IDENTIFYING THRESHOLD LEVEL OF URBANIZATION FOR ECONOMIC GROWTH: A CROSS COUNTRY ANALYSIS

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PIDE2017FMPHILECO20

Department of Economics

Pakistan Institute of Development Economics

Islamabad

2019

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CERTIFICATE

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Acknowledgement

In the name of Allah, the Most Gracious and the Most Merciful Alhamdulillah, First praise is to Allah, the Almighty, on whom ultimately we depend for sustenance and guidance. Second, my sincere appreciation goes to my supervisor Dr Attiya Y Javed, whose guidance, careful reading and constructive comments was valuable. His timely and efficient contribution helped me shape this into its final form and I express my sincerest appreciation for his assistance in any way that I may have asked.

I would like to express my appreciation to the Dean Department of economics and also to the head of department and coordinator of economics department. My acknowledgement also goes to all of teachers and staff for their co-operations.

Thirdly, my deepest gratitude goes to my beloved parents I would like to thanks my parents, my family and friends for their support and for their endless love, prayers and encouragement To those who indirectly contributed in this research, your kindness means a lot to me. Thank you very much.

Abstract

Urbanization and economic growth are affiliated process with each other. These two phenomenon's' goes side by side. Any economy cannot raise its income level until sufficient share of population shift to cities. Because cities are considered to be engines of growth (Sarah, 2016). Urbanization is important factor in economic growth of economy (Bairoch, 1988). Urbanization not only caused by economic growth it also a sufficient condition for economic growth (Gallup *et al.*, 1999). Urbanization is important for economic growth this not important that every resident of city get benefits. Gulabrao, in 2013 argued that there is nonlinear relationship after the certain level of population in urban areas its effect changes to negative. Everything has some type of upper limit. Similarly cities have some limit of absorbing population after that public sector have to face the challenges like shortage of jobs, housing, etc. hence in this study threshold level of urbanization for economic growth is computed in order to introduce polices which will maintain the population cities around the certain level. This study will check the impact of urbanization on economic growth and also compute the threshold level of urbanization for economic growth after which relationship gets reversed.in this study in order to choose appropriate estimation method which suits the data, the Hausman test(Hausman.s J.A, (1978). will be used to choose between two models random effect and fixed effect in order to estimate static panel data model. In order to estimate dynamic panel data D-GMM of Arellano & Bond (1991) will be used. Because AR (1) Panel data is introduced one lag of dependent variable is used in model as explanatory variable and it violates the condition of exogeneity.

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List of Abbreviations

AR	Auto regressive
D-GMM	Dynamic Generalized Method of Moments
FE	Fixed Effect
GDP	Gross domestic product
GCF	Gross capital formation
POP	Population not in labor force
RE	Random Effect
UR	Urbanization
UR^2	Square of Urbanization
WDI	World development index

Chapter 1

Introduction

1.1 Introduction:

Urbanization and economic growth are common jargon in economic literature and are often discussed in unison given, that the former is an important conduit for the latter (Bairoch, 1988). Therefore, it has been proven time and again, that for economies to raise their income levels a sufficient share of population needs to shift toward cities considering that they are hub of regional as well as international connections and thereby, an effective medium of growth (Sarah, 2016). In literary term, urbanization refers to the shift of a considerable portion of population from rural to urban areas or increase in the number and size of cities. While, in economic context it pertains to the shift of labor from agricultural to the industrial sector. The essence behind it, is that, there exists surplus labor in agricultural sector resulting in negative marginal productivity of labor, hence forcing the surplus labor to move out and settle in industrial sector. This results in positive marginal productivity which is symbolic of higher productivity and in turn a positive contributor to the growth in economy. Therefore, urbanization is not only considered a determinant of economic growth but also a sufficient condition to ensure economic progress (Gallup *et al.*, 1999).

In the recent past, globally, a considerable increase has been observed in the urban population. The statistics are quite astounding, 1950s had world urban population of 16% which doubled to 30% in 1985. According to the most recent United Nations report there is more world urban population than the rural one. As of 2018, 55% of population resides in urban areas and this number is suggested to rise to a staggering 68% by 2050. Though, of present, Developed European Economies are the most

urbanized. While, America is at the top with 82% of its population living in urban areas and Africa is least urbanized with only 43% of urban population. However, half of the population in Asia lives in urban areas which is of concern given that 90% of world's rural population belongs to Asia and Africa. Moreover, in the coming years there is prediction of increase in the urban population particularly in less developed and developing economies. Therefore, in order to ensure economic development economies should consider sustainable urbanization and adopt necessary measures to control the growth of urban population (UN Report).

Urbanization is important for economic growth but this is not important that every resident of city gets benefit. Cities are considered to be engine of growth but according to evidence one of seven people in city is living in poverty. Poor or low income individuals are unable to get basic needs in urban areas because cost of living in cities is far higher than rural areas. There are many drivers of urbanization both social and economic. Most of urbanization occurs in search of better jobs and facilities of life like education, health etc. As in rural areas and agriculture sector wages are very low. Moreover, rural areas lack basic facilities of life like healthcare and education facilities. However, economic growth increases with the reallocation of resources from sub-optimal to their optimal utilization (shift of labor from agriculture sector to industrial one). Strauss (1998), is of the view that good health of nation (in terms of labor force) is initial condition for achieving development.

Urbanization and economic growth are closely related concepts. Many previous studies witnessed the significant relationship between them. Some of these studies showed direct relationship and others showed negative relationship. However, impact of urbanization on economic growth relies on the economic conditions of the economy. Consequently, in case of developing nation urbanization causes economic

growth and in case of developed nations this relationship get reversed when nations' production changes from labor intensive to capital intensive (Daniel Yet Fhang Lo, 2010). Hence, in this study impact of urbanization on economic growth is determined together with computation of threshold level of urbanization, for both developing and the developed countries.

1.2 Research Gap:

There are several studies done on the issues of urbanization and economic growth. Most of studies employs times series data for particular area or country while some others use panel data. However, these studies find causal relationship between urbanization and economic growth. No study has tried to find threshold level of urbanization for economic growth other than the study of HM and LD Nguyen (2017) but this study finds threshold level for only seven countries of Asia.

Previous related studies have investigated the causal relationship between urbanization and economic growth. Where, some studies witnessed positive relationship between urbanization and economic growth and others claim that there exists nonlinear (inverted U-shaped) relation the two variables.

Hence this study will check the impact of urbanization on economic growth and also compute the threshold level of urbanization for economic growth for developing countries and developed countries. Determining the Threshold level of urbanization will help economies to maintain the level of urbanization around that certain level through implementation of appropriate policies. Moreover, urbanization at optimal level will enhance the economic growth.

1.3 Significance of Study:

In abundance can be found the studies that have explored the phenomena of urbanization and economic development. Despite that, 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 long-standing argument. In this respect, 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. Additionally, threshold level of urbanization for developing countries as well as developed countries will be determined. Threshold is the level of urbanization after which the impact of urbanization changes to negative as everything has some type of upper limit. Similarly, cities have some limit of absorbing population after that public sector has to face challenges like shortage of jobs, housing, etc. Hence, it is important to check the threshold level of urbanization for economic growth in order to introduce polices which will maintain the population of cities around a certain level. Therefore, main contribution of the study is to find the threshold level of urbanization for economic growth of developed and developing countries. This will enable the public sector to introduce polices which will maintain the level of urbanization around that certain level.

1.4 Objectives of the Study: -

This study has following objectives:

- To examine the impact of urbanization on economic growth for both developing and the developed countries.
- To determine the threshold level of urbanization for economic growth of developed as well as developing economies.

1.5 Research Questions: -

- What is the relationship between urbanization and economic growth?

- What is the threshold level of urbanization which guarantees economic growth?

1.6 Organization of study:

Study has been organized in 6 chapters. Where, Chapter 1 consists of introduction to the topics under consideration and Chapter 2 contains review of both empirical and theoretical literature. While, Chapter 3 gives brief overview of urbanization trend in the world followed by conceptual framework and methodology including the econometrics techniques adopted for the current study, in Chapter 4. Finally, Chapter 5 contains results together with their interpretation and Chapter 6 provides conclusion of the paper as well as some suggestions for future study and policy recommendations.

Chapter 2

Literature Review

2.1 Literature Review:

This section provides review of past studies on the topic of urbanization. There are numerous studies on the issues of urbanization and economic growth for varying sample and sample size.

2.2 Theoretical evidence:

Previous work on the issue of urbanization is related to Lewis (1954) and Fei rains (1961). They recognize that urbanization mainly enhances the difference in factors of productivity and wage rate differentials. Mostly, labor move toward the areas where rate of return is higher.

Coordination between microeconomic theory of movement and general equilibrium is found in the papers of Tadaro, (1969) and Harris & Tadaro (1970). They argued that reallocation decision of economic agent depends on the basis of wage differential prevailing between rural wage rate and wage rate in industrial sector. According to the theory, there is surplus labor in agriculture sector and marginal productivity of labor is less than zero. So difference in rate of return in agriculture sector and industrial sector is the major cause of shift of labor toward cities. Later on, theory is modified by many other researchers including Stiglitz (1974); Cordon & Findlay (1975); Fields (1975); Khan (1979, 1980) and Cole & Sanders (1985).

