Assessing vertical urban development gaps: Which developing regions have tall buildings, which do not, and why?

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- Cities need to build upwards to become more compact. This brief explores findings from a study assessing vertical urban development "gaps" globally and over time, i.e., the extent to which some regions of the world build upwards more than others, given similar economic and geographical conditions.
- Among developing economies, the research finds that Asian nations now lead with respect to vertical development (with Southeast Asia being the leading subregion), followed by Latin America. Africa ranks last.
- Africa lags behind in terms of vertical development, but this is not due to its lower incomes or geographical factors. Moreover, important subregional differences can be observed within Africa, with East Africa being on the same path as Southeast Asia in the past. Other African subregions have diverged from the rest of the world.
- This policy brief highlights the importance of adapting land-use regulations and reducing other constraints related to permitting and construction processes in order to meet urban demand.

POLICY BRIEF XXX-20181

JUNE 2022

This project was funded by the IGC

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Policy motivation

To reduce their carbon footprints and exposure to climate change, cities may need to become more compact (UN-Habitat, 2020). In the context of dramatic urban growth, especially in developing economies, this implies less horizontal expansion (i.e., sprawl) and more vertical development (i.e., high-rises). However, the global determinants and impacts of vertical urban development have been little studied in the literature.

Recently, Jedwab, Barr, and Brueckner (2020) have documented that countries that tend to restrict vertical urban development – whether motivated by historic preservation, the desire to preserve open skies, or other factors – also tend to have: (i) higher housing prices, likely because the supply of housing is more constrained; (ii) more sprawl, likely because cities have to expand horizontally if they cannot expand vertically; (iii) more congested roads, likely because urban sprawl is typically associated with a rise in automobile commuting; and (iv) greater air pollution, likely because workers commute from farther, and many via automobile. Thus, countries with more restricted cities tend to have cities that are less affordable, less compact, less environmentally friendly, and possibly more exclusionary.

Overview of the research

While Jedwab, Barr and Brueckner (2020) study some of the determinants of the vertical urban development gaps that they observe, their study essentially focuses on high-income, developed economies. In contrast, the present study – Barr and Jedwab (2022) – uses relatively simple methodologies to better estimate and understand the vertical urban development gaps that might exist in less developed economies today. More precisely, Barr and Jedwab (2022) exploit a novel database – Emporis Research – which gives data on the location, height, and year of construction of all tall buildings in the world (high-rises and skyscrapers above 55 metres, or 14 floors). The authors then use simple methodologies and various standard controls to estimate “conditional” gaps, i.e., the extent to which some regions of the world build “up” more than others given similar economic conditions, geographical constraints on tall building construction, city size distributions, and other features.

