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**ANALYSIS OF URBAN AGGLOMERATION AND REGIONAL
ECONOMIC PERFORMANCE IN SUB-SAHARAN AFRICA**

Theses of the PhD Dissertation

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University of Szeged

Faculty of Economics and Business Administration

Doctoral School in Economics

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1. Actuality and Justification of the Research Topic (Research Problem)

Urbanization is a valuable outcome of regional economic performance (Zheng et al., 2020). As nations develop, the urban share of the population in urban regions increases because a large section of their total population shift from the perceived underdeveloped rural areas to the perceived developed urban areas full of economic opportunities such as employment, better income, and quality accessibility of social infrastructure such as water, sanitation, and energy (Kuznets, 1955; Castells-Quintana, 2017). Thus, the urban regions are deemed a critical perspective force in reflecting human prosperity and sustained economic performance as they contribute to consumption, innovation, and investment in developed and developing economies (Ikwuyatum, 2016; Moreno, 2017; Xue et al., 2020). As such, the urban agglomeration in developing regions has been tremendously rising due to the increasing rural-urban influx of people in the urban areas searching for prosperity and good life (Ikwuyatum, 2016).

Although the increase in urbanization is seen as a significant contributor to regional economic performance, there is still a hotly contested debate in the literature regarding the connection between urban agglomeration and economic performance in different contexts (Xue et al., 2020). On the one hand, some authors argue that the drift of population from rural to urban areas results in a commendable economic performance and a continuous urban opening in cities' agglomeration (Ahrend et al., 2017). On the other hand, other scholars posit that increased population entry into urban regions pauses great negative outcomes indicated by greater inequality in terms of urban living standards (Li et al., 2019). Bourgeoning urbanization and subsequent urban agglomeration increases the uncontainable widening variation of income, retarded economic resources, and undesirable human well-being levels across different urban regions (Grafakos et al., 2019). In line with this conjecture, it is projected that by 2050, more than two-thirds of the world's population will be urban, with many living in informal and unplanned settlements and growing cities in regions such as Sub-Saharan Africa and Asia (UNDESA, 2018).

The sudden and unregulated upsurge in urban agglomeration preceding rapid urbanization presents conflicting economic and human well-being outcomes in developing regions such as Sub-Saharan Africa (UN-Habitat, 2017). On the one hand, it leads to positive economic outcomes such as increased regional economic performance resulting from an increased labor supply pool, specialization, productive human capital, and proximity to urban industries (Ahrend et al., 2017). On the other hand, it leads to deleterious outcomes such as increased income inequality and an

increased share of the urban population living in slums with inadequate access to urban infrastructural services such as water, sanitation, waste management, and energy, hence impacting negatively on the overall human well-being (Li et al., 2019; UN-Habitat, 2017).

Notwithstanding the massive rural-urban population drift, the occasioned regional economic performance attributed to the agglomeration of skilled labor in the urban region's industries is growing at a low pace (UNDESA, 2018). The economic performance measured by the gross domestic product (GDP) growth averaged below 6% of the annual growth rate of urban agglomeration between 2000 and 2020 (World Bank, 2022). However, income inequality appears to have risen with urban agglomeration. The Gini coefficient, which depicts the distribution of income and the standards, has been increasing rapidly in recent decades (UN-Habitat, 2017). For instance, the income inequality in Sub-Saharan Africa averaged above 0.65 between 2000 and 2020 (Solt, 2016; Standardized World Income Inequality Database, 2022).

Furthermore, the urban infrastructure in Sub-Saharan Africa has encountered severe pressure from the rising urban agglomeration, rendering over 50% of the urban agglomeration in the acute proliferation of slums (Tuholske et al., 2020). While the infrastructural gap has been identified as significant in the region, there seems to be increasing income inequality and poverty levels in urban areas. Mainly, this is due to the increasing urban agglomeration in Sub-Saharan Africa, which has been regarded to be much faster than the pace of urban infrastructure development (Goodfellow, 2020). Also, the rising of small and mid-sized cities, annexation, and reclassification of previous rural regions as part of the main urban regions has been the major contributing factor to unplanned urban infrastructure in Sub-Saharan Africa (Güneralp et al., 2020). Partly, this is also contributed by urban governance mismanagement, lack of sufficient financial resources, and overlapping functions of the urban institutions, leading to the overall retarded per capita GDP growth, unsuitable investment, decreasing productivity, and undesirable levels of human well-being (Güneralp et al., 2020).

