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Identifying Threshold Level of Urbanization for Economic Growth in Developing and Developed Asian Economies

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Abstract

This study scrutinized the relationship between urbanization and economic growth in 11 developed and 23 underdeveloped Asian countries from 1998 to 2021. The study formulated dynamic and static models and employed the Fixed Effect Model and Dynamic GMM for estimation. The results of both static and dynamic models illustrated that urbanization augments growth in developed and developing countries, however, the nature of this relationship is non-linear. The study calculated the threshold level of urbanization and established that after this threshold level, the impact of urbanization on growth reverses. In the static model, developed and developing countries have thresholds of 68.08% and 53.8%, respectively. In the dynamic model, developed and developing countries maintained thresholds of 77.6% and 61.5%, respectively. The study concluded that urbanization and growth share a non-linear association in both developed and developing countries, and this relationship is not contingent upon the type of model or technique being used.

Keywords: *Urbanization, Threshold, Economic Growth, Dynamic GMM, Fixed Effects*

JEL Classification: O1, O18, O47

1. Introduction

Urbanization serves as a key conduit for economic growth, the terms urbanization and economic growth are frequently used together in economic literature (Liang et al., 2023). Hence, numerous studies have consistently demonstrated that for economies to increase their income levels, a significant proportion of the population has to migrate to urban areas. This is due to the fact that cities serve as central hubs for both regional and international networks, thereby facilitating effective channels for economic growth (Ahimah-Agyakwah et al., 2022). Urbanization is the movement of a sizable population from rural to urban regions, or the growth in the number and size of existing cities. While, in economics, it refers to labor migration from agriculture to industry. Redirecting resources from less productive areas (like agriculture) to more productive ones (like industrial) can prove to be a vital factor in boosting growth (Henderson & Becker, 2000). The basic idea is that the negative marginal productivity of labor due to an abundance of agricultural workers drives excess labor elsewhere, primarily in the industrial sector. This results in positive marginal productivity, and consequently contributes to economic growth. Hence, urbanization is regarded not only as a factor influencing economic growth but also as a condition that is adequate to guarantee economic advancement (Gallup et al., 1999).

Urban areas are commonly recognized as the catalysts for fostering growth, as enhanced employment prospects and access to basic facilities encourage workers to move towards the industrial sector and take part in production processes. On the other hand, in rural areas workers do not have access to the basic facilities and work for lower wages, hence their productivity remains low resultantly the output per unit decreases. Therefore, relocation of labor from one towards another sector acts as a driving force for

enhanced productivity (Zhao, 2023). Likewise, Arif (2005) maintained that people migrate to acquire health facilities and improve their standard of living, hence urbanization is one of the vital elements to enjoy the privileges. Rural areas lack basic employment facilities making it hard for individuals to have better living conditions. Likewise, Drinkwater et al. (2004) in their study argued that one significant consequence of migration relates to the economic growth of the region. However, depending on the particulars of the migration process, such as whether it is vertical or horizontal, the effects of migration can have different impacts, either positive or negative. Vertical migration, specifically from rural to urban areas, has been found to have a substantial and positive influence on economic growth. Similarly, the literature approved that urbanization and economic growth are related but the nature of their relationship can be either positive or negative. In this respect, Kuddus et al. (2020) argued that the correlation between urbanization and growth is contingent upon the economic state of a nation. Furthermore, Arouri et al. (2014) found an inverse U-shaped connection between urbanization and growth.

Numerous studies have been conducted on the topic of urbanization and its impact on growth. Nonetheless, there is a lack of agreement regarding whether the correlation between urbanization and growth is favorable or unfavorable. Hence, the discussion remains inconclusive regarding the relationship between the two variables. Thereby, leaving a curvature for future study to examine the nexus and finally put an end to the longstanding argument. In this respect, the current study will be a step forward in this direction by exploring the relationship between urbanization and economic growth for both developing and developed economies. Likewise, insufficient attention has been given to the non-linear correlation between urbanization and economic growth. No study other than one conducted by Nguyen & Nguyen (2017) has attempted to calculate the threshold level of urbanization, however, the scope of the given study remained limited to only seven Asian countries. In this regard, this study will contribute to the literature by not only estimating the threshold level of urbanization but also including developed and developing nations and comparing their findings. The determination of the threshold level of urbanization is crucial for governments, as it signifies the point at which accommodating additional populations within cities becomes challenging. Consequently, having a precise understanding of this threshold level empowers policymakers in developed and developing nations to formulate migration policies that address the transition from rural to urban areas appropriately. Furthermore, this study will demonstrate its significance by providing recommendations for effectively managing urbanization to ensure it remains within a certain limit.