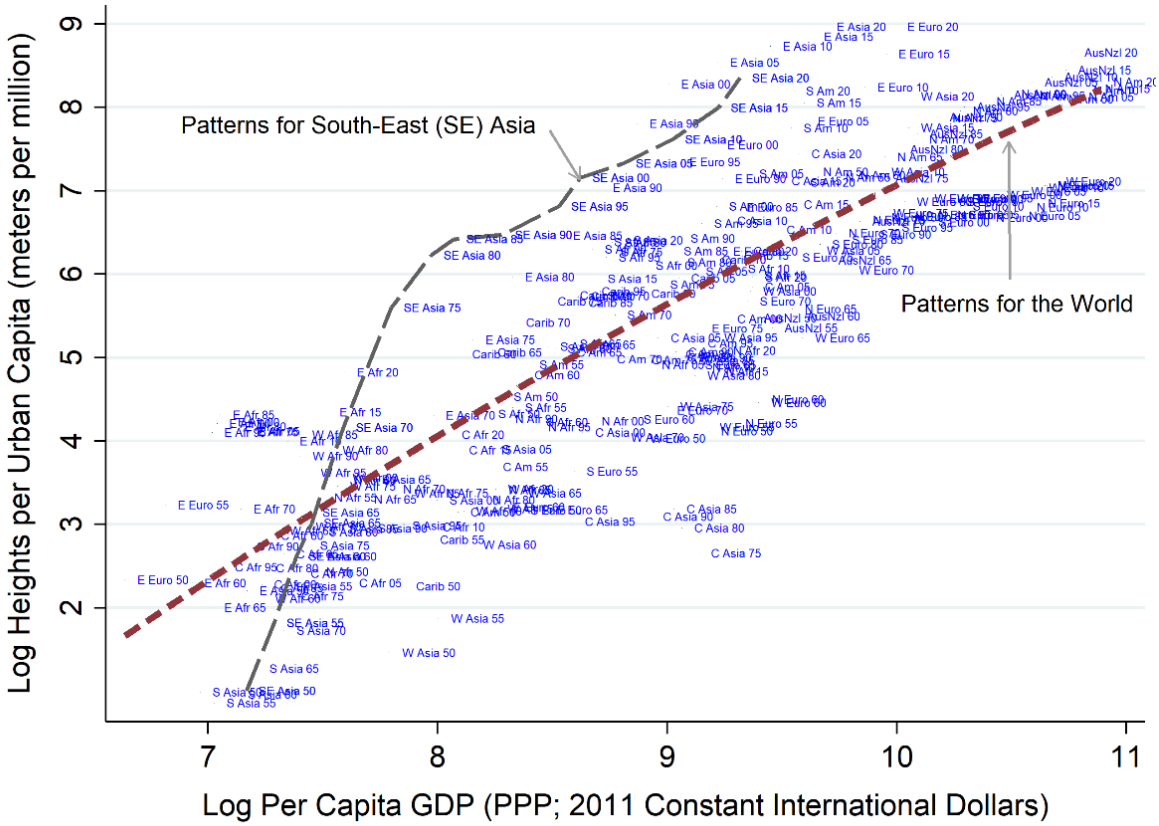
Key findings

To be as transparent as possible regarding their methodology, they first start with an unconditional, hence more descriptive and visual, analysis. For 20 official United Nations subregions and using data every five years from 1950 to 2020, Figure 1 shows the relationship between the natural logarithm (log) of the

total sum of tall buildings heights per urban capita (in metres per million urban residents) and the log of per capita GDP (in PPP and constant international 2011 dollars)[1]. There is a very strong relationship between the two, and the predictive power of the relationship – the R2 is 0.72 – implies that economic development is the most obvious driver of urban vertical development. Indeed, as countries get wealthier and urbanise, cities become larger, land values and the opportunity cost of commuting time increase, and developers naturally build taller structures on the land.

However, the relationship does not explain all the variation in heights per urban capita in the data. In other words, the R2 is not 1.0, suggesting that many subregions have different levels of vertical urban development for a given level of economic development. To highlight this point, Figure 1 also displays the specific patterns for Southeast Asia (SE Asia). As can be seen, SE Asia was "below" the world average until 1965. Since then, SE Asia has been consistently more vertical than the rest of the world for a given level of economic development. If anything, SE Asia, not East Asia or North America, has been the "leading" region in the world in terms of vertical urban development conditional on per capita income.