Whether rising urban agglomeration is related to regional economic performance, income inequality, and urban infrastructure remains the puzzling question informing this study. Despite the glaring evidence of theoretical relationships between the variables, the empirical literature has no exhaustive clarity of arguments. For instance, studies conducted in developed regions display different findings from those undertaken in developing regions (Frick & Rodriguez-Pose, 2018). Also, the empirical literature provides a mix of strong negative and positive relationships between

urban agglomeration and regional economic performance (Castells-Quintana, 2017). Similarly, some scholars have empirically observed that the linkage between urban agglomeration and income inequality could be linear, non-linear, negative, or positive (Wu & Rao, 2017). Moreover, most studies have followed the subjective approach rather than the objective, where regional human well-being has been measured by self-reporting indicators such as the OECD's Better Life Index about urban life (Truelove, 2019; Das et al., 2022).

Therefore, inspired by the recent limited but considerably growing literature strand that is shifting the research attention to the regional level (Castells-Quintana, 2017) and literature strand focusing on Sub-Saharan Africa (Adams & Klobodu, 2019; Asogwa et al., 2020; Sulemana et al., 2019; Beard & Mitlin, 2022), this thesis contributes to the literature in several ways. First, the study computes a more nuanced measure of urban agglomeration, from which the relationship between urban agglomeration and regional economic performance is determined. Secondly, the study investigates whether the relationship between urban agglomeration and income inequality follows an inverted U-shaped Kuznets hypothesis. Lastly, the study investigates the role of urban infrastructural service accessibility on regional human well-being in SSA. The study utilizes a dynamic panel model estimated using various techniques to determine the study variables' relationships and effects. The choice of the dynamic panel model is informed by its robustness in capturing dynamic effects and its suitability for short panels, as in this study (Baltagi, 2008). The study findings are expected to provide a road map for sound urban development policies to ensure sustainable economic performance, reduced income inequalities, and equitable access to urban infrastructural services such as water, energy, and sanitation.

2. Objectives, Questions and Hypotheses of the Study

The study focuses on five main topics: 1) urban agglomeration, 2) income inequality, 3) urban infrastructure, 4) regional human well-being, and 5) regional economic performance. The topical concepts are assumed to be incredibly independent but highly sequential, laying down the practicality of developing a detailed dynamic panel model that can be used to model the ongoing infrastructural, demographic changes, and urbanization trends in Sub-Saharan Africa. In line with these topical issues, the study's main purpose is to determine the relationship between urban agglomeration and regional economic performance in Sub-Saharan Africa.

The study addresses the following specific research objectives:

- i. To determine the relationship between urban agglomeration and regional economic performance in Sub-Saharan Africa.
- ii. To determine the relationship between urban agglomeration and income inequality in Sub-Saharan Africa.
- iii. To determine the relationship between urban infrastructural service accessibility and regional human well-being in Sub-Saharan Africa.

Based on the objectives above, the thesis answers the following leading estimation questions:

- i. How does urban agglomeration in Sub-Saharan Africa influence regional economic performance through an increased share of the urban population and enhanced human capital formation?
- ii. To what extent does urban agglomeration influence income inequality in Sub-Saharan Africa, if any, does the inverted U-shaped Kuznets hypothesis apply?
- iii. How does urban agglomeration influence urban infrastructural service accessibility and contribute to regional human well-being?

The following research hypotheses guided the study analysis:

H₁: Urban agglomeration does not significantly influence regional economic performance in SSA.

H₂: There is no significant relationship between Urban agglomeration and income inequality in SSA.

H₃: There is no significant relationship between urban infrastructural service accessibility and regional human well-being in SSA.

3. Justification of the Study

Currently, Sub-Saharan Africa is classified as the fastest urbanizing region, followed by the Eastern Asian part (UNDESA, 2018). The Sub-Saharan African region has over 472 million people living in urban areas. Also, the region is projected to have more than a billion of its population in urban areas by 2050, going by the current annual growth rate of 65 million people (Center for Strategic and International Studies, 2018). Although the region is experiencing a massive rural-urban population drift, the occasioned regional economic performance attributed to

the agglomeration of skilled labour in the urban region's industries is growing at a low pace (Center for Strategic and International Studies, 2018; UNDESA, 2018).