Economic development is phenomenon of better economic, social as well as political condition of nation. In other words, economic development refers to change in the standard of living, better food, health facilities and infrastructure etc. Many economists have made attempts at defining economic development. Todarro (1969)

gives definition of economic development as improvement in the nations standard of living and reallocation of resources to sector where the productivity increases, transformation of society into modern (industrialization). While, Dudley Sears defines economic development as depletion and weeding out of problems like poverty, unequal distribution of wealth and unemployment etc. within the economy. Economic growth and economic development are the two faces of one process. An economist Amartya Sen, noble prize winner defined "development as freedom" and argues that economic growth is the one dimension of phenomenon of economic development. Whereas, in Lewis' definition of economic growth means per capita increment in the output.

Bairoch (1988) claims that urbanization plays important role in accelerating the pace of economic growth. Where, urbanization refers to shift of population from rural to urban sectors. While, a Sociologist Kingsley Davis gives definition of urbanization as the migration of population from villages to cities and it includes both increase in size of cities and urban population. This phenomenon is closely related to industrialization and modernization. On the other hand, Friedmann (2006) claims that economic development is the basic reason for boosting industrialization along with increase in urbanization but urbanization also plays a vital role in economic growth.

2.3 Empirical Evidence:

This section review past studies on the issue of urbanization. There are numerous studies on the issue of urbanization on economic growth all over the world.

2.3.1 Relationship between Urbanization and economic growth:

Jacques and cedent (1982) found that industrialization takes place due to movement of population from rural area to the urban area. The study is based on United Nations

(UN) Global Review of Human Settlement 1976 on urban-rural population for developing countries. The study used the methodology to build up the relationship between the annual growths rates of per-capita GDP and rural out-migration rate.

Henderson (2003) and many other studies found direct association in between these two phenomenon of urbanization and economic growth. Wo *et al* (2001) conduct study on impact of urbanization on economic development and found significant positive relationship in between urbanization and economic development for developing countries. This paper further claims that with increase in trend of urbanization more land is used in building houses industries etc. Urbanization will have inverse impact on agricultural sector because agricultural land is decreased.

Drinkwater et al. (2003) presented a survey about the migration of labor and its effect on economic growth in Europe for the year 2000. The study explains three possible effects of migration. The first one is that there may be inverse effect of migration on wage rate and employment level of domestic country. The second effect is that the migration has increased the level of skill of labor but this is long term phenomena. The third effect of migration is on economic growth of the region. These effects may be positive or negative depending upon the nature of migration (either vertical or horizontal). If the migration is vertical (rural to urban) it has positive and significant impact on economic growth.

Arif (2005) argued that urbanization mostly enhanced in the search of better quality of jobs, food, education and health facilities which one can found in cities only. Henderson in 1998 found that economic growth can be enhanced by the reallocation of factors of production from low performing sectors to the high performing sector. in other words shift of labor from agriculture sector to industrial sector. Shabu (2010)

concluded in his study that there is direct relationship in between urbanization and economic growth for developing countries. He further argued that urbanization leads to enhance the growth in economy because cities were considered to be engines of growth. Similarly Naing Oa (1989) conduct a study on urbanization and economic development and concluded that phenomenon of urbanization occurs due to increase in the size of cities and urban population. He further stats that urbanization increases due to economic growth and more employment opportunity in urban sector. Similarly several studies witness positive impact of urbanization on economic development in developing countries.

Zhen *et al.* (2008) conducted study in china on the issue of urbanization on economic development and found that growth is faster in larger cities than smaller ones and further he stats that urbanization has positive impact on economic development. Dharmendra *et al.* (2010) conducted a research on the issue of urbanization on economic development for the Asian countries by selecting sample of 5 developing countries of south Asia. In this study they concluded that urbanization is positively related with growth and play key role in enhancing the growth but developing countries like Pakistan, Nepal, India, Bangladesh and Srilanka will be facing many problems of shortage in urban areas in near future due to rapid increase in urbanization because everything has certain upper limit in this world so government of these countries need to implement policies through which they can keep balance in between rural and urban population. Schultz & Loughram (2005) claim in their paper that performance of firms and industry can be affected by the geographical location. As firms located in urban areas earns more than firms located in rural areas because rural firms need to bear some extra costs in order to reach the market.

Lewis (2010) analyzed the impact of urbanization and demographic changes on economic growth for Indonesia from 1960 to 2007. The study examined that economic growth is positively associated with rate of change of working age population and level of urbanization but negatively related with the rate of urbanization. The study concludes that government should spend more on urban infrastructure in order to increase economic development in the country.

Haider (2006) discussed outline of urban challenges would be faced by Pakistan in next 25 years. The study projected that the urban population of Pakistan will become 50 percent of the total population in year 2030. Although urbanization exerts new challenges of accumulation, hygiene, educational and health facilities for government but leads to create new opportunities to increase economic growth in Pakistan. The study concludes that urbanization is key factor for economic growth, innovation and development.

Ying (2011) analyzed the relationship between urbanization and economic growth in China. The data is selected from China Statistical Year Book 2010 for year 1985 to 2009. The study determined co-integration between urbanization and economic growth. The study used Co- integration test and Error Correlation Model used for estimation. The main variables are urbanization, Gross Domestic Product, GDP of the primary industry, GDP of the secondary industry and GDP of the tertiary industry. First the study analyzes the impact of urbanization on overall GDP, second GDP of primary industry, third GDP of secondary industry and the fourth GDP of tertiary industry. The results show that urbanization and economic growth are long run balanced relationship, whereas in short run one percent increase in urbanization lead to increase GDP by 4.83%. The study concludes that there is one way causality

relationship between urbanization, and GDP of primary and secondary industry, whereas both-way causality between urbanization and GDP of tertiary industry.

Urbanization can be helpful in poverty reduction because in urban areas there are a lot of opportunities to run own business. This is the main reason for the attraction of population towards urban areas. According to the law of P. Clark's with rise in per capita income reallocation of labor force from agriculture sector to manufacturing and other sector also rises. Hence nature of relationship in between urbanization and industrialization depends on the nation of economic stat of country. Similarly, D.Y. Fhang Lu (2010) check the causal relationship in between urbanization and economic growth for 28 countries for time period of 50 years from1950 to 2000 and found results in line with theories and findings earlier. There exist co integration (long run relationship) in between urbanization and economic growth. Relationship in urbanization and economic growth depends on the state of economic condition of country. As for developing economies urbanization granger causes economic indicators whereas in the case of developed countries it gives opposite results because at initial stages country follows labor intensive techniques of production but in later stage when status of country changes to developed will also shift production technique to capital intensive. Hochman (1996) argues that firms can be more profitable by locating in areas where more population is residing because there transportation and advertising cost for jobs new innovation etc. will be reduced. Their supplies can easily accessible to markets. In other sense urbanization results in efficient provision of basic facilities like health, education, food, jobs, infrastructure and law enforcement etc. similarly another researcher David Segal (1976) conclude that cities with more population is more production than less populated cities. Hence these studies witnessed urbanization is positively associated with economic growth.

2.3.2 Evidence of Negative relationship in between Urbanization and Economic growth

Some of studies also witnessed the negative relationship in between urbanization and economic growth as everything has some certain upper limit similarly cities have also upper limit after which cities can have negative impact on economic growth. Because after the increase of population after optimal limit of cities. Urban population can create many challenges of shortage for the government. It is the responsibility of government to provide housing, health, food and employment facilities to public. Industrial and manufacturing sector has some finite capacity to absorb the labor. As far labor force is absorbed in the industrial sector cities can enhance economic growth because more employment leads to more demand in market which will cause production to increase this process will create more jobs it will attract more people towards cities. this will reduce the size of agriculture sector. share of agriculture sector will fall in GDP. As whole nation can be fed by the agriculture sector when industrial sector grows fast and agriculture sector will be smaller than it is difficult to feed urbanization sector. as study on urbanization and economic development is conducted by Gulabrao. (2013) in India and concluded that there exist positive relationship in between development and urbanization and there is two way relationship in between these two but nature of relationship is not linear because when urbanization crosses certain limits its effect reversed to negative. As higher rate of urbanization will create many problems and challenges for the economy. Similarly Quigley in 2007 argues that urban growth at initial stages of development in many economies have to face the economic as well as social problem. But urbanization may be harmful for the economy but it is sufficient condition for the economic growth of an economy.

Afzal (2009) discussing the consequences of rapid population growth, rural-urban migration on economic development in Pakistan. The study is based on Pakistan Economic Survey and International Financial Statistics Year books from 1950 to 2001. The study examined that there is increase in rural-urban migration due to rapid increase in population growth rate. Consequently, level of urbanization is increased. The study found that rapid population growth has negative and significant effect on economic development whereas urbanization has positive impact on it. Results show that rapid population growth rate is a major problem that leads to decreased rate of saving in Pakistan.

2.3.3 Evidence of Non-linear relationship in Urbanization and Economic growth

Sato and Yamamato (2005) investigated the impact of urbanization on demographic transition and economic growth for European and less developed countries from 1790-1990. The variables used in the model are technological progress, human capital accumulation and economic growth. The study concludes that there exists a positive relationship between urbanization and economic growth and confirms U-shaped relationship between urbanization and demographic transition. Also, it is provided that economic growth plays a vital role in the process of urbanization.

On the contrary, H M and L D Nguyen, (2017) in their study with sample comprising of seven Asian countries for the time period of 1980-2016. It is suggested that there is two-way causality between urbanization and economic growth. Also, there exists Inverted U-shaped relationship between economic growth and urbanization. At initial stage impact of urbanization is positive but after attaining a certain level of urbanization impact is reversed.