Figure 1: Heights per urban capita and income, 20 U.N. subregions, 1950-2020

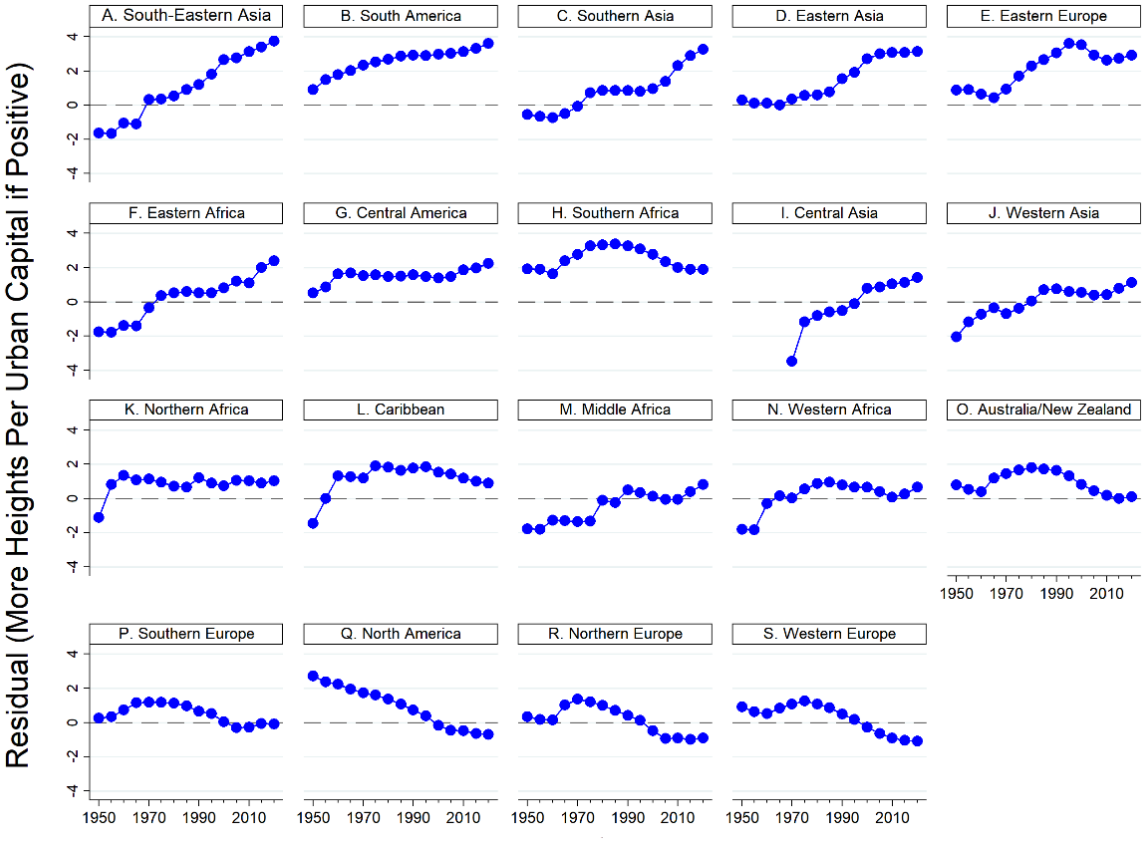


[1] Official 20 U.N. subregions are Eastern Africa, Middle Africa, Northern Africa, Southern Africa, and Western Africa in Africa; Central Asia, Eastern Asia, South-Eastern Asia, Southern Asia, and Western Asia in Asia; Eastern Europe, Northern Europe, Southern Europe, and Western Europe in Europe; the Caribbean, Central America, and South America in Latin America; and the Caribbean, North America in North America, and finally Australia/New Zealand and Melanesia in Oceania.

Notes: This figure shows the relationship between the total sum of tall building heights per urban capita (metres per million) and log national per capita GDP (PPP and 2011 constant international dollars) for 20 U.N. subregions from 1950 to 2020.

Next, Barr and Jedwab (2022) obtain a conditional measure of vertical urban development, i.e., tall building construction per urban capita, using econometric methods to control for per capita income. Figure 2 plots the obtained conditional measure for each U.N. subregion-year. As can be seen, some subregions have improved over time, especially in Asia (South-Eastern, Eastern, Southern, Central, and Western) and Latin America (South and Central). Within Africa, Eastern Africa is a clear outlier, with the measure declining in the other African subregions. Thus, with the exception of East Africa, the analysis suggests that African cities have become relatively less vertical over time.

Figure 2: Vertical urban development conditional on income, 20 U.N. subregions, 1950-2020



Notes: This figure shows, for 20 UN subregions every 5 years from 1950 to 2020, the average (population-weighted) residuals estimated when regressing for 2,376 country-year observations the log total sum of tall building heights per urban capita on log per capita GDP and its square.

The next step in Barr and Jedwab (2022) is to conduct their global analysis at the city level, controlling for income, technological innovation, geographical constraints, and other factors. Using this method, their analysis confirms that Asia now leads the world in terms of vertical development (with the following ranking: SE > E > S > W > C), followed by the Americas (S > C > N). Africa (E >

S > N > W > C) and also Europe (E > W > S > N) clearly lag behind in terms of vertical development. South Asia and East Asia are slowly getting on the same path as Southeast Asia, which is a positive development. However, West Africa and Central Africa appear to be diverging from the rest of the world as their incomes increase.

Finally, Barr and Jedwab (2022) discuss the factors that could be driving the observed differences. They consider four factors: land-use regulations in general (for example, height restrictions), land-use regulations specifically related to historical preservation (for example, prohibitions on modern redevelopment in historical areas), dispersed ownership (for example, when land and existing structures are owned by many owners, thus preventing land assembly), and societal preferences for high-rise apartments (for example, when they are associated with modernity and luxury living or social housing and social ills such as poverty and crime).

Policy implications

Since many African cities were founded or became cities at the turn of the 20th century, as opposed to the 16th century for Latin America and earlier for Asia, historical preservation cannot be the reason why Africa lags behind. Dispersed ownership is also unlikely to explain the observed differences because cities in Asian, Latin American, and African low- and middle-income countries were likely not that different in terms of population density, informality, and other features circa 1950. Lastly, while societal preferences could be a factor (for example, wealthier residents prefer to live in suburban (gated) communities in South Africa), land-use regulations and other constraints related to the permitting and construction processes must explain most of the gaps.

If this is indeed the case (although it cannot be fully proven due to the lack of global and historical quantitative data on the extent of regulatory constraints), this suggests that Africa lags behind not because of its lower income levels but because of policy-related factors and also, possibly, socio-cultural factors.

Having said that, East Africa now has almost the same urban height density and income levels as Southeast Asia in the early 1970s. It is too soon to tell if the patterns observed during the recent period in East Africa will be sustained. However, the analysis confirms that there is no sub-Saharan African “curse.” East Africa’s performance (in per capita urban terms) has been driven by Kenya and also Mozambique. Countries such as Ethiopia (Marsh, 2018) and Rwanda (Byaruhanga, 2016) have clearly become more pro-development in the past few years, likely inspired by the economic and vertical “rise’’ of China’s cities.

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