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Change in urban concentration and economic growth

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ABSTRACT

The paper investigates (1) the evolution of urban concentration from 1985 to 2010 in 68 countries around the world and (2) the extent to which the degree of urban concentration affects national economic growth. It aims to overcome the limitations of existing empirical literature by building a new urban population dataset that allows the construction of a set of Herfindahl-Hirschman-Indices which capture a country's urban structure in a more nuanced way than the indicators used hitherto. We find that, contrary to the general perception, urban concentration levels have on average decreased or remained stable (depending on indicator). However, these averages camouflage diverging trends across countries. The results of the econometric analysis suggest that there is no uniform relationship between urban concentration and economic growth. Urban concentration is beneficial for economic growth in high-income countries, while this effect does not hold for developing countries. The results differ from previous analyses that generally underscore the benefits of urban concentration at low levels of economic development. The results are robust to accounting for reverse causality through IV analysis, using exogenous geographic factors as instruments.

1. Introduction

Many countries have experienced sizeable shifts in the geographic distribution of their population over the past decades, in particular developing countries. Population growth paired with galloping urbanization rates have resulted in an increase in the size of some cities, shrinking population in others, and the birth of new cities. The perceived increasing concentration of people has received much attention in the literature in terms of its impact on different socio-economic aspects such as poverty reduction (Christiaensen, Weerdt, & Todo, 2013; Portes & Roberts, 2005; Sekkat, 2016), CO_2 emissions (Makido, Dhakal, & Yamagata, 2012; Mohajeri, Gudmundsson, & French, 2015), and inequality (Castells-Quintana & Royuela, 2015; Oyvat, 2016). The question whether increasing agglomeration is beneficial for productivity and economic growth has been particularly high on the agenda. A growing number of academics and policy-makers have stressed the importance of urban concentration for economic growth: the concentration of people and firms in one place generates agglomeration economies and productivity gains through pooled labour markets, forward and backwards linkages, as well as knowledge spill-overs (Fujita & Thisse, 2003; Martin & Ottaviano, 2001; Romer, 1986; Rosenthal & Strange, 2004). Many studies even posit a trade-off between a spatially-balanced economic development (equity) and economic efficiency in the form of a greater concentration of population and economic activity in one place which may potentially lead to greater national economic growth (see Martin, 2008 for an overview). More concentrated urban structures – in particular at low levels of development – are frequently regarded as growth enhancing (Brülhart & Sbergami, 2009; Henderson, 2003; World Bank., 2009). Policies to stimulate economic development outside of the main cities are, in contrast, often considered inefficient and growth limiting.

The literature on the topic, while extensive, has two important constraints. First, there is still limited information on how the levels of urban concentration have evolved across different countries in the world. While a few studies explicitly describe the patterns and evolution of urban concentration, the majority focuses on analysing what drives city size distribution within countries (Anthony, 2014; Moomaw, 2004). When they do analyse the patterns, studies often remain cross-sectional (Short & Pinet-Peralta, 2009) or, when they are longitudinal, they focus on a specific country or region (Aroca & Atienza, 2016; Behrens & Bala, 2013; Cuervo & Cuervo, 2013). Frequently, general references to the well-known higher levels of urban concentration in developing countries and their social consequences also suffice as an introduction to the

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topic (Castells-Quintana, 2016; Henderson, 2003; Venables, 2005). A more nuanced description is therefore desirable to understand the extent to which perception of increasing concentration matches reality.

The second limitation relates to the measure of urban concentration. Most literature uses either levels of primacy i.e. the concentration of a country's urban population in the largest city (Anthony, 2014; Behrens & Bala, 2013; Cuervo & Cuervo, 2013; Henderson, 2003) or the share of the urban population living in cities above a certain size threshold (Bertinelli & Strobl, 2007; Brülhart & Sbergami, 2009; Sekkat, 2016) as indicators of urban concentration. This is particularly true for studies looking at the link between urban concentration and growth, since both indicators have the advantage of being available for many countries over several periods. They do, however, only imperfectly portray the historical shifts occurring in many countries: the share of the population in cities of a certain size has little to say about the relative distribution of the urban population; and primacy only depicts changes in the largest city and the overall size of the urban population. In the few studies, in which more sophisticated indicators of concentration are used, the samples tend to be restricted to developed countries, mainly in Europe (Gardiner, Martin, & Tyler, 2011). Whether these lessons can be applied to today's developing countries is increasingly called into question given the rapid urban transformations developing countries are undergoing and potential differences in their developing paths.

Our study specifically aims to address these two gaps in our knowledge. By assembling an entire new dataset – which permits the construction of more nuanced indicators of urban concentration for a large number of countries – we first examine how the level of urban concentration has evolved between 1985 and 2010 across a large set of countries. Secondly, we assess how changes in urban concentration have affected economic growth in the same time period. We furthermore specifically test for differences in impact between developed and developing countries. Concerns about the potential reverse causality of the variables are addressed through instrumental variable (IV) analysis.