2.2 Conclusion:

As evident from the above discussion, there exists evidence on both types of relationship, positive and negative between urbanization and economic development. Soucat *et al.* (2014) in his study for Africa argues that positive impact of urbanization on development is not consistent. Since many studies witnessed that there is nonlinear relationship between urbanization and economic development and their relationship curve is inverted U shaped. Therefore, there are two stages in which there is different type of relationship between these two. At initial stage there is positive relationship where with increase in urbanization economic growth also increase but with further increase in urbanization over optimal level this relationship gets reversed as with increase in urbanization economic growth starts to decrease. Therefore, this relationship is very complex and depends on many other factors like economic status of economy and level of urbanization. So it is important to check the threshold level of urbanization for economic development. Thus, threshold level of urbanization for economic development in case of developing country as well as developed countries will be computed in the current study. This will assist government in formulating polices that keep urbanization around a certain level in order to sustain economic growth.

Chapter 3

Overview of Urbanization Trend In the World

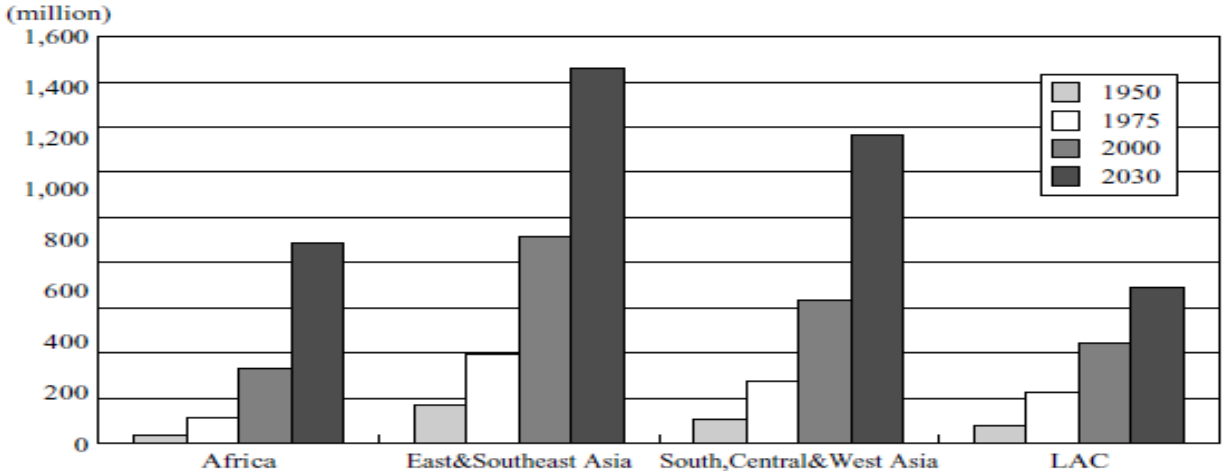
3.1 Trends of Urbanization in the World:

Urbanization trend is increasing in all over the world during the past few decades. As per UN Report in 2010 fifty percent of world total population is living in cities. There some regions where less population is residing in urban localities like Asia and Africa. But in near future these regions will also be more urbanized, because there urban population is increasing faster day by day. Developed countries are more urbanized than less developed countries. Because urban population have more opportunities of better jobs, education, health and improve life standard. Many studies on the issue witnessed positive relationship in between urbanization and economic growth.

Figure 1 shows the trends of urbanization in Africa, Latin America, Asia for the period of 1950- 2030. Graph depicts that pattern of urbanization is almost same for the region of Asia, and Africa.

Figure 3.1

Urbanization trend in Asia and Africa (1950-2030)

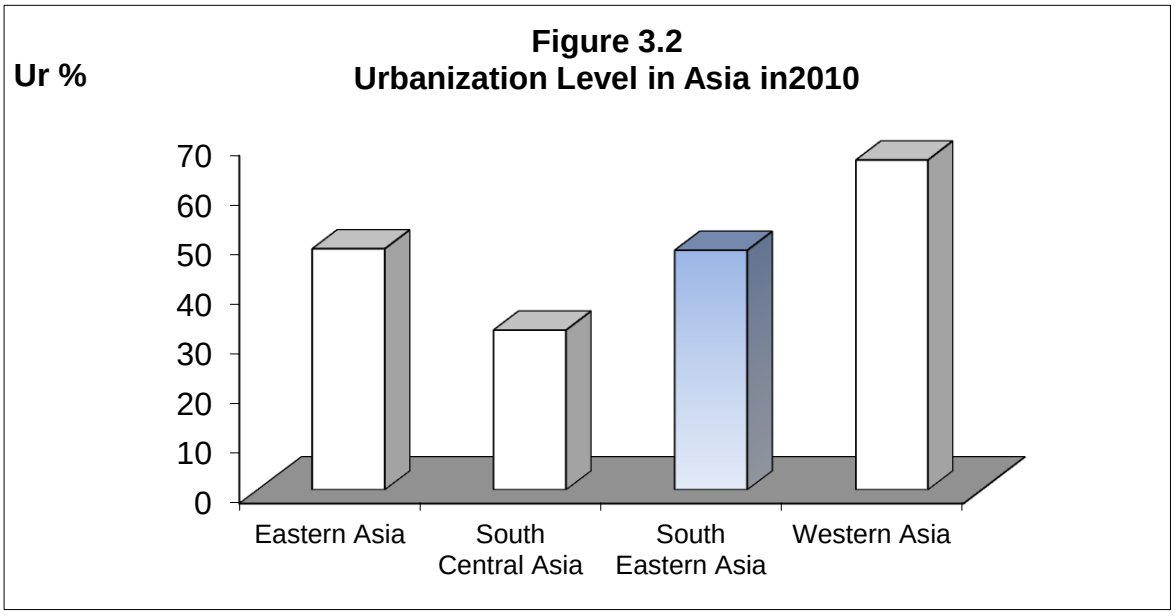


Source: *Urbanization and Development of Infrastructure in the East Asian Region, United Nations* (2002).

3.2 Trends of Urbanization in Asia:

Urbanization leads to economic growth and reduction in poverty because in urban areas there is vast opportunity to get better job and facilities of life like education, food housing and health. Hence due to this there is rapid increase in internal migration towards cities (agriculture sector to industrial sector) in Asia. There is half population is living in urban areas in 2010 but it will reach up to 75% in 2050. Graph below shows level of urbanization

Figure 3.2

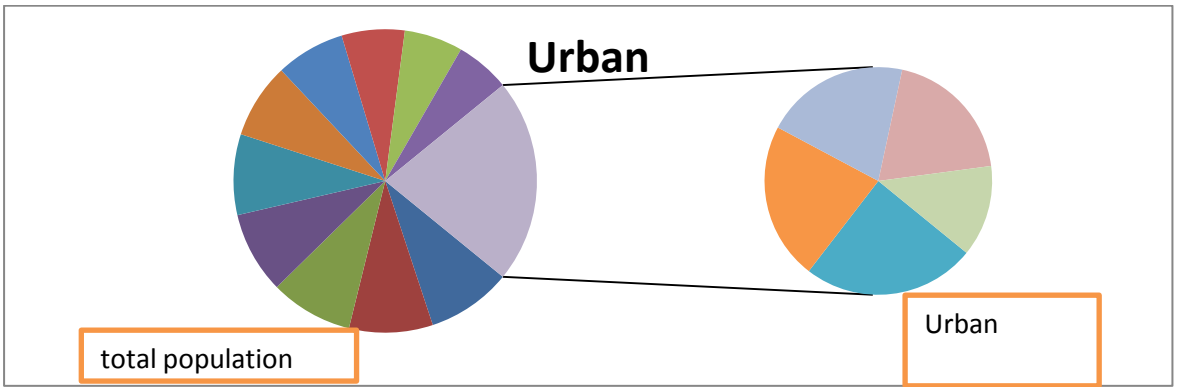


Source: *World Development Indicators, World Bank* (2010).

Graph below depicts the urbanization trend in Asia ranges from 1960 to 2018. In this graph share of urban population in total population of Asia is drawn. In 1960 there is only 15.7 % of total population was living in cities and it is increased up to 50.2 % of total population in 2019. Urbanization had increasing trend from 1960s to onwards. Urbanization is increasing rapidly due to several reasons. Basic purpose of movement of population to wards cities is the wage rate differentials as prevailing wage rate in rural areas far more less than wage rate in urban areas secondly marginal productivity of labor in agriculture sector is less than zero

which may become positive in urban sector. There may be another reasons like education, and in search of better jobs, and facilities in cities.

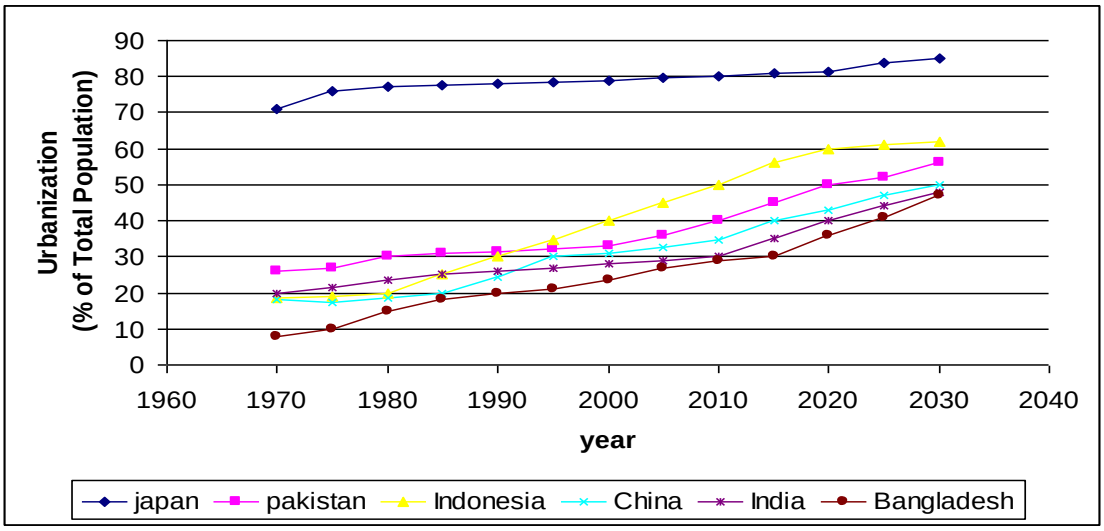
Trends of Urbanization in Asia
(1960- 2019)
Figure 3.3



Source: *World Development Indicators*.

Next graph depicts the country wise urbanization trend. Almost every country is facing increasing urban trend but urbanization rate differs along the countries japan is top most urbanized country in Asia with 94% of population is living in urban areas and Nepal is at least with only 20% of population is residing in the urban areas. Countries like japan and china highly urbanized earlier are more developed now because urbanization is key factor in economic development of the country more populated cities are considered to be engines of growth.

Figure 3.4
Urbanization trend in Asian Countries



Chapter 4

CONCEPTUAL FRAMEWORK AND METHODOLOGY

4.1 Introduction:

Economic growth and urbanization are affiliated with each other. Urbanization plays important role in enhancing economic growth in the economy. All developed countries in the world have more than 70% of population living in cities. As D Segal claims that more populated cities are more productive. Hence, urbanization level will shape the growth of economy but some studies witnessed Inverted-U shape relationship between the two variables. So, it is important to calculate the threshold level of urbanization in the context of developing and developed countries More importantly because over populated cities will have negative impact on development of economy and when population becomes more congested it will create many challenges of shortages of basic necessities like food, clothing, jobs etc. This chapter will give theoretical framework which is based on the studies of Lewis and Todarro (1954, 1976). So, in this study threshold level of urbanization is being calculated for developing countries as well for developed countries.

4.2 Conceptual Framework:

The conceptual framework is constructed on the basis of two model presented by Lewis (1954) and Todaro (1976). Firstly, in the theory of development presented by the Lewis a migration model for developing countries is formulated. In this theory Lewis claims that developing countries have surplus labor in agricultural sector and their marginal productivity is less than zero so the surplus labor can be shifted to industrial sector. Lewis suggests that with movement of labor from agricultural sector

to industrial sector, level of production and employment will rise. Basically urbanization rate depends on the level of industrialization and capital stock in cities thus urbanization will result in higher economic growth.

Secondly, Todarro (1976) gives model of urbanization and claims that movement of labor from one sector to another is an economic phenomenon. Migration takes place in search of better quality of life and wage rate differentials. Current earning is lower than prevailing wage rate in cities so expected income is higher than their current earnings. Study further states that urbanization and industrialization are two faces of one coin. Process of reallocation of factors of production from less performing sector to high performing sector will result in enhancement of economic growth. In other words, shift of labor from rural areas (agriculture sector) to urban areas (Industrial sector). Furthermore, it is claimed that higher expected income in cities will attract labor toward cities. Labor force shifts to cities in search of better quality of life and jobs because good employment opportunities are rare in rural areas.

Model of migration is mainly built on the basis of modern or developed countries which are more industrialized and on the assumption of full employment level in the economy. Shift of labor from rural to urban sector due to expected wage rate will result in decrease of wage rate differential due to forces of demand and supply. It is assumed that skilled and educated labor force will find various jobs but unskilled worker has two choices either to work in agriculture sector or migrate toward cities. In case of developed country there are many opportunities and only small proportion of labor will be left unemployed but in case of developing nation with less opportunity more will be jobless. In particular, this will result in major proportion of migrants being left unemployed.

Therefore, labor must compare the risk of unemployment and under employment associated with migration and wage rate differentials (Todarro 1976). Hence, unplanned urbanization will cause the problem of shortage of basic necessities of life and unemployment. This all leads to negative impact of urbanization on economic growth. A Soucat *et al* (2014) in his study witnessed inverted U-shaped relationship between urbanization and economic growth for Africa. Similarly, H M Nguyen & L D Nguyen, (2017) argue that relationship amid urbanization and economic growth is nonlinear and there is threshold level of urbanization after which relationship gets reversed from positive to negative. Consequently, in this paper threshold level of urbanization is being calculated.

4.3 Methodology:

4.3.1 Economic Modeling:

In order to examine the impact of urbanization on economic growth and to find the threshold level of urbanization real per capita GDP is taken as function of urbanization (% of total population), square of urbanization, gross capital formation per capita, trade, Proportion of population not in labor force (% of total population under 15 years and above 64 years age, Government expenditures. Aligned with study of nguyen (2017)

GDP per capita= f (urbanization, urbanization square, trade, population not in labor force, gross capital formation

GDP per capita $= \gamma_0 + \gamma_1 UR + \gamma_2 URsq + \gamma_3 GCF + \gamma_4 POP + \gamma_5 Trade + \xi_1$

$\gamma_0, \gamma_2, \gamma_3$.....Parameters

Ur = urbanization GCF = Gross capital formation

GDP per capita = Gross Domestic product per capita

POP = Population not in labor force URsq = square of Urban population

4.3.2 Selection of indicators:

In this study variable are used on the basis of previous related theories and studies. Real per capita GDP (Indicator of growth) is selected as dependent variable for measuring the impact of urbanization on economic growth.

4.3.3 Independent variables:

Urbanization:

Urbanization is main variable in this study as this study is conducted in order to calculate the threshold level of urbanization for economic growth. In this paper proportion of total population living in cities is being used. Urbanization will enhance the economic growth because marginal product of labor in agriculture sector is zero or may be negative. When the surplus labor shift to urban areas (industrial sector) they get job in other sector (industrial sector) and their marginal productivity become positive. This will lead to increase in overall employment level. When level of employment rises in the economy definitely output level will rise. On the other side when individuals have jobs they have money to demand more. When demand increase in order to respond that demand producer will hire more labor and capital to increase output. Hence the whole process will enhance the process of economic growth.

Numerous studies in past done on the issue and some studies of Fay & opal (1999), Dharmindra *et al* (2010)., Lewis (2010) and Polese (2014) witnessed positive relationship in between urbanization and economic growth. But there is some limit of absorbing labor in the industrial sector and similarly cities have limit of housing education and health facilities and agriculture sector has responsibility of feeding the whole economy when more and more labor will shift to cities this will put two types of impact on agriculture sector firstly agriculture sector become small and secondly more cultivated land is utilized in the construction of houses building which will

reduce the performance and output level of agriculture sector which will effect negatively on economic growth. This will reverse the impact of urbanization on economic growth when urbanization crosses the optimal level.

Some studies in past also witnessed nonlinear and negative relationship in between urbanization and economic growth. Rakodi (2004) witnessed negative relationship and H M Nguyen & L D Nguyen (2017) witnessed nonlinear relation hence it is very important determinant of growth. Urbanization square is also added in the model in order to check that weather the relationship will get reversed after some certain stage and to calculate threshold level of urbanization.

Gross capital formation:

Gross capital formation means add up in the present capital stock. It is selected because growth model is incomplete with labor and capital. Gross capital formation is one of key factor in determining economic growth as growth theory of neoclassical suggests that increase in capital stock will have positive effect on productivity level. Similar argument is presented by a number of studies like DeLong (1991); Mankiw (1992) and Romer (1992). According to these studies, increase in capital stock has a positive effect on the economic growth rate and claims that capital formation will lead to increase in production level in the economy and it will results in rapid economic growth in the economy. Therefore, economic growth is a function of capital stock.

Population not in labor force:

Population which is not in labor force includes two age group one that is smaller than 15 year of age and other group which is upper the age of 64 years. Hence these two groups have negative impact in sense that these are the burden on earning group. These groups those not work and have negative impact on the economic growth. It

includes population under the age of 15 years and above the age of 64 years according to L D Nguyen (2017) it has negative impact on economic growth of economy.

Trade:

Trade is being selected because trade is not only about the exchange of goods and services across the country but also when countries get involved in trade production techniques, skills and technology also exchanged. When more worker shifted in industrial sector and production level increases in the economy surplus output will be exported to other economies. This all will enhance the economic growth in the economy. Trade is also key factor of growth. As smith (1776) claims that trade will expand markets and improves productivity, efficiency of labors. International trade will also provide motivation for the technical innovations and inventions this all will results in rapid economic growth.

4.4 Data description:

Data for this study is extracted from World Development Indicator. We have selected all (subject to availability of data) developing and developed countries of Asia for which data is available on world development indicator for the time span of 1996-2018. Distinction between developed and developing countries is being made on the basis of GDP per capita and ranking of World Bank.