Appreciably, no region can gain successful economic performance without undergoing the urbanization process. However, this can only bear fruits if urban areas are positioned as strategic economic hubs (Center for Strategic and International Studies, 2018). This requires concerted efforts by stakeholders such as urban planners, external donors of capital goods, city governments, development practitioners, and the private sector. Linking the concerted development efforts of different stakeholders presents the Sub-Saharan African region with an opportunity for a successful economic performance, given its immense demographic transitions. Conversely, the Sub-Saharan African area cannot contain the associated urbanization threats. The region is witnessing rapid urbanization growth without adequate urban infrastructural services such as affordable housing, water, sanitation, and clean energy, pushing over 50% of the urban population into slums and shanties (UN-Habitat, 2017).

Partly, this is contributed by urban governance mismanagement, lack of sufficient financial resources, and overlapping functions of the urban institutions, leading to the overall retarded per capita GDP growth, unsuitable investment, decreasing productivity, and undesirable levels of human well-being (World Bank, 2015; Güneralp et al., 2020). Whereas Sub-Saharan Africa has been experiencing better economic growth in recent decades, sustaining long-term economic performance is a figment without adequate urban structural adjustments (Goodfellow, 2020). Revising regional policies and individual countries' policies related to interstate systems and building the regional capacity for managing urbanization are the main elements of sustainable economic performance. Additionally, investing in urban infrastructure, empowering local governments to deliver adequate social amenities, and tying them to national economic agendas and regional regulatory framework is the surest way of achieving ideal regional economic performance (Farrell, 2018).

Therefore, this study seeks to determine the relationship between urban agglomeration and regional economic performance in Sub-Saharan Africa using panel data from 2000 to 2020 for 22 countries. We apply a dynamic panel model to achieve the study's objective using Pooled OLS, FE, RE, and GMM methods in estimating the interrelationships and effects among study variables. The model is preferred as it is ideal for explicitly modeling the time-space dependence concepts of short panels. It is also suitable for spatial structural and demographic transition concepts. The

findings from the study are anticipated to set a dialogue path of chatting the urbanization policy frameworks that can help the Sub-Saharan African region to redirect its active urban population to productive activities that will not only contribute to regional economic performance but also cut the enormous income inequalities, hence boosting the regional human well-being.

4. Thesis Structure

This thesis book is drawn from the dissertation structured into seven distinct chapters. The first chapter introduces the research concept of the study in the form of the research problem, objectives, and hypotheses that direct the study. The second chapter provides the conceptualization and theoretical literature on urban agglomeration, urban infrastructure, income inequality, regional economic performance, and regional human well-being. The third chapter overviews population growth dynamics, GDP per capita growth, regional human well-being, income inequality, and urban infrastructural growth trends in SSA vis-à-vis that of East Asia and Europe in the last two decades. Also, the chapter encompasses the theoretical model from which the model estimation strategy is developed. In addition, the chapter describes the variables and various statistical tests carried out as part of the model estimation in chapters four, five, and six.

In chapter four, the analysis of the relationship between urban agglomeration and regional economic performance is carried out by comparing the evolution of urban agglomeration in SSA, East Asia, and European economies in the last two decades. Chapter five estimates whether the inverted U-shaped Kuznets Hypothesis holds for SSA by evaluating the relationship between urban agglomeration and income inequality. Chapter six analyzes the relationship between urban infrastructural service accessibility and regional human well-being. Lastly, chapter seven provides a detailed summary of the key findings, concludes, suggests policy implications, and provides a roadmap for future studies.

5. Data and Methodology

This thesis utilized balanced panel data focusing on the recent two decades, 2000 to 2020, in Sub-Saharan Africa and a comparative analysis of East Asia and European economies. The data was sourced from organizations such as World Bank, United Nations Development Programme, Standardized World Income Inequality Database, World Penn Tables, UN-Habitat, Africapolis, City Population.de, and World Governance Indicators. The study relied on the dynamic panel model developed founded on the neoclassical growth model, which considers specific country

effects (Brülhart & Sbergami, 2009; Henderson, 2005). The model incorporated the growth-enhancing impact of urban infrastructure as per Bertinelli and Black's (2004) stylized urban economics model, which suggests a testable prediction that the quality of urban infrastructure significantly influences the growth-inducing effects of urban agglomeration. The generalized dynamic panel model is stated as follows:

$$\Delta y_i = \beta(\log y_{i,0}) + \lambda_1 UA_{i,0} + \lambda_2 UI_{i,0} + \lambda_3 UA_{i,0} * UI_{i,0} + \pi Z_{i,0} + \varepsilon_{i,t} \quad (1)$$

where Δy_i is the GDP per capita growth measuring regional economic performance, $\log y_{i,0}$ is the logarithm of initial GDP per capita, $UA_{i,0}$, $UI_{i,0}$ and $UA_{i,0} * UI_{i,0}$ are urban agglomeration, urban infrastructure, and their interaction measured at the beginning of the study period. Various country-specific fixed effects denoted by $Z_{i,0}$ are controlled in all aspects of this dissertation. The error term assumed to be normally distributed is denoted by ε_{ii} .

Equation (1) above is our general theoretical model based on the neoclassical growth framework backed up by the agglomeration life cycle, inverted U-shaped Kuznets, New Economic Geography, and the Theory of a Good City Form. In this theoretical model, the main objective is to depict how urban agglomeration influences growth efficiencies of regional economic performance through the quality of urban infrastructure and other controllable fixed effect factors. Secondly, the model captures how urban agglomeration affects regional well-being through the precincts of competition for urban infrastructural services, resulting from skewed urban governance and limited financial resources. Thirdly, the model sheds light on how urban agglomeration influences income distribution. As argued in the literature, as the urban share of the population increases, the urban employment opportunities dwindle, resulting in many active people being jobless, thus, overall income inequality in the region. To test this model, we subdivide the main model in equation (1) into specific theoretical models in line with the three study objectives before proceeding to empirical strategy.

The model presented in equation (1) was estimated using various techniques under various assumptions and conditions. For instance, estimating the model using the pooled ordinary least squares (Pooled OLS), random effect (RE), and fixed effect (FE) methods, the study assumed that, $E(\varepsilon_{it}) | X_{it} = 0$. However, this assumption is unrestrictive, hence can easily be violated if there is unobserved country-specific effects are correlated with independent variables contained in the error term (ε_{it}). Also, Pooled OLS produces inconsistent estimates because the lagged endogenous

variable ΔY_{it-1} is associated with the unobserved country-specific fixed effect (Baltagi, 2008). Therefore, natural mitigation to the problems of exogeneity and heterogeneity required in RE, FE, and Pooled OLS estimations is using the instrumental variable models—generalized method of moments (GMM). The first GMM estimation framework is referred to as the Arellano-Bond estimator or first-difference GMM (difference-GMM) (Arellano & Bond, 1991), which considers the moment condition, $E[Y_{i,t-s}\Delta\varepsilon_{it}] = 0$, with $t=3, \dots, T$ and $S=2, \dots, t-1$, and utilizes the vector $(Y_{i1}, \dots, Y_{i,t-2})$ as the GMM instruments for ΔY_{it-1} in equation (1). Secondly, this study utilizes a system GMM estimator (system-GMM) estimation technique, which is critical in enhancing the efficiency of the GMM-Dif by using more moment conditions. The procedure regards $(\Delta Y_{i,2}, \dots, \Delta Y_{i,t-1})$ as the instruments for $(Y_{i,t-1})$ under the moment condition $E[Y_{i,t-s}\varepsilon_{it}] = 0$, with $t=3, \dots, T$ and $s=1, \dots, t-2$ (Arellano & Bover, 1995; Blundell & Bond, 1998). The system GMM is vested at the moment condition: $E[\Delta X_{i,t-1}\eta_i + \mu_{it}] = 0$.

In ***H1***: **Urban agglomeration does not significantly influence regional economic performance in SSA**, the study computed a more nuanced urban agglomeration indicator measure using the Herfindahl-Hirschman-Index (HHI), which has recently emerged as a frequently preferred measure for different urbanization aspects because of its desirability to describe the total size of the city distribution (Shen et al., 2019). The HHI takes on values ranging between $\frac{1}{n}$ and 1, where a value of 1 shows complete agglomeration (Frick & Rodríguez-Pose, 2018). Based on the experimental approach developed by Frick and Rodríguez-Pose (2018), this study computed HHI50, which is the urban agglomeration index measure of the population in all cities with $\geq 50k$ and HHI100, which measures urban agglomeration of all cities with urban share of population $\geq 100k$. Before testing the significant effect of urban agglomeration on regional economic performance, we evaluated the evolution of urban agglomeration in SSA, EA, and EU.

In ***H2***: **There is no significant relationship between Urban agglomeration and income inequality in SSA**, the focus was to determine the relationship and effect of urban agglomeration on income inequality in SSA. The study followed an inverted U-shaped Kuznets hypothesis in determining whether the relationship between urban agglomeration and income inequality is non-linear or quadratic. To address this objective, the study applied the quadratic form of equation (1), where income inequality was expressed as a function of the urban share of the population and its squared term together with the country-specific control variables. Specifically, the urbanization rate and its squared term were included as the moderating variable, following the assumption that

income inequality increases at least in the initial stages of urban development when the urbanization rate is still manageable and later falls at later stages of urban development when all urban infrastructural systems are working.

In *H₃*: **There is no significant relationship between urban infrastructural service accessibility and regional human well-being in SSA**, the focus was to determine the relationship between urban infrastructural service accessibility and regional human well-being in SSA. Unlike most previous studies, this study approached this hypothesis from a quantitative measure of regional human well-being using the Human Development Index (HDI). Also, we used a quantitative measure of urban infrastructural service quality using the urban share of the population accessing at least essential water, sanitation, and energy services the government provided in the urban regions. Also, the study controlled various country-specific variables, such as urban agglomeration and urban governance, in determining how they influence the quality of urban infrastructural service accessibility and how it affects regional human well-being.

6. Summary of Key Study Findings

This thesis investigated the relationships and effects of urban agglomeration on regional economic performance. Further, the study investigated the relationship between urban agglomeration and income inequality and the relationship between urban infrastructural service accessibility and regional human well-being. The study used different methodological estimation approaches for estimating the dynamic panel model from a spatial perspective. In many ways, the findings align with the theoretical and empirical notions in the literature and confirm the set hypothesis. Thus, in this thesis chapter, the summary of each study's objective findings and hypothesis testing are presented, out of which conclusive deductions, policy professes, and limitations of the study as the pathway to future studies.

In chapter four (*H₁*), we purge whether urban agglomeration is growth-enhancing or an inhibitor from the developing world perspective. A 5-year interval panel data from 2000 to 2020 for 22 SSA, 22 Asian, and 22 European economies was estimated using System GMM, Difference GMM, Pooled OLS, RE, and FE techniques. The study determined the direct influence of urban agglomeration on regional economic performance. Also, the study controlled for urban specificities in terms of urban infrastructure quality in SSA compared to EA and EU.

The descriptive and stylized facts from the data show a declining urban agglomeration in the last two decades for all economies regardless of their income levels, disabusing the long-held

notion of an increasing urban agglomeration in developing economies. However, the urban agglomeration in developing, especially SSA, ranks higher, almost double that of Asia and Europe. Regarding the relationship between urban agglomeration and economic performance, we observe distinct findings depending on the income level and urban specificities—the quality of urban infrastructure. Considerably, although we observe beneficial direct effects of urban agglomeration in developed economies, urban agglomeration appears deleterious in developing economies of Asia and SSA, where there is inadequate urban capacity to meet the social needs of out-of-hand urbanization. However, introducing the moderating effect of urban infrastructural service accessibility quality, the interactive positive impact of urban agglomeration with urban infrastructure indicates the need for better accessibility to urban infrastructural services as they are growth-enhancing. Therefore, the study contributes to the literature and policy advocacy by depicting the augmenting effect of urban infrastructure quality on the relationship between urban agglomeration and economic performance in developing economies.

Chapter five (H_2) interrogates the validity of an inverted U-Shaped Kuznets Hypothesis in the case of SSA by investigating the relationship between urban agglomeration and income inequality. A balanced panel data of 22 SSA economies from 2000 to 2020 was estimated using System GMM, Difference GMM, Pooled OLS, RE, and FE techniques. The choice of the multi-model approach was informed by varied empirical outcomes when using strictly one model. However, based on the weakness of Pooled OLS, RE, and FE models, the discussions, conclusions, and policy recommendations are based on the System GMM model due to its corrective power, especially when using short panels. Regarding the validity of the inverted U-Shaped Kuznets Hypothesis, we applied the urban agglomeration measure (urban share of population) in its second-order polynomial to capture a non-linear relationship. In this regard, the findings indicated an inverted U-Shaped Kuznets Hypothesis holds for SSA, with income inequality rising gradually with urban agglomeration until a threshold of 62% urban share of the population, after which it declines. Therefore, SSA economies will continue encountering increased income inequality until they pass the turning point of 62%.

Further, the findings indicate a significant positive relationship between urban agglomeration and income inequality. In addition, imposing a quadratic term on a measure of urban agglomeration sustains the relationship, depicting a significant non-linear relationship. Controlling for the urbanization rate, the findings showed a significant negative relationship with

income inequality in this connection, implying a non-linear relationship between the two variables. Therefore, we concluded that the inverted U-shaped Kuznets hypothesis is valid for SSA. However, GDP per capita growth and its quadratic term produce an insignificant influence on income inequality. Lastly, industrialization and governance effectiveness in implementing urban infrastructural development and returns to education affect income inequality significantly.

Chapter Six (H_3) investigates the relationship between urban infrastructure and regional human well-being using balanced panel data from 22 SSA countries from 2000 to 2020. In particular, our interest was to ascertain whether the accessibility of urban infrastructure matters in enhancing the human well-being of the urban population. The descriptive findings point out that the general human well-being, as measured by the human development index (HDI), has been trailing behind other regions with an overall average value of less than 0.5. First, the study hypothesized no significant influence of urban infrastructural service accessibility on regional human well-being. The findings indicated a significant positive link between urban infrastructural service accessibility quality and human well-being for SSA.

Secondly, the study controlled for urban agglomeration and governance in determining the relationship between urban infrastructural service accessibility quality and regional human well-being. The findings highlighted the significant role of urban agglomeration and governance when evaluating the association between urban infrastructure and human well-being. Notably, the results confirm the disastrous effects of increasing urban agglomeration on human well-being in SSA, a region with limited urban infrastructural investment capacity, as depicted by high government ineffectiveness in implementing and monitoring public policies.

7. Conclusion

This thesis interrogates the connectedness between urban agglomeration and economic performance, the non-linear relationship between urban agglomeration and income inequality, following the inverted U-shaped Kuznets hypothesis, and the relationship between urban infrastructural service accessibility and regional human well-being in SSA. The study began the analysis by first describing the evolution of urban agglomeration in recent decades using a more nuanced computed measure, the HHI index, computed using urban population data from various cities with distinct urban shares of population sizes. Secondly, determines the extent to which the urban agglomeration has influenced economic performance, income inequality, and how it has

affected the urban infrastructure and general human well-being in SSA. Based on the findings, the thesis details a conclusion based on each research objective, leading question, and hypothesis.

On the relationship between urban agglomeration and regional economic performance, we concluded that a significant heterogeneous observation regarding the relationship between urban agglomeration and economic performance implies a lack of consensus in the literature. Perhaps this can be implicitly attributed to specific contextual driving factors of economic performance beyond urban agglomeration. Nonetheless, in our particular case, developing SSA and Asia, we conclude that continuous rapid urbanization and subsequent urban agglomeration remain significant economic growth inhibitors. However, this can be corrected by putting the necessary urban infrastructure and urban governance effectiveness that can augment urban agglomeration economies of scale in policy implementation.

On the non-linear relationship between urban agglomeration and income inequality, we concluded that income inequality increases with urban agglomeration through increased rural-urban migration, which shifts the skilled labor factors of production to formal urban regions, leaving out informal and rural sectors with limited economic productivity. Also, the disproportionate productivity and grim state policy preferences focused on engaging hopeful rural-urban migrants in economic production contribute to a massive scramble for limited resources in the urban region in their early years in cities. Turning to the second part of the inverted U-shaped Kuznets curve, it can be argued that income inequality starts to decline when the majority of the urban population is accessing better public provisions and returns to education, resulting from the distributive power of government through increased urban infrastructural investment and development. Also, scaled industrialization through public-private partnerships and increased government investment capacity on social amenities such as water, sanitation, and energy access resulted in a gradual decline in income inequality at later urbanization stages. However, the policy puzzling question is what must be done to ensure the inflection or turning point of the inverted U-shaped Kuznets curve comes sooner.

On the relationship between urban infrastructure and regional human well-being, we concluded that the quality of accessing urban infrastructural services such as water, energy, and sanitation plays a pivotal role in enhancing the human well-being of the urban population and the entire economy, as confirmed by literature and results. However, urbanization processes and quality of governance orchestrate remarkable heterogeneities across nations, cities, and regions. In

this regard, we argue that the low quality of accessing urban infrastructural services due to high levels of agglomeration is attributable to poor quality of governance effectiveness. This situation is dire in developing regions such as SSA, where urbanization is stirring, and urban infrastructural development is limited due to inadequate financial and technical resources. Also, access to water, electricity, and sanitation is deficient and is hampering positive structural change and the ultimate benefits from the active population flooding urban regions.

As per the obtained results, the adverse impacts of the quality of accessing urban infrastructure are linked to the increasing urban agglomeration and poor quality of governance. In tandem with these arguments, the Malthusian trap might be the ideal reality, as the urbanization pace supersedes the government's provision of urban infrastructural services vital for human well-being in SSA. Previous studies have suggested that when urban agglomeration is due to forced displacement rather than normal rural-urban migration, the government's effectiveness in investments in urban infrastructural service provisioning becomes highly fundamental. The quality of accessing urban infrastructural services, mainly, is not desirable in terms of the quality of life of the urban population but also the general human well-being at the regional level.

8. Policy Recommendations

Based on the obtained findings and conclusion, several interesting policy implications can be drawn from various analyses in this thesis.

- i. To begin with, and about analyzing the relationship between urban agglomeration and economic performance, the findings depicted the deleterious effects of uncontained urban agglomeration on economic performance.
 - In connection with this observation, the study provided a corrective solution by justifying the significant augmenting interactive effect of urban agglomeration with urban infrastructure on economic performance. Therefore, providing adequate essential infrastructural services such as electricity and water through public-private partnerships can be beneficial.
 - Secondly, there is a need for increased governance capacity regarding financial and technical know-how in implementing growth-promoting policies. For instance, increased industrialization can be beneficial through agglomeration economies from the active skilled population in urban regions. Also, the development agencies in the agricultural sector should enact policy incentives

to make agriculture attractive to educated and uneducated people, thereby reducing massive rural-urban migration pushed by the perceived better urban jobs and economic prosperity.

ii. About the non-linear relationship between urban agglomeration and income inequality:

- We suggest that the Sub-Saharan African economies tap into the rising active population moving into cities by implementing urban policies that favor employment creation, better accessibility to social amenities supported by scientific and technological innovations, and a favorable business working environment.
- This can be achieved through collaborative inward-looking industrialization frameworks such as public-private partnerships. Through this, employment, business, and scientific innovation opportunities can be increased.

iii. Lastly, about the relationship between urban infrastructure and regional human well-being:

- The study findings point to the fact that the government's investment and policy effectiveness that raises the quality of accessing urban infrastructural services such as water, energy, and sanitation, can influence the higher levels of human well-being significantly, especially in SSA—subsequently, certifying that better quality of accessing urban infrastructural services in these large agglomerations will help in stripping the entire region from *Malthusian trap*.
- Additionally, there is a need for Sub-Saharan African leadership and development stakeholders to review fiscal policy allocation to social development, such as quality education and accessibility to better healthcare. These policy measures will ensure the distributional effect of the productive urban and rural populace. Lastly, government agencies charged with the responsibility of urban development should dissuade their focus on decentralizing services and development projects, as this will be the avenue of opening up the peri-urban and connecting rural regions in the Sub-Saharan African area through industrialization and agro-processing.

9. Limitations and Suggestions for Further Studies

Although this study has attempted to uncover the growth effects of current urban agglomeration on economic performance, our study leaves out several thematic areas that future studies can investigate. For instance, the analysis restricted itself to the current two decades due to the unavailability of urban infrastructural long time-series data before 2000. Therefore, future studies can incorporate long-time-series urban infrastructure data as more data is being developed by incorporating more series before recent years. Also, the current study did not consider the urban population density due to a lack of available data, leaving the probable implication of urban concentration structure on economic performance. Future studies can incorporate population density as an alternative measure of urban agglomeration as this will not only point out the effect but also the structural effect as either an impediment or an enhancer to economic growth.