The paper adopts the following structure. The next section discusses possible indicators to measure the level of urban concentration, introduces the new dataset and describes the evolution of urban concentration in our sample. The following section provides an overview of the relevant literature on the link between agglomeration and growth. Section 4 introduces the model, data as well the estimation strategy. Section 5 examines the impact of a country's urban structure on its economic performance and discusses the results. The final chapter concludes and lays out some further areas for research.

2. Change in urban concentration

2.1. Indices of urban concentration

In order to describe the evolution of the urban structure of different countries around the world, we consider a number of indicators. Most literature concerned with the topic relies either on (i) urban primacy, (ii) the share of the urban population living in cities above a certain size threshold, (iii) Zipf's law, or (iv) the Herfindahl-Hirschman-Index (HHI). Among these four, primacy and the share of the urban population in cities above a certain size are the most widely used and have been particularly popular in research that considers the link between urban concentration and growth (Bertinelli & Strobl, 2007; Brülhart & Sbergami, 2009; Castells-Quintana, 2016; Henderson, 2003).

Although there is no universally accepted definition of urban primacy, it is commonly referred to as the percentage of the urban population living in the largest city or the ratio between the population of the largest city over the sum of the population of the two to four next largest cities (Anthony, 2014; Moomaw, 2004; Short & Pinet-Peralta, 2009). Similarly, different thresholds are used for the share of the population living in cities above a certain size, most prominently either 750,000 or 1 million inhabitants (Bertinelli & Strobl, 2007; Brülhart & Sbergami, 2009; Castells-Quintana & Royuela, 2014). The advantage of both indicators and thus their popularity in the literature rely on their availability for many countries and over a relatively long time period. This makes them particularly apt for use in panel regressions.

As discussed in the introduction, there are, however, certain limitations when using these indicators. On the one hand, the percentage of the urban population, which lives in cities of a certain size, does not say much about the relative distribution of the urban population across cities: as long as we do not know across how many cities this percentage is split nor how large the remainder of the cities are, this indicator does not reveal much about a country's urban structure. Primacy, on the other side, does address the question of the relative distribution of people across a country's cities. However, the descriptive power of primacy also has limitations. Henderson (2003) argues that primacy is a good proxy for the entire urban structures since the largest city delineates the remainder of the urban structure, if Zipf's Law holds. A brief examination of the latest World Urbanization Prospects data on city size (United Nations, 2014) however reveals a very different picture. The ratio of the largest city over the second largest city is on average 2.7 for developed countries and 3.9 for developing countries (it almost reaches the value of 10 in countries such as Afghanistan, Argentina, and Peru). This clearly violates Zipf's law, where this ratio should be 2. Primacy is, thus, not well suited as a proxy to depict the full urban structure. Furthermore, both primacy and the percentage of the urban population, which lives in cities of a certain size, are highly sensitive to how countries define what constitutes the "urban population". For instance in the UK, any settlement with 10,000 or more inhabitants is defined as urban; in the US, urban areas have 50,000 or more inhabitants, while urban clusters have between 2,500 and 50,000. Hence, the base over which both indicators is calculated may differ significantly across countries and bias the measurement.

This leaves us with the above-mentioned Zipf's law and the HHI as possible indicators to capture the level of concentration of a country's urban structure. Firstly, Zipf's law (also called rank size rule), describes an empirical phenomenon in which the size of a country's cities follows a Pareto distribution (Zipf, 1949). This law suggests that the second largest city within a country is half the size of the largest, the third largest city has a third of the population of the largest city and so forth. We can visualize this relationship by plotting the log of the population of all cities (x-axis) against the log of the cities' rank (y-axis): if the city size distribution follows Zipf's law, a straight downward line emerges with a slope of -1. Theoretically, this coefficient could be used as a measure of urban concentration since a deviation either below or above a coefficient of -1 indicates more or less evenly distributed urban structures. In practice, however, the empirical literature on Zipf's law has mainly aimed to test whether the law holds across different countries and not to describe the status and evolution of a country's urban structure (Giesen & Südekum, 2011; Ioannides & Overman, 2003; Rosen & Resnick, 1980; Soo, 2005). This is due to the fact that in order to calculate the coefficient, information on a large amount of cities and, in the case of time series analysis, over multiple time periods is needed. Most studies requiring a time-series indicator for urban concentration have, therefore, resorted to the above-mentioned primacy or urban population share.

The final option is the Herfindahl-Hirschman-Index (HHI). The HHI is frequently used in different disciplines to measure concentration and is defined as follows in an urban context: