

The Major Drivers of Urban Growth in Developed Countries: Evidence from the G7

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ABSTRACT

It is widely alleged that urbanization has gained momentum during the past 19th and 20th century in most of today's developed countries. Today, these countries still displaying higher urban rates globally, are recorded a tremendous decline in urban growth. As the phenomenon has been less examined in the concerned countries in the 21st century compared to the previous centuries, this study proposes an analysis of selected economic, demographic and political variables in the process of urbanization occurring in the Group of seven (G7) countries. Data from the World Development Indicators and some other specialized institutions related to the G7 countries from 1995 to 2014 are employed to test the hypothesis that economic factors and international migration are the main engines of urban growth in the area. Results from panel data analysis using Fixed Effects estimations are used to test the hypothesized relationships. We found that higher productivity in manufacturing and increasing international migration flows are accelerating the pace of urban growth in G7 countries in the contemporary era.

INTRODUCTION

Urbanization refers to a gradual increase in the proportion of people living in urban areas compared to that of the countryside. It enables the growth of cities and towns through the natural increase of urban population, migration, and the annexation of surrounding areas or reclassification of rural areas as urban centers (Kasarda & Crenshaw, 1991). The phenomenon is still expanding globally and is bringing about structural and spatial changes in the distribution of people and natural resources (UNDESA, 2014).

Urbanization has historically been associated with important economic and social transformations, which brought about greater geographic mobility, longer life expectancy, higher levels of literacy, greater access to social services, and enhanced opportunities for cultural and political participation (Bradshaw, 1987; Fox, 2012). The fact that many of the urbanization catalyzers also drive economic development has led many authors to the conclusion that urbanization is fundamentally a byproduct of economic development especially in developed countries (Fox, 2012; Namasaka & Kamaru, 2015; Fox, 2017).

Without any doubt today, urbanization is increasing globally and is much faster in some regions than others. Approximately fifty years ago, the metropolitan New-York was the only urban center with a population size of more than 10 million. Interestingly, in 2014, 19 similar big cities have emerged across the planet and the number of cities with more than one million inhabitants has increased more than fourfold (UNDESA, 2014). Recently in 2014 nearly 3.9 billion of people were living in cities and this figure is expected to reach 6.3 billion by 2050 with the majority of the increase projected to occur in developing countries (UNDESA, 2014).

Many of the today's developed countries have started undertaking their urban transition two centuries ago, in the 19th century. And their urbanization rate has increased by 25% over the last quarter of the 19th century from 1800 to 1910 (UNDESA, 2014). Interestingly, the urbanization rate has remained very high until today but urban growth is increasing at a very low pace. The most developed regions in the world, led by Europe are currently seeing their cities growing the least, and the share of the population living in the largest cities has fallen (UNDESA, 2014). However, approximately 70% of people are still living in cities in those areas (UNDESA, 2014).

At the same time, the critical drivers of urban growth or expansion are relatively less investigated and understood (Malik et al., 2017). The topic has been of much more attention over the last centuries and especially overlooked in our contemporary era in developed countries. That's why characterizing the determinants of urbanization is a crucial to understanding the phenomenon and its slowdown trend in G7 countries. It will shed light on the type of urbanization occurring in developed countries today in order to build more efficient and innovative urbanization policies.

1. Historical evidence of urbanization in developed countries

The proportion of the urban population have remained unchanged in today's advanced economies for many decades before the 19th century (Fox, 2012). The steady rate of urbanization of that period was mainly attributable to the occurrence of disease burdens and the insufficiency of food supplies in cities (Fox, 2012). The agricultural productivity was very low and its increase was driven primarily by bringing more land under cultivation rather than by rising yields. Transportation costs remained very high and constrained the exchange of agricultural goods and the potential for regional specialization, thus making trade inefficient (Bairoch, 1991; Fox, 2012). Many European cities including Rome were forced to adjust their population size (from almost one million to just 50,000 inhabitants) with their productive capacity and food supplies (Bairoch, 1991; Reader, 2004).