2. Literature Review

2.1 Evidence of Linear Relationship

Ahimah-Agyakwah et al. (2022) investigated the link between growth and urbanization in 30 African countries over the period 1970 to 2019. The results obtained after the application of GMM proved that urbanization surges growth, study argued that more population density in cities enhances productivity and indirectly improves growth. Similarly, Shaban et al. (2022) conducted a state-level study for India covering the years 1971 to 2020, the estimates obtained after bootstrap modeling verified the positive outcome of urbanization on growth. The study maintained that an unbalanced migration trend is followed in the country due to more allocation of resources in the cities. Moreover, Zhao (2023) attempted to explore the economic impact of urbanization in China, the author found urbanization to be beneficial for the economic uplift of a country. The study concluded that urbanization not only increases the per capita income but also reduces the regional disparities. Moreover, due to the availability of skilled workers as a consequence of urbanization, the country became able to increase output. A study by Shabu (2010) identified the existence of a direct relationship between urbanization and growth in developing countries. The author discussed that urbanization contributes to the augmentation of growth, as cities are widely regarded as catalysts for such progress. Likewise, Ou *et al.* (2008) argued that larger Chinese cities experience a growth at a faster pace in comparison to smaller ones, the author further added that urbanization is crucial for its growth-enhancing effect.

Afzal (2009) gathered data for Pakistan's economy over the period 1950 to 2001 to address the consequences of rapid population growth and rural-urban migration on growth. The author claimed that the population growth rate shrinks the net savings and consequently deteriorates the growth. However, urbanization is found to have growth-augmenting results. Moreover, the study concluded that the population growth rate is the driving force behind urbanization. Likewise, comparable results were obtained by Naing (1989) that extension in city sizes and population growth encourages urbanization. The study maintained that more employment and production activities in urban areas promote productivity and indirectly influence growth. Furthermore, Loughran & Schultz (2005) added that a firm's and industrial performance is contingent upon the geographical location. As it is witnessed that firms located in rural areas have to bear additional costs to approach the markets whereas urban firms experience less costs and more profits. The study maintained that high profits earned by urban industry are channeled toward the development of an economy. Haider et al. (2006) agreed that although urbanization poses various challenges related to the accumulation of population, hygiene, and the provision of educational and health facilities, however, it also presents new opportunities for fostering growth in a country. The study suggested that urbanization is essential for fostering innovations and growth. Drinkwater et al. (2004) in a survey of Europe in the year 2000 put forward the notion that labour migration is essential to induce productive activities for nurturing growth.

On the other hand, some studies have found an inverse relation between urbanization and growth, for instance, when examining the link between urbanization and growth in Nigeria from 1971 to 2014, Ali et al. (2022) discovered a detrimental connection. The empirical findings were evaluated using the FMOLS methodology, which revealed that urbanization has an adverse effect on growth. The authors' conclusion suggests that individuals residing in urban areas in Nigeria possess limited financial resources and do not make substantial contributions to economic activities. Likewise, Lewis (2010) by gathering data for Indonesia from 1960 to 2007 analyzed how urbanization and demographic changes influence growth. The study established that changes in work force yield fruitful outcomes for growth whereas urbanization is found to have adverse effects on growth. The author recommended that the government ought to increase spending on urban infrastructure to augment the growth of the country.

Literature also illustrated the existence of a bi-directional relationship between these two factors, for instance, Liang et al. (2023) verified the presence of a two-way relationship between urbanization and growth. The study used data from the Chinese economy for the period 1978 to 2019, the causality test revealed that urbanization is essential to augment the growth. Moreover, it was also revealed that the progress of both components is interdependent. The study conducted by Jacobs et al. (2023) focused on a South African province and examined data from the period 1997 to 2020. The authors employed causality and co-integration tests in their analysis. The empirical evidence has substantiated the presence of a causal link between growth and urbanization. The study concluded that economic growth is associated with an increase in employment opportunities and a corresponding migration of individuals towards urban areas. Likewise, Bakirtas & Akpolat (2018) examined the causality between growth and urbanization by garnering data from 6 emerging countries covering the period from 1971 to 2014. The Granger test indicated that urbanization and growth share a bi-directional relationship.