Table: 4.1 Data Source

Variable	Source	Definition
GDP Per Capita	WDI	(GDP divided by population) * 100
Urbanization	WDI	Urban population Percentage of Total Population
Gross Capital Formation	WDI	Gross Capital Formation
Population Not in Labor Force	WDI	Percentage of total population that is not in labor force
Trade	WDI	As a % of GDP

4.5 Econometric modeling:

In this study we have to analyze the impact of urbanization on economic growth in the context of developing and developed countries. Classification of developing and developed countries is based on their GDP per capita income. Also, sample of countries and time period is subject to availability of data. Main objective of this research is to find the threshold level of urbanization for developing and developed countries. Many previous studies have suggested the existence of two-way causal relationships between urbanization and economic growth. Urbanization causes economic growth and economic growth causes urbanization. Nguyen (2017) witnessed causal relationship in urbanization and economic growth. In order to check causal relationship between these two variables Granger causality test will be employed in this research.

For the purpose of analyzing the impact of urbanization on economic growth this research will employ static and dynamic model. Both models are specified below.

Static model:

$$GDP_{it} = \alpha_0 + \beta_1 UR_{it} + \beta_2 UR^2_{it} + \pi_1 GCF_{it} + \pi_2 POP_{it} + \pi_3 trade_{it} + u_{it} \quad (1)$$

Dynamic model:

$$GDP_{it} = \alpha_1 GDP_{it-1} + \beta_1 UR_{it} + \beta_2 UR^2_{it} + \pi_1 GCF_{it} + \pi_2 POP_{it} + \pi_3 trade_{it} + u_{it} \quad (2)$$

Ur = urbanization GCF = Gross capital formation

GDP per capita = Gross Domestic product per capita

POP = Population not in labor force URsq = square of Urban population

In the model above i= 0,1,2,3,….. Represents number of countries and t will represent number of time period. Table below will explain the definition of variable used in the model above.

Table 4.2: Abbreviation and expected signs of Variable in the model

Abbreviation	**Variable**	**Sign**
GDP	GDP Per Capita	
GCF	Gross capital Formation	+
Trade	Trade openness	+
UR	Urbanization	+
UR^2	Square of urbanization	_
POP	Population not in labor force	_
GDP_{it-1}	Lag of Dependent variable	

Panel data can give more information than cross section and time series data because they exhibit dynamic and granger causality across the units over time. There may be problem of heterogeneity in between cross sections hence we cannot apply pooled OLS because in those cases OLS estimators are biased (Cheng Hsiao, 2003). Secondly, we are dealing with causal relationship between urbanization and economic growth.

4.5.1 Calculation of Threshold Level:

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

$$GDP_{it} = \alpha_0 + \beta_1 UR_{it} + \beta_2 UR^2_{it} + \pi_1 GCF_{it} + \pi_2 POP_{it} + \pi_3 trade_{it} + u_{it}$$

By applying Ceteris paribus condition on above equation and taking derivative w.r.t Urbanization we get

$$d(GDP_{it})/d(UR) = \beta_1 + 2\beta_2 UR_{it}$$

Now applying first order condition for maximization on above equation by putting equals to zero.

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

$2\beta_2 UR_{it} = \beta_1$

$UR = \beta_1 / 2\beta_2$

4.6 Estimation Technique:

In order to find the threshold level of urbanization for economic growth the appropriate estimation techniques which suits data and give unbiased and efficient results needs to be selected.

4.6.1 Estimation technique of static model:

Fixed Effects and Random Effect Model: in fixed effect models individual specific effects are correlated with independent variables whereas in random effect model individual specific effects are uncorrelated with independent variables. If fixed effect assumption holds then fixed effect model gives more efficient results than random effect model and vice versa. To choose appropriate estimation method which suits the data, the Hausman test (Hausman.s J.A, (1978). will be used to choose between two models random effect and fixed effect. The Hausman test with the hypothesis "H0: RE model is best fit "If null hypothesis is being rejected than fixed effect model will be used and if null hypothesis is being accepted than random effect model is being used in order to estimate static panel data model. Static model is being given below.

Static model:

$GDP_{it} = \alpha_0 + \beta_1 UR_{it} + \beta_2 UR^2_{it} + \pi_1 GCF_{it} + \pi_2 POP_{it} + \pi_3 trade_{it} + u_{it}$

4.6.2 Estimation of Dynamic model:

There are several studies that have used Ordinary Least Squares (OLS) technique to empirically investigate the impact of urbanization. The OLS estimators are consistent and unbiased when the independent variables are exogenous with no mulita-collinearity, and error terms are homoscedastic and serially uncorrelated. For consistent estimates, the most important assumption is the exogeneity of regressors. This implies that the errors have zero mean and are uncorrelated with the regressors.

$$E(\mu) = 0$$

$$E(X', \mu) = 0$$

There are number of studies that identify the possibility of reverse causality and endogeneity among urbanization and economic growth (see Rakodi (2004) H M Nguyen & L D Nguyen (2017) , Gulabrao (2017)).

In panel data widely used technique of empirical enquiry is GMM (Generalized Method of Moment). There may be presence of endogeneity as lag of dependent variable is being added as independent variable. If method of ordinary least square is being applied in that case this will give biased results because OLS is based on the assumption of absence of endogeneity. The main advantage of the GMM estimation method is that the model needs not to be serially independent and homoscedastic. Another benefit of the GMM estimation technique is that it generates parameters through maximizing the objective function which includes the moment restrictions in which correlation between lagged regressors and error term is zero. Keeping the advantages of the GMM estimation technique to overcome endogeneity and omitted variable bias, the GMM estimation procedure developed by Arellano and Bond (1991), Arellano (1993), and Arellano and Bover (1995) has been applied to estimate

threshold level of urbanization using lagged values of the variables as instruments. The STATA software has been used for estimation.

Dynamic model:

$$GDP_{it} = \alpha_1 GDP_{it-1} + \beta_1 UR_{it} + \beta_2 UR^2_{it} + \pi_1 GCF_{it} + \pi_2 POP_{it} + \pi_3 trade_{it} + u_{it}$$

To estimate the above model estimation technique used in this study is Dynamic Generalized Method of Moment (GMM) of Arellano & Bond (1991). Since AR (1) Panel data is introduced one lag of dependent variable is used in model as explanatory variable and it violates the condition of exogeneity. Equation (2) is representing dynamic panel model where lags of dependent variables are used as independent variables where conventional or static Fixed Effect or Random Effect model do not give efficient and consistent results due to persistence of the lag of dependent variables, and these lags brings problem of endogeneity in the model. In the case of dynamic panel, the Arelleno Bond Dynamic Panel GMM estimator has been used. Therefore, the study would employ the fore mentioned dynamic GMM estimator to estimate the average response model. GMM has advantage of overcoming unobserved affect and dealing with explanatory variable endogeneity in panel data estimation. It also avoids the serious sample selection problem, measurement problem and simultaneity via structural estimation with large data.

Roodman (2006) explains that Generalized Method of Moment is dynamic because it allows to add lag of predicted variable in model. This method also enhances the efficiency of results by allowing addition of more instruments. General model for Generalized Method of Moment can be written as.

$$Y_{it} = \pi Y_{it-1} + X'_{it}\beta + \varepsilon_{it}$$

$$\varepsilon_{it} = \mu_i + v_{it}$$

$$E(\mu_i) = E(v_{it}) = E(\mu_i , v_{it}) = 0$$

The error term includes two components; fixed effect and idiosyncratic shock. Above equation can be written as

$$\Delta Y_{it} = (\pi - 1) Y_{it-1} + X'_{it}\beta + \varepsilon_{it}$$

Roodman (2006) claims that two stage GMM has low standard error and biasness than one stage GMM. Thus Roodman (2009) used two stage GMM technique in order to extend the model of Arellanao and Bover (1995) by implementing forward orthogonal deviation, so the given technique is subject to implementation is this study contrary to difference GMM. Another benefit of adopting this two-step method is that it also considers heteroscedasticity.

Chapter 5
Estimation Results and Discussion

5.1 Introduction:

This chapter gives the results obtained by estimating the static as well dynamic model. In order to calculate threshold level of urbanization static model is being estimated. However, the choice for appropriate technique for estimation is made by using Hausman Test. Which suggest whether random effect model or fixed effect model needs to be considered given the nature of data. While, dynamic model is estimated using D-GMM proposed by Arellano & Bond (1991).

5.2 Data:

Data used in this study is for both developed and developing countries of Asia for the time period 1996-2108. Distinction between developed and developing countries is being made on the bases of classification of World Bank as well as their individual GDP per capita. Data of 23 developing and 11 developed countries is being considered and sample selection was based on data availability. Table below gives descriptive statistics of data.

Table 5.1: Descriptive statistics of Developed countries

	Mean	**Standard Deviation**	**Minimum**	**Maximum**	**Count**
UR2	6858.478	2692.253	1018.631	10000	253
Urb	80.82581	18.082	31.916	100	253
POP	9.968142	5.186556	2.074548	27.47485	253
TRADE	136.3538	109.26	18.34896	442.62	253
LnGDPppc	9.754387	1.103525	6.512527	11.44868	253
Lgfc	24.03828	2.473083	20.16917	29.28006	253

As descriptive stats show, the mean urbanization in developed countries is 80.8% and the minimum value of urbanization is 32% while the maximum value is 100 %. It also

depicts that population over 64 years of age ranges from 2 to 27 % of total population with mean value of 10%.