Later during the 19th century, Europe undertook urbanization at its fastest rate with an essentially rural society becoming a developed and urbanized society. At that time, over 90% of the population have shifted from agricultural activities (Fox, 2012). Between 1800 and 1900, the proportion of Europeans living in cities grew from around 10 to 30 %, and by the turn of the millennium approximately 70 % of the Europeans lived in urban areas (Bairoch

& Goertz, 1986). The advent of technologies and institutions contributed to this urban transition by mitigating the urban constraints in the pre-modern period and facilitating disease control (Fox 2012). Some agricultural innovations (nitrogen fertilizer, crop rotation, and mechanization) have propelled the productivity in agriculture (Bairoch, 1991; Cameron, 1997; Maddison, 2007). The implementation of cheaper sources of energy (railroads, steamships, and eventually automobiles) have emerged to reduce transportation costs (Bairoch, 1991; Crafts & Venables, 2003). Improvements in hygiene and health care led to a dramatic decline in mortality rates (Szreter, 1997; Bloom & Sachs, 1999; Livi-Bacci, 2007). Political-institutional changes reinforced and sustained the growth of cities (Szreter, 1997; Cameron, 1997; Maddison, 2007). These changes collectively led to a permanent shift from an agrarian economy characterized by a stagnant per capita income and high mortality, to a modern economic growth regime with secular rises in factor productivity and life expectancy in Europe (Galor & Weil, 1999). Consequently, urban population growth increased directly through the raising of the rate of urban natural increase or indirectly by the flows of rural-to-urban migration.

Besides this urbanization trend, an uncommon phenomenon has been observed in the first half of the 19th century. Three former commercial powers namely the Netherlands, Portugal and Denmark, experienced dramatic decrease in their level of urbanization (Bairoch & Goertz, 1985). In the particular case of Denmark, given its important per capita Gross National Product, it had a lower level of urbanization than the other countries. The country's delay in urbanization was mainly attributable to the fact that its economic development was based on the export of raw agricultural products until 1870. It was only after that period that agricultural output increased substantially. Later in 1890 the development of some industries began (Bairoch & Goertz, 1985). This shows that industrialization was paramount for urbanization in those countries.

2. Empirical studies on urbanization in developed countries

Scholarly works on the causes of urbanization in today's developed countries during the 21th century are almost rare. A comprehensive analysis by Bairoch & Goertz (1985) has related to the determinants of urbanization in the 19th century. Their study is used in this part to review the empirical literature. Bairoch & Goertz (1985) have shown that the level of exports and agricultural productivity were crucial for urbanization in Europe and some selected advanced countries from the early to middle of the 19th century. The authors contend that the economic factors roughly accounted for 70 to 80% of the growth in explaining the level of urbanization. According to them, the beginning of the urbanization process corresponded approximately to a period of economic take-off.

Of the economic factors they enumerated, industrialization, international trade (entry in exports), per capita Gross National Product and agricultural productivity are the important promoters of urbanization. They also found that the United Kingdom alone had globally increased the level of urbanization in Europe from 10.4% to 12.6% during the 19th century. This situation has caused the massive imports of foodstuffs and cereals from other countries due to the nascent industrial revolution that occurred around 1830. In another study, Bairoch (1985) corroborates the importance of industrial revolution in urbanization by arguing that industrial employment shares in total employment has increased from 35-45 % to 50-55 % during the 19th century in European cities. Moreover, countries with concentrated industries were also more likely to display higher level of urbanization than countries with dispersed industrialization (Bairoch & Goertz, 1985). That's why the countries that concentrated their industry in a few places had recorded higher levels of urbanization than those that have their industry dispersed throughout the country. Our main authors also found that international trade have attracted people to the cities independently from industrialization.

However, it's worth noting that urbanization was proven to be enhanced either by industrialization or increasing agricultural productivity depending on country specific factors. For example, in their analysis Bairoch & Goertz (1985) showed that urbanization was pulled more by industrialization in Europe. Conversely, the levels of urbanization were lifted

up by the increase in agricultural productivity in the non-European developed countries. Furthermore, if history is any guide, urbanization is likely to be irreversible and tend to fuel itself, thus constraining de-urbanization as cities attract many people in terms of life-style, and new opportunities. In this regard, Bairoch & Goertz (1985) showed that the level of urbanization in 1800 at the beginning of urbanization is quite important in determining the level of urbanization of a society. They also find that countries with high levels of urbanization remain over-urbanized for their economic and demographic position.

International migration was another major determinant of urbanization identified by Bairoch & Goertz (1985) in today's advanced economies, two centuries ago. Migrations have been described as a factor accelerating urbanization in receiving countries and a restraining factor in the home countries of migrants. According to Gallaway & Vedder (1971), large population growth has generated large immigration from Europe to overseas (36 to 39 million of Europeans from 1865 to 1914). And the new immigrants who arrived after 1890, largely from southern and eastern Europe, were more inclined to settle in cities than the immigrants who preceded them. During the same period, Bairoch & Goertz (1985) denote that overseas urbanization increased at the expense of urbanization in Europe. Because of this rapid urbanization in the overseas developed countries, after 1880, Europe lost its place as the most urbanized developed. In addition, Bairoch & Goertz (1985) find that neither the central government nor the population density is strongly associated with the level of urbanization.

In a nutshell, the developed countries have recorded three main periods in the process of urbanization: preindustrial, industrial and post-industrial. Today's advanced economies have discovered the remedies to the main impediments to urban growth during the preindustrial period. These advancements coupled with the industrialization revolution have consistently been accompanied with sustained economic growth, thus prompting many authors to consider urbanization as a byproduct of economic development (Fox, 2012).

3. Methodology

Panel data also called longitudinal data is a particular type of data, where each entity (corporations, individuals, countries, etc.) is observed across two or more periods of time. It has the advantage to control the effect of individual heterogeneity or the effects of the variables that are not observed in the model (Baltagi, 2008). That is, it allows us identify the effects of the omitted variables, without being really included or observed in the model (Hsiao, 1985; Reyna, 2007; Anna et al., 2014). Anna et al. (2014) have explained that the panel data displays less collinearity among the variables, thus produce more efficient and precise parameters as they contain more information and more variability.

$$Urbgrowth_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 G_{it} + v_i + u_{it}$$

- $Urbgrowth_{it}$ stands for the urban growth variable of country i in year t
- X_{it} is a set of explanatory variables including economic variables (Per-capita income, manufacturing productivity), demographic factors (fertility, life expectancy, international migration) and political factors (political stability, government effectiveness index).
- G_{it} is a vector of year dummies.
- The error term is decomposed into time-invariant component v_i and time variant component u_{it} .

Urban growth refers to the increase (the relative or absolute) in the size of the population living in towns and cities over a period of time which is expressed in a number. It is the actual increase in number of people in cities. Our set of independent variables include political, demographical and economic factors as displayed in Table 1.

4. Data sources

The economic and demographic variables are retrieved from The World Development Indicators database of the World Bank, with the exception of the Human Development Index (HDI) from the United Nations Development Program database and the total inflows of foreign population variable, which is from the Migration database of the Organization for Economic Co-operation and Development. The political factors (Government Effectiveness and Political Stability and Absence of Violence/Terrorism) are derived from the World Governance Indicators database of the World Bank.

Table 1: Expected signs in the G7 countries

Variables		
Dependent variables Independent variables	Meanings	Expected Signs
Economic variables		
Per capita income	measures the average income per person in a given country in a specified year.	No effect
Unemployment	the share of the workforce that is currently without work but available for and seeking employment.	+
Manufacturing, value added	effect of the expansion of the manufacturing sector	+
Squared of Manufacturing, value added		+
Demographic variables		
Life expectancy	the number of years that a newborn infant could expect to live if the patterns of infant mortality rates at the time of birth remain the same throughout the infant's life.	+
Fertility	the number of years that a newborn infant could expect to live if the patterns of infant mortality rates at the time of birth remain the same throughout the infant's life.	No effect
Inflows of foreign population	is used in this study as an indicator of international migration flows in a given country.	+
Political factors		
Political stability	We use political stability to account for the absence of conflicts and violence in a given country	-
Government effectiveness	We use this factor as a proxy for government actions and policies in a given country.	+

Source: By the authors

5. The Estimation Process

We employ the diagnostic tests to discriminate between the appropriate model: Fixed Effects, the Random Effects model or Ordinary Least Squares.

Statistically, fixed effects models always give consistent results but they may not be the most efficient model to run (Anna et al., 2014). Random effects will provide more efficient estimator with better p-values and may be used if statistically justifiable. The Hausman specification H-test (1978) is generally used to discriminate between fixed effects and random effects models. The Hausman H-test tests probes the null hypothesis that the coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator. It basically tests whether the unique errors (u_i) are correlated with the regressors, the null hypothesis being that they are not.

If the null hypothesis is accepted, then random effects should be considered. Alternatively, the fixed effects model is the best. If the Hausman test results suggest the use of random effects model, the LM test helps to decide between the Ordinary Least Squares estimation

and the random effects model. The null hypothesis is that there is no variation among units (states in this example – i.e., no panel effect), thus OLS estimation is appropriate.

If the results of the Hausman test indicate the use a fixed effects model it is important to see if time fixed effects are needed when running a fixed effects model. In order to do this, we create a series of time dummy variables and then execute the test. If $\text{Prob} > F = <.05$ then the null hypothesis that all year coefficients are jointly equal to zero is rejected. If so, the time fixed-effects are needed.

6. Urban growth in G7 countries

Table 2 examined the effects of selected demographic, political and economic variables on urban growth in the G7 countries. Specifically, international migration flows and higher values of productivity in the manufacturing sector (Squared Manufacturing) are the main determinants of urban growth. The other factors: unemployment, political stability, fertility, and manufacturing productivity are all insignificant in explaining growth. We find that international migration flow is important in the explanation of the speed of urbanization in G7 countries.

Table2: Estimation of Urban growth in G7 countries

Variables	Fixed Effects Model
Per capita income	3.691 (2.361)
Manufacturing	-17.08 (8.798)
Squared Manufacturing	3.796* (1.825)
Unemployment	0.162 (0.247)
Life expectancy	-10.85 (7.262)
Fertility	0.0430 (1.335)
Political stability	0.0565 (0.205)
Migration	1.394* (0.693)
Constant	8.212 (24.13)
R-squared	0.366
Time FE	No

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ Robust standard errors in parentheses

Source: By the authors.

6.1. Urban growth and international migration

An immigrant is an international migrant who enters a given country from a place outside the country. As the UNDESA (2017) reported that (1) nearly two-third of all these migrants reside in Europe and Asia; (2) Europe, Asia and North America are considered as the top three destinations of international immigrants, it can be inferred that large share of the international migrants live in the G7 countries.

However most of the developed countries are all affected by the population ageing process that is projected to cause the region population to drop by 9% by 2050 (German Federal Statistical Office, 2015). As typically evident, almost 21% of the population in Italy and Germany as well as 25% in Japan is aged 65 or above. The trend in these three countries is believed to result from the fertility rate patterns that is significantly below the replacement level of 2.1 and further below the global average of 2.5 children per woman (German Federal Statistical Office, 2015). In this context, net international migration appears as a palliative to population decline in Europe and in other advanced countries. That's why international migration remains an increasingly important factor accompanying traditional internal migrations in explaining urbanization (Royuela & Castells-Quintana, 2014). Using a panel of 200 countries over the period 1960–2010, the authors describe the effects of international migrations on urbanization. Their results highlight international migration as a relevant factor in the urbanization process. They found a positive association between immigration and urbanization, particularly in small and medium-sized cities, and an inverse relationship between emigration and urbanization in developing countries.

6.2. Urban growth and Productivity in Manufacturing

Many scholars have linked urbanization to urban growth (Fay & Opal, 2000; Bloom et al., 2008). The results highlight that it is only very high values of productivity in the manufacturing sector (here represented by the squared of the productivity) that are conducive to rampant urban growth. In other words, an increase in one unit of higher rate of productivity in manufacturing is capable of driving urban growth up to 3.79%.

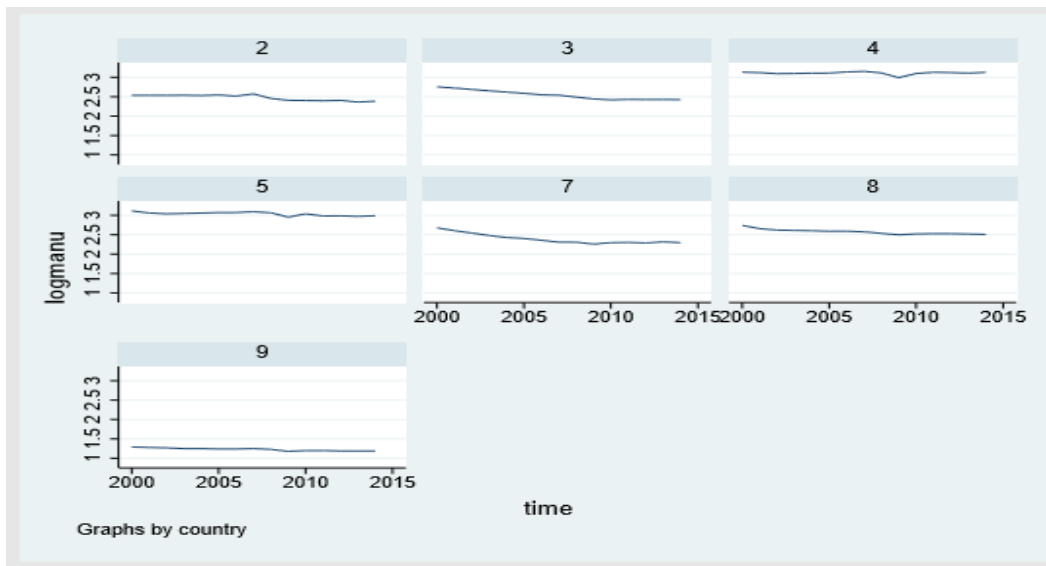
In fact, we first include the productivity in manufacturing variable only in the model but the results were quite strange, the coefficient was significant with a negative sign. This suggests that the productivity in manufacturing can lessen urban growth in G7 countries. However, to go deeper about this relationship and its implications, we add the squared of the productivity in the model to investigate the existence of a U-shaped relationship between productivity in manufacturing and urban growth. Surprisingly in the new model (that we definitely retain), the coefficient for the squared of the productivity is significant at the expense of the coefficient representing productivity in manufacturing. This suggests that productivity in manufacturing can propel urban growth only with very high value; small or constant value of productivity will appear insignificant or induce constant growth of urban growth in the G7 economies. Such results confirm and expand the previous works in two ways: first industrialization as a driver of urban growth; second, the slowing in urbanization in many parts of Europe and in the developed countries in general.

Regarding the first aspect, many authors, relying on the history of urbanization, view the advancements in technologies that occurred concomitantly with the industrialization as the main engine of the expansion of urbanization from the 19th to the 20th century in today's most developed countries (Fox, 2012; Fox, 2017). One possible channel through which this productivity can operate is the labor sector. Higher productivity of the urban sector generates more job opportunities with higher wages (Royuela & Castells-Quintana, 2014). Rural inhabitants are therefore pulled to urban areas and concentrate there to take advantage of higher high industrial wages, larger markets, and improved amenities (Royuela & Castells-Quintana, 2014). Also, cities' expansion and industrialization is accompanied with subsequent changes in infrastructures and facilities and improvement in the standard of living that attract many people to cities as they want to experience a better quality of life.

The second point concerns the general idea that urbanization is still higher in developed countries (at least 75% today) but increasing very slowly (less than 0.4% annually approximately in 2014). (UNDESA, 2014). It's like the pace of urbanization tends to be curbed as countries record high levels of urbanization. The pace of productivity in manufacturing determines the speed of urban growth in developed countries. As suggested by our results, it means that only very high increase in productivity can accelerate urban growth. And if urban is still slowing today, it means that the productivity in manufacturing is not growing significantly. Developed countries may be displaying higher but constant increase in the productivity of the manufacturing sector nowadays. The result is that the urban growth is slowing down or remaining constant in response to the current trend in the productivity of the manufacturing sector.

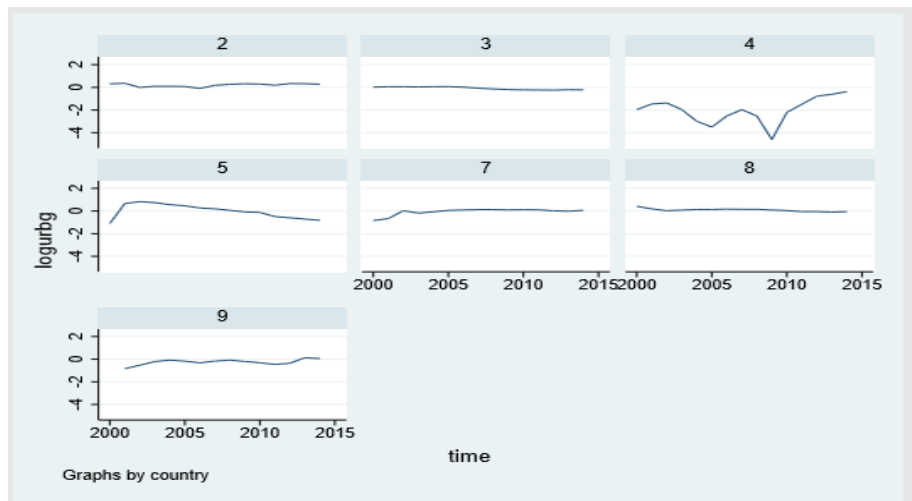
As portrayed by the Graph 1 and Graph 24, the productivity of the manufacturing sector remains almost constant in all the seven countries with higher value in Germany and lower values in Italy. At the same time, urban growth remains constant in all the countries with more fluctuations of up and down in Germany. However, Germany, the most productive country did not present extraordinary or greater value of urban growth compared to the others countries. Interestingly, Italy, the least productive country in the group, displays similar urban growth to the rest of G7 countries. These results highlight the fact that even the more productive country (Germany) did not reach very high level of productivity that can propel its urban growth. This is the reason why Germany is still displaying similar urban growth rates with the less productive countries of the G7.

Graph 1: Manufacturing, value added in G7 countries



Source: By the author

Graph 2: Urban growth in G7 countries



Source: By the author

CONCLUSION

This paper determines the factors that explain urban growth when countries already developed (G7 countries) in the 21st century. We consider a variety of economic, demographic and political factors that we deem important in the explanation of urban growth. By adopting the panel data analysis, and using Fixed Effects regressions, data of the seven countries of G7 from 1995 to 2014, we investigated the hypothesized relationships.

Regarding the accelerators of urban growth, the findings reliably demonstrates that higher productivity in manufacturing and international migration flows are accelerating the speed of urbanization in today's developed countries.

In G7 countries the findings reveal an underground problem: developed countries are obliged to rely on foreigners' migration flows to boost their population growth. A nation only constituted of old people is socially unbalanced and constituted a potential threat for the long run economic growth. Therefore, there is a need to mitigate the effect of population ageing in G7 countries. Given that, we encourage the improvement of life expectancy (that is already very high) in this area. Most importantly, we advocate for the development of mechanisms that can reverse the population ageing situation in order to make urbanization healthier.

Laws and rules to protect and delimitate the rights and facilitate the social and occupational integration of migrants in their foreign countries should be clearly defined. This will ease the migrants' stay, and make them active actors of the economy.

The study shows that the increase in productivity in the manufacturing sector determines the speed at which urban growth accelerates. As displayed by our database urban growth is slowing in G7 countries, meaning that productivity in manufacturing though high in G7, is increasing very slowly. Comprehensive researches need to be conducted to investigate the trend of productivity in G7 countries. The use of more advanced technology and the exploration of new sectors to boost the productivity in manufacturing are recommended. As part of their Foreign Direct Investment and the transfer of knowledge, G7 countries can intervene and partner in less developed countries especially in the industrialization of agriculture. This will expand their manufacturing potential and propel the sector. In this study, the per capita income has appeared no significant in the explanation of urbanization. Further analysis might be needed to grasp the channels through which it affects urbanization.

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