2.2 Evidence of Non-Linear Relationship

Kamble & Gulabrao (2013) while conducting a study on the Indian economy verified the presence of a non-linear association between urbanization and growth. Results indicated a direct and two-way association between two variables, however, the nature of this link is not straight. The authors discussed that after reaching a certain limit, the effect of urbanization becomes reversed and at that level, it begins to reduce the growth. It was argued that at a higher rate of urbanization, the economy is prone to several challenges related to population density, employment, and health facilities, hence, due to this fact after threshold urbanization tends to decline the growth. Moreover, a study by Ahimah-Agyakwah et al. (2022) for African economies indicated the occurrence of a positive but non-linear association concerning urbanization and growth. Likewise, Quigley (2007) claimed that urbanization at the initial stages proved to help fulfill the labor demand, however, at the later stages it contributed to several

economic and social challenges. The study established that excessive urbanization could be destructive for growth but an appropriate level of urbanization is crucial for growth. Aligning with subsequent studies, Nguyen & Nguyen (2017) in a study of 7 Asian economies over the period 1986 to 2016 found a two-way association between urbanization and growth. The study witnessed a U-shape relationship between both variables, it was discussed that at the initial stage, urbanization has growth growth-improving effect, however after achieving a certain level its effect becomes reversed.

Di Clemente et al. (2021) demonstrated the presence of a non-linear association between two phenomena. The authors posited that during the initial phases of urbanization, a country experiences a substantial acceleration in both its exports and production, leading to a correspondingly rapid growth trajectory. At advanced stages, the export sector has undergone significant development, such that any subsequent increase in urbanization at the moment does not exhibit any further economic transformations. Similarly, Sato & Yamamato (2005) in their study of European and developing countries for the period 1790 to 1990 confirmed the presence of a U-shape relationship. The study also underlined that the association between these two factors is bi-directional as growth also facilitates the process of urbanization. Literature is evident in the existence of both natures of linkages such as positive and negative between urbanization and growth. As Arouri *et al.* (2014) in a study of African countries discussed the growth augmenting effect of urbanization is not always consistent. Hence, the authors maintained that the link between growth and urbanization is complex and is entirely dependent upon the stages of urbanization. For instance, at early stages, an increase in urbanization is perceived to enrich the growth whereas at later stages urbanization extends at an optimal level, any development in urbanization beyond this point would have unfavorable consequences for growth. The past studies confirmed the complexity of association between two variables, hence in order to gain a comprehensive understanding of the urbanization and growth relation, it is imperative to identify the threshold level of urbanization and to analyze how the influence of urbanization on growth changes beyond this threshold. Similarly, Li & Hu (2015) employed regression analysis to examine the link between urbanization and growth during the period from 1978 to 2012 in China. Their findings confirmed a non-linear association between these two variables.

Therefore, there is no consensus among previous scholars as to whether the relationship between urbanization and growth is positive or negative, or whether it is linear or non-linear. As a result, this study makes an effort to resolve this controversy by including both linear and non-linear urbanization-related variables in the econometric model.

3. Data and Methodology

3.1 Theoretical Framework

The theoretical foundations of this study are derived from two models presented by Lewis (1954) and Todaro (1976). Lewis (1954) put forward the model of migration for developing countries, the theory claimed that developing countries consist of surplus labor in the agriculture sector due to which the marginal productivity remains less than zero. Hence, the model suggested that shifting surplus labor from agriculture towards the industrial sector would result in increased productivity in the traditional sector. Moreover, the shortage of labor in the industrial sector would be eliminated, consequently, more employment and production activities would take place. According to the model, urbanization increases industrial growth by eradicating a shortage of workers and results in rapid output production, hence, the model concluded that urbanization indirectly fosters growth. As argued by Henderson & Becker (1998) in developing countries urbanization and growth go hand-in-hand due to the fact that growth arises from the transformation of the agriculture sector into the industrial sector.

The second model serving as the foundational framework is derived from the urbanization model pioneered by Todarro (1976), this model claimed that sectoral movements of labor are regarded as a fundamental economic phenomenon. Moreover, the theory states that workers migrate due to wage differential and in search of improved quality of life, workers anticipate that by moving into the cities

their earnings would be more compared to their current ones. Hence, the difference between anticipated and current earnings encourages people to migrate. Theory illustrated that urbanization and industrialization are like two faces of the same coin that co-exist. In urbanization, factors of production are reallocated from less less-performing or agriculture sector towards the high-performing or industrial sector, in this way, urbanization directly rates the process of industrialization by offering improved productivity and supplying additional production factors.

Todaro's (1976) model of migration primarily focused on modern or developed nations that possess higher levels of industrialization, and operated under the assumption of full employment within the economy. Accordingly, the migration of labor from rural to urban areas, driven by anticipated wage rates, would cause a reduction in wage rate disparities as a consequence of market forces of supply and demand. It is commonly posited that individuals possessing advanced skills and education are likely to encounter a diverse range of employment opportunities. Conversely, individuals lacking specialized skills often face a limited set of options, typically consisting of either engaging in agricultural work or relocating to urban areas in search of alternative employment prospects. In the context of developed countries, there exist numerous opportunities, resulting in a relatively small proportion of the labor force experiencing unemployment. Conversely, in developing nations with limited opportunities, a larger percentage of the population could face unemployment. In particular, the prevalence of this phenomenon in developing nations would cause a significant portion of migrants to experience unemployment.

Before shifting from one to another sector, laborers need to assess the potential risks of unemployment and underemployment that are linked to migration, as well as the disparities in wage rates (Todaro, 1976). Therefore, it is evident from the preceding discussion that unplanned urbanization, particularly in developing nations, would give rise to issues such as shortages of fundamental necessities and unemployment. Furthermore, due to the severe consequences of excessive urbanization on macroeconomic determinants, the growth rate would also decline. In addition to theoretical models, empirical studies have also provided evidence that excessive urbanization is not conducive to economic growth. For instance, Arouri et al. (2014) carried out a study on African economies and witnessed an inverse U-shaped connection between urbanization and growth. Likewise, Nguyen & Nguyen (2017) also found that the relationship between these factors is non-linear, suggesting that after attaining a threshold level the growth-enriching role of urbanization becomes reversed.

3.2 Empirical Model

The empirical model formulated in this study is given by the underneath equation,

$$GDPC_{it} = \gamma_0 + \gamma_1 UR_{it} + \gamma_2 UR^2{}_{it} + \gamma_3 INV_{it} + \gamma_4 POP_{it} + \gamma_5 TRADE_{it} + \mu_{it} \quad (1)$$

Where γs are. parameters, UR shows urbanization measured as urban population as % of total population, INV illustrates Investment measured by Gross Fixed Capital, GDPC presents Gross Domestic Product Per Capita, POP depicts % of the population not in the labor force, UR^2 is Square of Urbanization, while TRADE variable is measured as trade as % of GDP. The data for all these variables is gathered from World Development Indicators.

i = 11 for developed countries model and 23 for developing countries

t = the year 1998 to the year 2021

Panel data is considered to be more informative compared to cross-sectional and time series data due to its ability to capture dynamic relationships as well as causalities across different units over time. However, it is challenging to employ pooled ordinary least squares (OLS) in this study, as the heterogeneity might exist across cross sections making pooled OLS an unsuitable technique. Moreover, Hsiao (2007) highlighted that OLS estimators become biased in the presence of heteroscedasticity, hence, this study cannot rely on OLS for estimation. Therefore, in this study both static and dynamic model is developed, the static model is estimated with the Fixed Effect (FE) Model while the dynamic

model is estimated with a two-step Generalized Method of Moment (GMM). The static model that is designed in this study is written as:

$$GDPC_{it} = \alpha_0 + \alpha_1 UR_{it} + \alpha_2 UR^2{}_{it} + \alpha_3 INV_{it} + \alpha_4 POP_{it} + \alpha_5 TRADE_{it} + \mu_{it} \quad (2)$$

The estimation of equation (2) will be conducted using a panel regression model. The decision to apply either a Fixed Effect (FE) or Random Effect (RE) model is contingent upon the results of the Hausman test. In the FE model, individual-specific effects are correlated with independent variables while in the RE model, individual-specific effects are uncorrelated with regressors. When the assumptions of FE are met, the fixed effect model produces more efficient outcomes in comparison to the random effects model, and vice versa. The Hausman test is employed as a means of selecting between two estimation techniques, the null hypothesis of the test posits that random effect is the most appropriate model. While the alternative hypothesis recommends the utilization of fixed fixed-effect model. In this study the null hypothesis. The findings derived from the implementation of the Hausman test in this study suggest that the fixed effect model is more suitable than the random effects model. Consequently, the aforementioned equation will be estimated using the fixed effect model.

According to a study conducted by Ahimah-Agyakwah et al. (2022), it was suggested that the growth rate of the current year is influenced by the growth rate of the previous year. Therefore, utilizing a static model and disregarding the past values of the growth rate in the model could end up in the issue of the model under specification and yield biased outcomes. Moreover, previous researchers [Ahimah-Agyakwah et al. (2022), Di Clemente et al. (2021), Nguyen & Nguyen (2017), and Arouri et al. (2014)] have demonstrated the presence of a bi-directional relationship between growth and urbanization, thereby necessitating the concern of endogeneity. Therefore, as a means of ensuring the reliability of the findings, this study incorporates a dynamic model that includes a lagged dependent variable. Furthermore, to address the problem of endogeneity arising from the lagged variable and the potential for two-way causality, the model will be estimated using dynamic GMM. The dynamic model is expressed in the following form:

$$GDPC_{it} = \beta_0 + \beta_1 GDPC_{it-1} + \beta_2 UR_{it} + \beta_3 UR^2{}_{it} + \beta_4 INV_{it} + \beta_5 POP_{it} + \beta_6 TRADE_{it} + \mu_{it} \quad (3)$$

In the above equation, the lag of the dependent variable is added as an independent variable, likewise, the lag of independent variables and dummy variables of years are used as instruments. Roodman (2006) argued that GMM is a flexible estimation technique as it permits the inclusion of not only internal but also external instruments as well. According to Roodman (2006), the GMM is considered a flexible estimation technique due to its ability to incorporate both internal and external instruments. In the dynamic model, the potential for endogeneity arises due to the inclusion of a lagged dependent variable as an independent variable. The GMM estimation procedure developed by Arellano & Bond (1991) and extended by Arellano & Bover (1995) is employed to address these concerns. The GMM possesses the advantage of effectively addressing the issue of unobserved heterogeneity and mitigating the problem of endogeneity arising from explanatory variables in the estimation of panel data. Moreover, the application of GMM offers a strategy to overcome the substantial difficulties linked to sample selection, measurement, and simultaneity (Arellano & Bond, 1991). According to Roodman (2009), the two-stage GMM approach exhibits lower standard error and bias compared to the one-stage GMM method, therefore, considering the numerous benefits of the two-step GMM, this study employs the same methodology to estimate a dynamic model.

4. Finding and Results

4.1 Descriptive Statistics

Table 1. Descriptive Statics

	Developed Countries' Sample				Developing Countries' Sample			
Variable	Mean	Standard Deviation	Max	Min	Mean	Standard Deviation	Max	Min
UR^2_{it}	6858.4	2692.25	10000	1018.63	3391.95	2358.10	8277.17	128.8
UR_{it}	80.82	18.08	100	31.91	53.93	21.99	90.97	11.35
POP_{it}	9.96	5.18	27.47	2.07	5.47	2.25	14.42	2.13
$TRADE_{it}$	136.35	109.26	442.62	18.34	76.12	37.13	220.40	21.92
$LnGDPPC_{it}$	9.75	1.103	11.44	6.51	7.82	1.157	10.35	5.32
$LnINV_{it}$	24.03	2.47	29.28	20.16	23.47	1.97	27.39	18.71

Source: Author's Calculation

Mean urbanization in developed countries is 80.8 units, and its minimum and maximum values are 32 and 100 units respectively. Whereas in developing countries, urbanization has a mean value of 53.9 units and maintains the minimum and maximum value of 11 and 90 units respectively. Likewise, the deviations of 21.9 units from the mean are greater in the developing country sample compared to 18 units of deviations in a developed sample. The data illustrated that there is a huge gap between urbanization levels in both sample countries. Moreover, the mean value of GDP remained at 9.75 and 10.35 units in developed and developing countries respectively. Similarly, a huge difference between the mean value of TRADE is witnessed in both samples, as it maintained values of 136.35 and 76.12 units respectively in developed and developing countries.

4.2 Panel Data Regression Results

In order to examine the correlation between urbanization and growth, this study estimated two models, denoted Model 1 and Model 2 as described in the methodology section. The utilization of the Hausman test is necessary to identify the most appropriate techniques for estimating static models. The Hausman test is employed to evaluate the null hypothesis that the random effect model is an appropriate fit against the alternative that the fixed effect model is suitable. The outcomes of static model (1) for developed countries and developing countries are presented in columns 2 and 3 of underneath table respectively. The results demonstrate that the p-value for both models is statistically significant, indicating that the null hypothesis, which suggests the use of random effects, is rejected. Hence, the estimation of equation (1) is conducted through the utilization of fixed effects.

Table 2. Results of Impact of Urbanization on Economic Growth

Panel A: Estimation Results of FE Model: Dependent Variable LnGDP

Variables	Model 1	Model 2
UR_{it}	0.099***	0.017***
	(0.000)	(0.000)
UR^2_{it}	-0.0007***	-0.0002***
	(0.000)	(0.0000)

POP_{it}	-0.061***	-0.041***
	(0.000)	(0.000)
$TRADE_{it}$	0.001	0.002***
	(1.53)	(0.000)
$LnINV_{it}$	0.055***	0.732***
	(0.000)	(0.000)
Constant	7.220***	9.784***
	(0.000)	(0.000)
Panel B: Diagnostic Tests		
Hausman Test		
Chi Square	32.93	Chi Square 32.93
P-value	0.000	P-value 0.000

*Note: ***, **, and * shows 1%, 5%, and 10% level of significance.*

Source: *Author's Calculation*

The findings of both Model I and Model II align with the anticipated results. Additionally, in Model II, all of the independent variables demonstrate statistical significance. In contrast, the coefficient of trade in Model I was found to be statistically insignificant. The findings from both Model I and Model II demonstrate a high degree of similarity, indicating that the association between urbanization and economic growth is not contingent upon the economic status of a nation. In both of the models, urbanization turned out to be positive demonstrating a growth fostering effect, moreover, the co-efficient remained significant in both models. Results are in line with previous related studies on the urbanization and growth literature [Jacobs et al. (2023), Zhao (2023), Liang et al. (2023), Shaban et al. (2022), Di Clemente et al. (2021), and Arouri et al. (2014)]. Results confirmed that urbanization is crucial to enriching the growth in both developed and developing countries.

Conversely, the square of urbanization exhibited a negative coefficient in both models, suggesting the presence of a nonlinear relationship. Furthermore, it has been demonstrated that this nonlinearity also confirms the existence of an inverted U-shaped relationship between urbanization and growth. The empirical findings align with previous literature that posited that excessive urbanization beyond a certain threshold has detrimental effects on economic growth. For instance, a study by Rakodi (2004) found that a persistent upturn in urbanization deteriorates growth. Likewise, Nguyen & Nguyen (2017) conducted a study that established the existence of a nonlinear connection and determined a threshold level of urbanization for seven countries, beyond which the effects of urbanization exhibit a reversed pattern. In both models, the sign urbanization square's coefficient is negative and significant at a 1% level of significance, demonstrating that the impact of urbanization reverts from positive to negative after a certain level as cities have a finite capacity to accommodate people and provide essential amenities. So threshold level of urbanization after which its impact reversed is being calculated below. Therefore, the empirical results of this study align with previous scholarly works [Ahimah-Agyakwah et al. (2022), Di Clemente et al. (2021) and Kamble & Gulabrao (2013)] which indicate that the link between urbanization and growth is intricate and exhibits non-linear patterns. This implies that the influence of urbanization on growth strengthens initially, then urbanization attains a threshold level and subsequently diminishes once a specific degree of urbanization is reached. Hence, it is essential to compute the threshold level of urbanization that redefines the growth relation, in the subsequent section the threshold level for both developed and developing countries is calculated.

Only a contrasting result is obtained for the trade variable, as in Model I trade variable illustrates growth enhancing effect for developed countries, whereas in Model II the given variable remained insignificant. The research conducted by Doğan et al. (2023) provides empirical evidence that aligns with the conclusions of Model I, which posits that trade stimulates growth in developed nations. While the findings for developing countries contradict the conclusions reached by [Nurjannah et al. (2023) and Elhakim & Ali (2023)] that trade promotes growth in these countries.

The findings indicate that investment exerts a significant positive influence on economic growth in both Models. Studies carried out by [Kanu & Ozurumba (2014) and Jhingan (2006)] approve the outcomes of the current study. The co-efficient of population not in the labor force variable appears with a negative sign. In this regard, Nguyen & Nguyen (2017) observed a detrimental effect of population on growth, specifically concerning individuals who are not part of the labor force.

4.3 Computation of Threshold Level of Urbanization

In order to compute the threshold level of urbanization for economic growth following procedure is being used.

$$GDPC_{it} = \beta_0 + \beta_1 UR_{it} + \beta_2 UR^2{}_{it} + \pi_1 INV_{it} + \pi_2 POP_{it} + \pi_3 TRADE_{it} + \mu_{it} \quad (4)$$

By applying the Ceteris paribus condition on equation (4) and taking derivative w.r.t Urbanization we get.

$$\frac{d(GDPC_{it})}{d(UR_{it})} = \beta_1 + 2\beta_2 UR_{it} \quad (5)$$

Now apply the first-order condition for maximization on the above equation by putting equals to zero.

$$0 = \beta_1 + 2(-\beta_2) UR_{it} \quad (6)$$

$$2\beta_2 UR_{it} = \beta_1 \quad (7)$$

$$UR_{it} = \frac{\beta_1}{2\beta_2} \quad (8)$$

The formula presented in equation (8) will be used to compute urbanization in developed as well as developing countries.

4.4 Threshold Level of Urbanization in Developed Countries

In order to compute the threshold level of urbanization for economic growth following procedure is being used.

$$LnGDPC_{it} = -7.220375 + 0.0999061 * UR_{it} - 0.0007337 * UR^2{}_{it} + 0.5509075 * LNINV_{it} - 0.0610565 * POP_{it} + 0.0005887 * TRADE_{it} + \mu_{it} \quad (9)$$

Now putting the values of Betas in equation (6) we get,

$$0 = 0.0999061 - 2(0.0007337) UR_{it} \quad (10)$$

$$2(0.0007337) UR_{it} = 0.0999061 \quad (11)$$

$$UR_{it} = \frac{0.0999061}{2(0.0007337)} \quad (12)$$

$$UR_{it} = \frac{0.0999061}{0.0014674} = 68.08375\ \% \quad (13)$$

Hence threshold level of urbanization for developed countries is 68.08% a sign that the urbanization coefficient is positive and a sign that the urbanization square coefficient is negative which shows that initially, urbanization has a positive impact on economic growth after a certain limit its impact reverts to negative.

4.5 Threshold Level of Urbanization in Developing Countries

Model for developing countries after attaining estimated parameters can be written as,

$$LnGDPC_{it} = -9.784804 + 0.0166311 * UR_{it} - 0.0001544 * UR^2{}_{it} + 0.7321524 * LNINV_{it} - 0.0408015 * POP_{it} + 0.0022928 * TRADE_{it} + \mu_{it} \quad (14)$$

Putting the value of parameters in equation (6) to compute the threshold level of urbanization for developing countries.

$$0 = 0.0166311 - 2(0.0001544)UR_{it} \quad (15)$$

$$2(0.0001544)UR_{it} = 0.0166311 \quad (16)$$

$$UR_{it} = \frac{0.0166311}{2(0.0001544)} \quad (17)$$

$$UR_{it} = \frac{0.0166311}{0.0003088} = 53.85\% \quad (18)$$

Hence threshold level of urbanization for developing countries is 53.8%

4.6 Robustness Check with Dynamic Model

Results of the dynamic model are reported in the table underneath, the panel B of the table illustrates the diagnostic test results of dynamic GMM. The results confirmed the non-existence of autocorrelation of second order for both samples. Moreover, the Hansen test established that the instruments used in the study were valid for both samples.

Table 3. Results of Impact of Urbanization on Economic Growth

Panel A: Results of Dynamic GMM: Dependent Variable LnGDP

Variables	Model 1	Model 2
UR_{it}	0.043***	0.324**
	(0.008)	(0.017)
UR^2_{it}	-0.0003**	-0.002***
	(0.015)	(0.014)
POP_{it}	-0.136***	-0.073
	(0.000)	(0.322)
$TRADE_{it}$	0.007***	0.0091**
	(0.000)	(0.041)
$LnINV_{it}$	0.096***	0.527
	(0.000)	(0.171)
$LnGDP_{it-1}$	0.068***	0.536**
	(0.000)	(0.030)
Constant	-2.211***	-20.592**
	(0.000)	(0.030)

Panel B: Diagnostic Tests		
AR (2)	-1.46 (0.144)	-0.65 (0.514)
J stat	18.46 (0.767)	19.89 (0.786)

*Note: ***, **, and * shows 1%, 5%, and 10% level of significance.*

Source: *Author's Calculation*

The growth rate of the current year is determined by that of previous years, the results also indicated that lagged growth augments the current rate of growth in both samples of countries, this result is significant in both samples of countries.