Table 5.2: Descriptive statistics of developing countries

	Mean	**Standard Deviation**	**Minimum**	**Maximum**
UR2	3391.952	2358.106	128.8225	8277.178
Urb	53.93737	21.99151	11.35	90.979
Pop	5.47819	2.252149	2.134785	14.42484
trade	76.1232	37.13768	21.92949	220.4074
ln gfc	23.47461	1.971749	18.7186	27.39176
Lngdppc	7.824324	1.157051	5.321476	10.35338

As descriptive stats show that mean urbanization in developing countries is 53.9% and minimum value of urbanization is 11% while maximum value of urbanization is 90 % hence there is huge gap between level of urbanization for different countries. It also depicts that population over 64 year of age ranges from 2% to 14 % of total population with mean value of 5%. Whereas, GDP per capita has minimum value of 397 US $ and maximum of 25000 US$ with mean value of only 6225 US$ which is very low compared to the average value of GDP per capita in developed countries, 23000 US$. Hence descriptive stats table show difference between the data of different countries.

5.3 Models:

In order to find threshold level of urbanization and check the relationship in between urbanization and economic growth two model given below is being estimated.

Static model:

$$LnGDP_{it} = \alpha_0 + \beta_1 UR_{it} + \beta_2 UR^2_{it} + \pi_1 LnGCF_{it} + \pi_2 POP_{it} + \pi_3 trade_{it} + u_{it} \quad (1)$$

Dynamic model:

$$LnGDP_{it} = \beta_0 + \alpha_1 LnGDP_{it-1} + \beta_1 UR_{it} + \beta_2 UR^2_{it} + \pi_1 LnGCF_{it} + \pi_2 POP_{it} + \pi_3 trade_{it} + u_{it} \quad (2)$$

Researcher used STATA software for the estimation of results. In order to estimate static model researcher used hausman's test to find the technique which suits the data. Hausman test tell us weather fixed effect model or random effect model is best fit the data. Hausman test is applied with null hypothesis that random effect model is best fit hence if null hypothesis is being accepted than random effect model is best for data and is null hypothesis is being rejected than fixed effect model is good fit. Estimations for developing countries and developed countries is done separately.

5.4 Estimation of static model for developed countries:

5.4.1 Hausman test:

Results of hausman test of developed countries data is being given below

H_0: Random effect model is best fit

H_1: Fixed effect model is best fit

Table: 5.3 Results of Hausman test

Chi square	32.93
Probability	0.0000

As chi square calculated value is more than chi tabulated value and probability is less than 0.05 hence we reject null hypothesis that random effect model is good fit and accept alternate hypothesis that fixed model is best fit and model should be estimated with fixed effect model.

5.4.2 Results of Fixed effect model:

Fixed effect model is being estimated for the developed countries. Result of model is given in table below.

$LnGDP_{it} = \alpha_0 + \beta_1 UR_{it} + \beta_2 UR^2_{it} + \pi_1 LnGCF_{it} + \pi_2 POP_{it} + \pi_3 trade_{it} + u_{it}$

Table: 5.4 Results of Fixed Effect Model

Variable	Coefficient	T-value	Probability
UR	0.0999061	7.28	0.000***
UR^2	-0.0007337	-6.10	0.000***
Pop	-0.0610565	-6.48	0.000***
Trade	0.0005887	1.43	0.153
LnGCF	0.5509075	26.03	0.000***
Constant	-7.220375	-16.11	0.000***

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

$LnGDP_{it} = - 7.220375 + 0.0999061UR_{it} - 0.0007337UR^2_{it} + 0.5509075LnGCF_{it} - 0.0610565POP_{it} + 0.0005887trade_{it} + u_{it}$

Hence results in the above table are according to expected signs off coefficients and parallel with previous studies. All variable turns out to be significant at 1% level of significance only coefficient of trade is insignificant.

Urbanization: As coefficient of urbanization is significant at 1% level of significance and turn out to be positive. It shows positive relationship in between urbanization and economic growth which indicates that rise in urbanization level will enhance the economic growth of economy. If there is one unit increase in level of urbanization there will be 0.09% change in economic growth. Results are in line with previous related studies on the urbanization and economic growth conducted by Lewis, Todarro (1970), Polese, Arouri et al. (2014), Kolomak (2012) and Lewis (2014).

Square of Urbanization: some of studies in past witnessed nonlinear type of relationship in between urbanization and economic growth. Rakodi and Quingley witnessed negative relationship in between urbanization and economic growth. HM Nguyen and LD Nguyen in 2017 in their study find the nonlinear relationship in

between urbanization and economic growth and threshold level was also being calculated for seven countries. Hence result of this study also witnessed nonlinear relationship in between urbanization and economic growth. As sign of coefficient of urbanization square is negative and significant at 1% level of significance. Which shows that impact of urbanization reverts back from positive to negative after certain level of urbanization because there is some certain upper limit to absorb people in cities and provide them basic necessities and facilities of life. So threshold level of urbanization after which its impact reversed is being calculated below.

5.4.3 Threshold level of urbanization:

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

$LnGDP_{it} = - 7.220375 + 0.0999061UR_{it} - 0.0007337UR^2_{it} + 0.5509075LnGCF_{it} - 0.0610565POP_{it} + 0.0005887trade_{it}$

By applying Ceteris paribus condition on above equation and taking derivative w.r.t Urbanization we get

$d(GDP_{it})/d(UR) = \beta_1 + 2\beta_2 UR_{it}$

Now applying first order condition for maximization on above equation by putting equals to zero.

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

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

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

$UR= 0.0999061/ 2(0.0007337)$

UR = 0.0999061/ 0.0014674 = 68.08375 %

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

Gross Capital Formation: In above results coefficient of gross capital formation is positive and significant. This results shows that capital formation has strong positive impact on the economic growth. As one percent increase in capital formation will bring 0.55 percent increase in economic growth. This results are consistent with studies of kanu (2014) and Jhingam (2006). **Population not in labor force,** it includes percentage of population that does not in labor force. HM & LD Nguyen (2017) witnessed negative impact of population on growth which is out of labor force. Hence this study also witnessed the same result as sign of coefficient is negative and significant which show that there exist strong negative relationship in between population not in labor force and economic growth.

5.5 Static model for under developed countries:

5.5.1 Hausman test:

Results of hausman test of developed countries data is being given below

H_0: Random effect model is best fit

H_1: Fixed effect model is best fit

Table: 4.5 Results of Hausman Test

Chi Square	158.6
Probability	0.0000

As in above results chi square calculated value is more than chi tabulated value and probability is less than 0.05 hence we reject null hypothesis that random effect model

is good fit and accept alternate hypothesis that fixed model is best fit and model should be estimated with fixed effect model.

5.5.2 Results of Fixed effect model:

Fixed effect model is being estimated for the developing countries. Results of model are given in table below.

Table: 5.6 Results of fixed effect model

Variable	Coefficient	T-value	Probability
UR	0.0166311	2.79	0.000***
UR^2	-0.0001544	-3.17	0.000***
Pop	-.0408015	-4.44	0.000***
Trade	0.0022928	4.78	0.000***
LnGCF	0.7321524	56.82	0.000***
Constant	-9.784804	-37.48	0.000***

Hence results in the above table are according to expected signs off coefficients and parallel with previous studies. All variable turns out to be significant at 1% level of significance only coefficient of trade is insignificant.

Urbanization: As coefficient of urbanization is significant at 1% level of significance and turn out to be positive. It shows positive relationship in between urbanization and economic growth which indicates that rise in urbanization level will enhance the economic growth of economy. If there is one-unit increase in level of urbanization there will be 0.016% change in economic growth. Results are in line with previous related studies on the urbanization and economic growth conducted by Lewis, Todarro (1970), Polese, Arouri et al. (2014), Kolomak (2012) and Lewis (2010).

Square of Urbanization: some of studies in past witnessed nonlinear type of relationship in between urbanization and economic growth. Rakodi (2004) and Quingley witnessed negative relationship in between urbanization and economic

growth. HM Nguyen and LD Nguyen in 2017 in their study find the nonlinear relationship in between urbanization and economic growth and threshold level was also being calculated for seven countries. Hence result of this study also witnessed nonlinear relationship in between urbanization and economic growth. As sign of coefficient of urbanization square is negative and significant at 1% level of significance. Which shows that impact of urbanization reverts back from positive to negative after certain level of urbanization because there is some certain upper limit to absorb people in cities and provide them basic necessities and facilities of life. So threshold level of urbanization after which its impact reversed is being calculated below.

5.5.3 Threshold level of urbanization:

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

$LnGDP_{it} = -9.784804 + 0.0166311UR_{it} - 0.0001544UR^2_{it} + 0.7321524LnGCF_{it} - 0.0408015POP_{it} + 0.0022928trade_{it}$

By applying Ceteris paribus condition on above equation and taking derivative w.r.t Urbanization we get

$d(GDP_{it})/d(UR) = \beta_1 + 2\beta_2 UR_{it}$

Now applying first order condition for maximization on above equation by putting equals to zero.

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

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

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

$UR = 0.0166311 / 2(0.0001544)$

$UR = 0.0166311 / 0.0003088 = 53.85\ \%$

Hence threshold level of urbanization for developing countries is 53.8% as sign of urbanization coefficient is positive and sign of urbanization square coefficient is negative which shows that initially urbanization has positive impact on economic growth after certain limit its impact reverts back to negative.

5.6 Estimation of dynamic model:

Result of dynamic model is given below.

$$LnGDP_{it} = \beta_0 + \alpha_1 LnGDP_{it-1} + \beta_1 UR_{it} + \beta_2 UR^2_{it} + \pi_1 LnGCF_{it} + \pi_2 POP_{it} + \pi_3 trade_{it} + u_{it}$$

Table: 5.7 Results Of D-GMM

GMM for developing countries				**GMM for Developed countries**		
Variable	**Coefficient**	**T stat**	**Probability**	**Coefficient**	**T stat**	**Probability**
UR	0.0431006	2.89	0.008***	0.3244602	2.91	0.017
UR^2	-0.0003501	-2.64	0.015**	-0.0020889	-3.05	0.014
Pop	-0.1363038	-6.64	0.000***	-0.0734542	-1.05	0.322
Trade	0.0074318	4.88	0.000***	0.0096671	2.38	0.041
LnGCF	0.0965047	4.51	0.000***	0.5269674	1.49	0.171
$LnGDP_{it-1}$	0.0681274	13.32	0.000***	0.5362701	3.76	0.004
Constant	-2.211113	-4.23	0.000***	-20.59289	-2.57	0.030

$LnGDP_{it} = -2.211113 + 0.06812745LnGDP_{it-1} + 0.0431006UR_{it} - 0.0003501UR^2_{it} + 0.0965047LnGCF_{it} - 0.1363038\ POP_{it} + 0.0074318trade_{it}$ ----------Developing countries

$LnGDP_{it}$ = -20.59289 + 0.5269674$LnGDP_{it-1}$+ 0.3244602UR_{it} - 0.0020889UR^2_{it} + 0.0965047$LnGCF_{it}$ -0.0734542POP_{it} + 0.0096671$trade_{it}$ ---------- Developed countries

5.6.1 Diagnostic test of model:

Table: 5.8 Results of Test

Developing countries			**Developed countries**		
Test	**Chi-Value**	**Probability**	**Test**	**Chi-Value**	**Probability**
AR (2)	-1.46	0.144	**AR (2)**	-0.65	0.514
J stat	18.71	0.767	**J stat**	19.89	0.786

Hence result of diagnostic tests of D-GMM is shown in above table. AR (2) test tell us about the autocorrelation. Null hypothesis of AR(2) test is there is no autocorrelation and alternate hypothesis is there is autocorrelation. As value of chi square is 1.41 and probability value is 0.144 which is greater than 0.05 hence we accept null hypothesis that means there is no autocorrelation. Hansen test result also given in table in order to check the validity of instruments. This test null hypothesis is instruments are valid and alternate is instruments are invalid. As chi square value is 18.71 less than chi tabulated value and p-value is greater than 0.05 hence null hypotheses is being accepted that means instruments are valid. Similarly results of diagnostic tests of D-GMM for developed countries also given in above table. As value of chi square is -0.65 and probability value is 0.514 which is greater than 0.05 hence we accept null hypothesis that means there is no autocorrelation. Hansen test result also given in table in order to check the validity of instruments. As chi square value is 19.89 less than chi tabulated value and p-value is greater than 0.05 hence null hypotheses is being accepted that means instruments are valid

Urbanization: As in above results coefficient of urbanization is statistically significant 1 percent significance level and comes out with positive sign which depicts that urbanization has strong positive impact on economic growth of economy. Economic growth will be enhanced by the increase in level of urbanization these results are in line with the studies of HM & LD Nguyen and Lewis. **Urbanization square** is added in model in order to find the threshold level. In above results urbanization square has statistical meaning and it is significant at 5% level of significance and its coefficient comes out with negative sign that means impact of urbanization revert back to negative after certain stage of urbanization level. Threshold level is being calculated below.

5.6.2 Threshold level of urbanization:

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

$LnGDP_{it} = 0.06812745LnGDP_{it-1} + 0.0431006UR_{it} - 0.0003501UR^2_{it} + 0.0965047LnGCF_{it} - 0.1363038\ POP_{it} + 0.0074318trade_{it}$--------- Developing countries (1)

$LnGDP_{it} = -20.59289 + 0.5269674LnGDP_{it-1} + 0.3244602UR_{it} - 0.0020889UR^2_{it} + 0.0965047LnGCF_{it} - 0.0734542POP_{it} + 0.0096671trade_{it}$ ---------- Developed countries (2)

By applying Ceteris paribus condition on above equations and taking derivative w.r.t Urbanization we get

$d(GDP_{it})/d(UR) = \beta_1 + 2\beta_2 UR_{it}$

Now applying first order condition for maximization on above equation 1 by putting equals to zero.

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

$0 = 0.0431006 - 2(0.0003501)\ UR_{it}$

$2(0.0003501)\ UR_{it} = 0.0431006$

UR= 0.0431006/ 2(0.0003501)

UR = 0.0431006/ 0.0007002 = 61.55 % (developing countries)

Developed countries:

Now applying first order condition for maximization on above equation 2 by putting equals to zero.

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

$0 = 0.3244602 - 2(0.0020889)\ UR_{it}$

$2(-0.0020889)\ UR_{it} = 0.3244602$

UR= 0.3244602/ 2(-0.0020889)

UR = 0.3244602/ 0.0041778 = 77.66 % (developed countries)

Threshold level of urbanization for developing countries is 61% and 77.66% for developed countries. At initial stages urbanization have positive impact on economic growth but after threshold level which is 61% in developing countries and 77.66% in developed countries its impact changes to negative because cities have limited capacity to absorb population secondly there should be balance between the

population in villages and cities because cities or urban sector can be feed by the agriculture sector with growth in urban areas and urban population more and more cultivated land is utilized in building of houses, factories etc. this all lead to dependency of economy on other economy in order to meet their food needs. There is higher threshold level of urbanization in developed countries because developed countries can afford more people in cities unable to provide more facilities and infrastructure to more population than the developing countries. Result is aligned with the study of HM & LD Nguyen (2017).

Population not in labor force have negative impact on economic growth as in above results coefficient comes with negative sign and significant at one percent level of significance. **Gross capital formation** has strong positive impact on the economic growth proven by the above result as coefficient of gross capital formation is positive and significant at one percent significance level, it has statistical meaning that with increase in capital formation economic growth will also increase. Results are also aligned with the previous related study HM & LD Nguyen (2017).

Chapter 6

Conclusion

6.1 Conclusion:

Main purpose for conducting this research is to find the threshold level of urbanization for developing and developed countries. Hence, in order to find the threshold level of urbanization static and dynamic models are being separately estimated by employing appropriate techniques. Similar studies such as by Lewis and Todaro provided that urbanization has positive impact on economic growth. They further claim that for any economy to become developed a fair percentage of population needs to shift toward cities given that they are considered as engines of growth. Also, the urban dwellers have an easy access to basic necessities of life such as better housing, healthcare, education, public transit and other facilities which enable them to be more productive in their everyday work.

The major incentive for worker to shift from agriculture sector is better job and living condition. The higher salary leads to increase in demand of goods and to respond to the demand, more production is undertaken by businesses which contributes towards economic growth. This process continues as more and more workers are attracted towards urban areas due to wage rate differentials. However, urban sector has only a finite capacity of absorbing labor therefore, surplus labor is left unemployed. This in turn puts a new challenge for public sector to provide housing, food, education, health and job facilities to everyone. There is higher cost of living in urban areas as compared to rural areas therefore to make the ends meet the outcast is often forced to opt shortcuts or wrong means of earning which gives rise to many social problems

like crimes (bribery, theft etc.) and black marketing. These evils negative effect the social fiber also the economy as a whole.

Results of this study also witnessed that initially urbanization has strong positive impact on economic growth. However, in the long run after reaching a certain level of urbanization it reverts back to negative. Gulabrao (2013) and HM & LD Nguyen (2017) claim that there is non-linear relationship between urbanization and economic growth. In line with the study, threshold level of urbanization is being estimated for the developing countries which is 61.55% for developing and 77.66% for developed countries. To acquire the results dynamic model is being estimated using the D-GMM estimation technique developed by Arelleno and Bond (1991). Also, static model is estimated with fixed effect model and it gives the threshold level for developing countries to 54% and 68% for developed countries. As can be seen the threshold level of urbanization is higher in developed countries given that they have more sources and opportunities for workers. Additionally, they have strong public sector capable of providing basic facilities.

6.2 Suggestions:

Based on the findings of the current research, it is suggested that developing economies should take necessary steps to allow for smoother transition from rural to urban areas since they are yet to meet the threshold level of urbanization. This is important because urbanization has the potential to boost the process of economic growth, as shown by the findings of the present study. Hence, public sector needs to provide infrastructure and basic facilities in urban areas as an incentive for surplus labor to shift from agriculture sector to the industrial one. More importantly, this will

be beneficial for the labor in the agricultural sector where they have zero marginal value which when shifted to industrial sector becomes positive.

On the other hand, developed economies need to decrease wage rate differentials as major portion of their population is residing in urban areas and the level of urbanization is higher than the threshold. In this regard, public sector needs to play an effective role in providing equal facilities and opportunities to worker in rural areas as enjoyed by a resident of urban area to maintain balance between the two sectors. Lastly, countries with higher level of urbanization should devise policies to channel the abilities of labor towards more productive utilization such as addition to monetary development, work development and natural supportability as opposed to interest which accelerates the process of urbanization.

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Appendix

Static model results for developed countries

Fixed effect model

```
. xtreg lgdppc urb ur2 pop trade lgfc, fe

Fixed-effects (within) regression               Number of obs      =       253
Group variable: countrynum                      Number of groups   =        11

R-sq:  within  = 0.8849                         Obs per group: min =        23
       between = 0.0033                                        avg =      23.0
       overall = 0.0057                                        max =        23

                                                F(5,237)           =    364.58
corr(u_i, Xb)  = -0.7959                        Prob > F           =    0.0000
```

lgdppc	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
urb	.0999061	.01372	7.28	0.000	.0728774	.1269349
ur2	-.0007337	.0001202	-6.10	0.000	-.0009705	-.0004969
pop	.0610565	.0094271	6.48	0.000	.0424848	.0796282
trade	.0005887	.000411	1.43	0.153	-.0002209	.0013983
lgfc	.5509075	.0211604	26.03	0.000	.509221	.592594
_cons	-7.220375	.4483037	-16.11	0.000	-8.103544	-6.337206
sigma_u	1.881005					
sigma_e	.16989959					
rho	.99190763	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(10, 237) =   217.90            Prob > F = 0.0000

. estimates store fixed
```

Random effect model

```
. xtreg lgdppc urb ur2 pop trade lgfc, re

Random-effects GLS regression                   Number of obs      =       253
Group variable: countrynum                      Number of groups   =        11

R-sq:  within  = 0.8793                         Obs per group: min =        23
       between = 0.0273                                        avg =      23.0
       overall = 0.0754                                        max =        23

                                                Wald chi2(5)       =   1374.92
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

lgdppc	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
urb	.0952947	.0145923	6.53	0.000	.0666944	.1238951
ur2	-.000574	.0001209	-4.75	0.000	-.0008111	-.000337
pop	.0422568	.0095306	4.43	0.000	.0235772	.0609365
trade	.0010355	.0004476	2.31	0.021	.0001583	.0019126
lgfc	.5144159	.0231189	22.25	0.000	.4691036	.5597281
_cons	-6.939003	.5435496	-12.77	0.000	-8.004341	-5.873666
sigma_u	.59585019					
sigma_e	.16989959					
rho	.92480953	(fraction of variance due to u_i)				

```
. estimates store random
```

Hausmans test for selection between Random and fixed effect model

```
. hausman fixed random
```

	Coefficients			
	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
urb	.0999061	.0952947	.0046114	.
ur2	-.0007337	-.000574	-.0001597	.
pop	.0610565	.0422568	.0187997	.
trade	.0005887	.0010355	-.0004468	.
lgfc	.5509075	.5144159	.0364917	.

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 32.93
Prob>chi2 = 0.0000
(V_b-V_B is not positive definite)

.

Static model estimations for developing countries

Fixed effect model

```
. xtreg lngdppc urb ur2 pop trade  lngfc, fe

Fixed-effects (within) regression               Number of obs      =       529
Group variable: countrynum                      Number of groups   =        23

R-sq:  within  = 0.9317                         Obs per group: min =        23
       between = 0.1696                                        avg =      23.0
       overall = 0.2570                                        max =        23

                                                F(5,501)           =   1366.31
corr(u_i, Xb)  = -0.6756                        Prob > F           =    0.0000
```

lngdppc	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
urb	.0166311	.0059688	2.79	0.006	.0049042	.0283581
ur2	-.0001544	.0000487	-3.17	0.002	-.0002501	-.0000588
pop	.0408015	.00918	4.44	0.000	.0227654	.0588375
trade	-.0022928	.00048	-4.78	0.000	-.0032359	-.0013498
lngfc	.7321524	.0128858	56.82	0.000	.7068354	.7574693
_cons	-9.784804	.2610472	-37.48	0.000	-10.29769	-9.271922
sigma_u	1.3666901					
sigma_e	.15160308					
rho	.98784473	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(22, 501) =   330.21             Prob > F = 0.0000

. estimates store fixed
```

Random effect model

```
. estimates store fixed

. xtreg lngdppc urb ur2 pop trade  lngfc, re

Random-effects GLS regression                   Number of obs      =       529
Group variable: countrynum                      Number of groups   =        23

R-sq:  within  = 0.9303                         Obs per group: min =        23
       between = 0.2545                                        avg =      23.0
       overall = 0.3398                                        max =        23

                                                Wald chi2(5)       =   5656.08
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

lngdppc	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
urb	.0226066	.0062975	3.59	0.000	.0102637	.0349494
ur2	-.0001377	.0000526	-2.62	0.009	-.0002407	-.0000346
pop	.0384114	.0098163	3.91	0.000	.0191718	.0576509
trade	-.0017684	.0005197	-3.40	0.001	-.002787	-.0007497
lngfc	.6962106	.013446	51.78	0.000	.669857	.7225642
_cons	-9.347079	.3069149	-30.45	0.000	-9.948621	-8.745537
sigma_u	.54097282					
sigma_e	.15160308					
rho	.92718333	(fraction of variance due to u_i)				

```
. estimates store random
```

Hausman test:

```
. hausman fixed random
```

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
urb	.0166311	.0226066	-.0059754	.
ur2	-.0001544	-.0001377	-.0000168	.
pop	.0408015	.0384114	.0023901	.
trade	-.0022928	-.0017684	-.0005245	.
lngfc	.7321524	.6962106	.0359417	.

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 158.68
Prob>chi2 = 0.0000
(V_b-V_B is not positive definite)

Dynamic model estimation:

Developing countries

```
. xtabond2 lngdppc l.lngdppc urb ur2 pop trade lngfc, gmm(l.urb ,  collapse eq (level))  iv(l(3/3).lngdppc l(0/3).lngfc l(0/3).ur2 du
> q (level) passthru mz ) twostep small nodiffsargan
Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: id                              Number of obs      =       506
Time variable : year                            Number of groups   =        23
Number of instruments = 31                      Obs per group: min =        22
F(6, 22)      =    876.41                                      avg =     22.00
Prob > F      =     0.000                                      max =        22
------------------------------------------------------------------------------
     lngdppc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     lngdppc |
        L1.  |   .6812745   .0511511    13.32   0.000     .5751935    .7873554
             |
         urb |   .0431006   .0149119     2.89   0.008     .0121752     .074026
         ur2 |  -.0003501   .0001324    -2.64   0.015    -.0006247   -.0000756
         pop |   .1363038   .0205386     6.64   0.000     .0937093    .1788983
       trade |   .0074318   .0015231     4.88   0.000     .0042732    .0105904
       lngfc |   .0965047   .0213912     4.51   0.000     .0521419    .1408674
       _cons |  -2.211113   .5228791    -4.23   0.000    -3.295498   -1.126728
------------------------------------------------------------------------------
Warning: Uncorrected two-step standard errors are unreliable.

Instruments for levels equation
  Standard
    L3.lngdppc lngfc L.lngfc L2.lngfc L3.lngfc ur2 L.ur2 L2.ur2 L3.ur2 dumy16,
    missing recoded as zero
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    DL(1/21).L.urb collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.28  Pr > z =  0.023
Arellano-Bond test for AR(2) in first differences: z =  -1.46  Pr > z =  0.144
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(24)   = 290.72  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(24)   =  18.71  Prob > chi2 =  0.767
  (Robust, but weakened by many instruments.)
```

Developed countries

```
. xtabond2 lgdppc l.lgdppc urb ur2 pop trade lgfc, gmm(l(2/2).urb l(0/2).ur2 ,  collapse eq (
> iff) passthru mz ) iv(l(1/2).pop , eq(diff) passthru mz) twostep small nodiffsargan
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: countrynum                      Number of obs      =       220
Time variable : b                               Number of groups   =        10
Number of instruments = 48                      Obs per group: min =        22
F(6, 9)       =  21801.11                                      avg =     22.00
Prob > F      =     0.000                                      max =        22
------------------------------------------------------------------------------
      lgdppc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lgdppc |
         L1. |   .5362701   .1424552     3.76   0.004      .214014    .8585262
             |
         urb |   .3244602   .1115393     2.91   0.017     .0721408    .5767795
         ur2 |  -.0020889   .0006855    -3.05   0.014    -.0036395   -.0005383
         pop |  -.0734542   .0700829    -1.05   0.322    -.2319929    .0850844
       trade |   .0096671   .0040587     2.38   0.041     .0004855    .0188486
        lgfc |   .5269674   .3542146     1.49   0.171    -.2743216    1.328257
       _cons |  -20.59289   8.007682    -2.57   0.030    -38.70753   -2.478257
------------------------------------------------------------------------------
Warning: Uncorrected two-step standard errors are unreliable.

Instruments for first differences equation
  Standard
    L.pop L2.pop, missing recoded as zero
    L2.trade lgfc L.lgfc L2.lgfc dumy4, missing recoded as zero
Instruments for levels equation
  Standard
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    DL(1/21).(L2.urb ur2 L.ur2 L2.ur2) collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =   -3.24  Pr > z =  0.000
Arellano-Bond test for AR(2) in first differences: z =  -0.65  Pr > z =  0.514
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(41)   = 118.27  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(41)   =  19.89  Prob > chi2 =  0.786
  (Robust, but weakened by many instruments.)
```