In addition, the current study computed HHI50 and HHI100 using population data from all cities holding a capacity of 50 000 and 100 000 people, ruling out the implication of concentration in cities with 10 000 people and above. Therefore, future studies can investigate the implication of urban concentrating by considering the non-FUAs population in computing the urban agglomeration HHI measure. Although the study pointed out the significant role played by urban governance as a control variable, future studies can investigate the direct linearity between urban governance and urban agglomeration, as this will help uncover the contribution or prevention of urban governance on persistent urbanization and subsequent urban agglomeration.

Lastly, we observed no universal relationship between urban agglomeration and economic performance; the relationship depends on country-specific factors. Therefore, future studies can focus on country-based microdata analysis to provide a more robust policy framework regarding the potential economic benefits of urban agglomeration rather than far-reaching policy suggestions. Lastly, further studies on urban demographic transitions using longitudinal data can be of great value to better understand the link between urban agglomeration and regional economic performance, a relevant present issue for developing regions.

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List of Publications

Peer-Revered Journal Papers

1. **Maket, I. J.**, Kanó, I.S. & Vas, Z. (2023). Urban Agglomeration and Income Inequality: Is Kuznets Hypothesis Valid for Sub-Saharan Africa?. *Social Indicators Research* 170(3), 933–953.
2. **Maket, I. J.**, Kano, I. S., & Vas, Z. B. (2023). Estimations of Pooled Dynamic Panel Data model with Time-Space Dependence of the Selected Sub-Saharan African Urban Agglomerations, 2000-2020. *Regional Statistics* 13(4), 651-673.
3. **Maket, I. J.**, Kano, I. S., & Vas, Z. B. (2022). Reverse Causal Nexus between Pro-Poor Policies and Income Inequality in Kenya. *Regional Science Policy & Practice*, 15(6), 1163–1182.
4. **Maket, I.J.** (2021). Population Dynamics and Economic Growth in Kenya. *Hungarian Statistical Review*, 4(2), 18-33.
5. **Maket, I.J.** (2020). Vector Autoregressive Modeling of Kenyan Economic Uncertainty of the COVID-19 Pandemic on Stock and Oil Market Volatility. *International Journal of Social Science and Economic Research*, 5(11), 3445-3465.

International Conference Presentations

1. **Maket, I. J.** (2023). Socioeconomic and Poverty Vulnerabilities Among Urban Refugees in Kenya During COVID-19 Pandemic. AERC-World Bank Kenya Analytical Program on Forced Displacement Inception Workshop 13-16 June 2023, Mercure Hotel, Nairobi, Kenya.
2. **Maket, I. J.** (2023). Is the Quality of Governance a Precursor for Regional Disparity or Prosperity? The 5th Conference in Cooperation with the European Association for Comparative Economic Studies, 14-15 April 2023, Faculty of Economics and Business Administration, University of Szeged, Hungary.
3. **Maket, I. J.** (2022). Urban Agglomeration and Income Inequality. Is Kuznets Hypothesis Valid for Sub-Saharan Africa? 8th Central European Conference in Regional Science, 4-6 November 2022, Faculty of Human Geography and Planning, Adam Mickiewicz University, Poznań, Poland.
4. **Maket, I. J.** (2022). Estimations of Pooled Panel Dynamic Data model with Regional Time-Space Dependence. EcoMod2022-International Conference on Economic Modeling and Data Science 14-16 September 2022, Ljubljana, Slovenia.

5. **Maket. I. J.** (2022). Exchange Rate Reaction to Economic Uncertainty of Political Instability and COVID-19 Pandemic in Kenya: ARDL Modelling. 7th Business & Entrepreneurial Economics (BEE) Conference, 3-6 June 2022, Student Business Incubator at the Faculty of Economics & Business of the University of Zagreb, Plitvice Lakes, Croatia.
6. **Maket. I. J.** (2021). Reverse Nexus between Pro-Poor Policies and Income Inequality in Kenya. Hungarian Regional Science 19th Annual Meeting 4-5 September 2021 Corvinus University of Budapest, Hungary.