The dynamic model also confirmed that urbanization positively influences the growth in both sets of countries, while, urbanization square is negatively associated with the growth. Moreover, the formula illustrated in equation (8) is utilized to determine the threshold urbanization level. The threshold level for developing countries appeared as 61.55%, while for developed countries it turned out to be 77.66%. The threshold urbanization is observed to be more pronounced in developed countries due to their capacity to accommodate larger urban populations and offer sufficient amenities and infrastructure. In contrast, developing nations typically demonstrate a higher reliance on agriculture and other activities centered in rural areas. Furthermore, these nations possess a constrained urban capacity to accommodate a growing population and resources for a larger population. Therefore, regardless of whether a static or dynamic model is employed, the relationship between urbanization and growth consistently exhibits a non-linear pattern, as indicated by the negative value of UR^2 in both types of models. The size of the coefficient in the dynamic and static models is the only observed difference, resulting in a higher threshold level of urbanization in the dynamic model.

In both the static and dynamic models, the coefficients of all variables exhibit consistent signs. Specifically, the findings indicate that investment and trade openness have a positive impact on economic growth in both samples. Furthermore, the coefficient representing the proportion of the population not engaged in the labor force is found to have unfavorable consequences for economic growth.

5. Conclusion and Policy Implications

The study aimed to explore the relationship between urbanization and economic growth in both developed and developing Asian countries from year 1996 to 2018. The threshold level of urbanization is calculated for both developing countries and developed countries. The Hausman test is employed to choose between Fixed and Random effects for estimating the static model, the test predicted the utilization of the Fixed Effect Model. To ensure the reliability of the findings, a dynamic model is constructed, and the two-step GMM is used for estimating the parameters of the dynamic model. The findings derived from both the static and dynamic models demonstrate a clear and consistent pattern, indicating that urbanization has a growth-enriching effect in both developed and developing nations. Furthermore, the coefficient of UR^2 exhibited a negative value in both the dynamic and static models for both developed and developing countries suggesting that the relation between urbanization and growth is non-linear in both sets of countries and that this non-linearity is not dependent on the specific estimation technique employed.

Using a static model, the study found that the threshold urbanization in developed countries is 68.08% while in developing countries it is 53.08 percent. In contrast, after applying the dynamic model, the threshold appeared to be 77.66% and 61.55% for developed and developing countries respectively. The study concludes that developed countries have higher levels of threshold urbanization compared to developing countries, regardless of the specific technique applied. This phenomenon can be attributed to the greater availability of resources in developed countries, which enables them to accommodate the

influx of urban population and offer essential amenities. In addition, developed nations offer a broader spectrum of employment prospects, consequently leading to a rapid expansion in economic growth. On the other hand, developing nations encounter difficulties in accommodating the significant rise in urban population and providing access to vital services due to their limited capacity. Moreover, investment and trade variables illustrated growth-enhancing effects for both sets of countries, while population growth is found to have a detrimental effect on growth in developed as well as developing countries.

Based on empirical findings, the present study makes fewer recommendations, firstly, it is suggested that developing countries implement measures to facilitate a more seamless transition from rural to urban areas, as they have not yet reached the required level of urbanization. The significance of this matter lies in the potential of urbanization to enhance the trajectory of economic growth, as evidenced by the findings of the current investigation. Therefore, the public sector must offer infrastructure and essential amenities in urban regions as a means to encourage the migration of labor from the agricultural towards the industrial sector. Secondly, developed economies need to address the issue of wage rate differentials as a significant proportion of the population of such countries resides in urban areas, where the level of urbanization exceeds the established threshold. In this context, the public sector must assume a proactive role in ensuring equitable access to amenities and opportunities for workers in rural areas, similar to those provided to urban residents. This step will prove to be essential in maintaining a harmonious equilibrium between these two sectors. Lastly, countries characterized by a higher degree of urbanization have to formulate policies aimed at directing the labor force's capabilities towards more productive endeavors, such as contributing to economic growth, promoting employment opportunities, and fostering environmental sustainability, rather than encouraging the rapid pace of urbanization.

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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