporizhia**	**Novohrad-Volynskyi, Komsomolsk**	**Kharkov, Odessa**

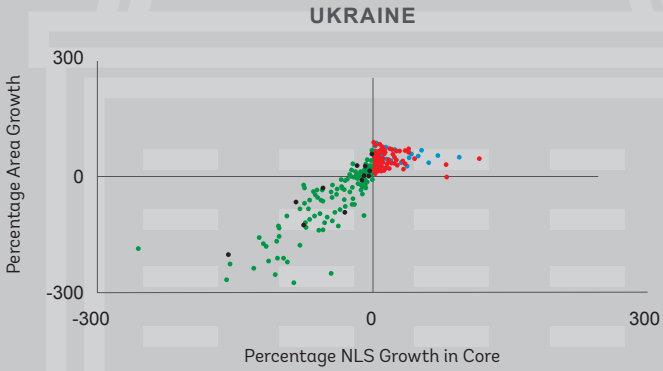
A third dimension is added to **Typology 2** classification to review the interaction between spatial, economic and demographic trends across the urban system. This reveals that most of the spatial growth is correlated to economic growth as cities whose footprint is growing have also experienced an increase in the nighttime lights emitted in the core of the city. Also, all **Type 1 cities** *(growing in population and economic activity)* are also growing in area. The graphs below present the distribution of cities in across these 3 dimensions and their interactions. The table presents summary statistics for **Typology 2 cities**.

POPULATION AND ECONOMIC DYNAMICS*



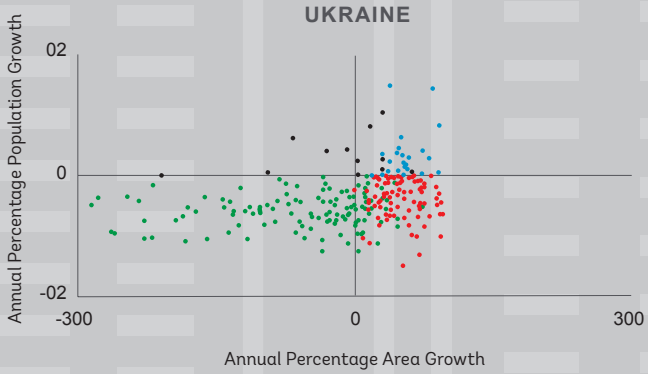
* Econ growth in NLS growth 1996–2010.
Population growth in annual avg. 1989–2013.

SPATIAL AND ECONOMIC DYNAMICS*



* Area growth in NLS footprint growth 1996–2010;
Econ growth in NLS growth 1996–2010.

POPULATION AND SPATIAL DYNAMICS*



* Area growth is NLS footprint growth (1996–2010);
Population growth is annual average growth (1989–2010).

Type 1: Growing population, growing economic activity

Type 2: Declining population, declining economic activity

Type 3: Growing population, declining economic activity

Type 4: Declining population, growing economic activity

CONCLUSIONS

Over the past decades Ukraine has experienced a sharp decline of its total population and an important decline of the urban population. The country, however, continues to urbanize in the strict sense of the term as urban areas are declining at slower rates than rural areas. 80 percent of the cities in Ukraine have been shrinking in population over the past two decades. However, urban population decline is also not homogeneous across the territory. Most of the urban population growth is concentrated in cities in the West of the country while the majority of cities in the Eastern region are losing population.

Cities in Ukraine play a fundamental role in the country's economy. Urban areas are estimated to contribute to around 70 percent of the country's economic growth and are much more productive than rural areas. However, the analysis of economic trends in the urban system reveal the emergency and consolidation of three city types with contrasting economic and demographic patterns. The first type is composed of a few urban centers that are large contributors to the economy and continue to be pillars of economic and population growth. As mentioned above, these are mainly represented by large cities and agglomerations *(Type 1)*. The second type, corresponds to cities which continue to be engines of growth in the country despite declining in population *(Type 4)*. The third corresponds to cities that are declining both in population and economic activity *(Type 2)*.

While this snapshot does not intend to study the underlying dynamics behind observed trends nor prescribe specific interventions; the analysis does have important policy implications. In particular in regards to the need to develop a dual approach in the managing of urban areas;

As it will be difficult to redress trends in overall urban population decline, Ukraine needs to put in place the right national policies to better manage the population decline of most of its cities. At the subnational level, local authorities will need to re-assess how infrastructure is planned and maintained and the way services are financed and delivered. The country also needs to put in place the right policies in cities that continue to grow economically, but are experiencing population decline. In these cases, city administrators should aim at managing population decline in an efficient and harmonious way making the best out of it, for example, turning brown fields into public space and optimizing public transportation.

In parallel, Ukraine also needs to recognize the role of urban areas in economic growth and make sure that they have the right tools to reach their full potential. To achieve increased productivity in urban centers, the right mix of good governance, a beneficial business climate, and an efficient provision of public goods, usually in the form of public services and infrastructure, is necessary so that agglomeration economies are fostered and congestion costs reduced. In urban areas experiencing population growth, cities should focus on adapting infrastructure and services to ensure that newcomers are well absorbed and integrated into the city and manage peri-urban growth to avoid sprawl, etc. In addition, the realignment of city boundaries or introduction of metropolitan governance mechanisms might be needed to achieve an effective coordination of agglomerations which span across administrative units.

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