The Role of Foreign Direct Investment and Trade in Urbanization in Developing Asia: Structural Changes after the Global Financial Crisis

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A dynamic between foreign direct investment (FDI) and international trade, and the level of urbanization, has been observed in many developing countries. This study seeks to fill a literature gap on the extent that FDI and international trade impact developing Asian economies through urbanization. The study explores the relationship between FDI, international trade, and urbanization in 31 developing Asian economies from 1991 to 2019, utilizing the dynamic panel model. Empirical results imply the significant effect of FDI inflows and trade openness on urbanization in developing Asia. The impact is clearly observed following the global financial crisis despite increased deglobalization. This finding supports the existence of structural changes and the transformation of economies in the region, which, among other factors, are driven by stronger global supply chains and improved logistics infrastructure in developing Asia.

Keywords: Asia, developing economies, dynamic panel model, foreign direct investment, generalized method of moments, structural change, trade, urbanization

JEL codes: F21, O24, R12

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Asian Development Review, Vol. 40, No. 2, pp. 343–362
DOI: 10.1142/S0116110523500117

I. Introduction

For a number of decades, the countries of developing Asia have experienced rapid urbanization as a result of increased globalization. The globalization trend itself gained momentum in the 1990s as a result of the strong recovery of the world economy from recession in the early 1980s. This recovery saw increased global trade activities along with cross-border mergers and acquisitions that were driven by a reduction in trade barriers, technological developments, and other competitive forces. Growth in the manufacturing and service sectors accelerated due to increased trade liberalization and deregulation policies. All of these factors laid a strong foundation for economic growth in developing Asia.

The global trends show that the world's population and its economic activity are increasingly concentrated in megacities. More than half the global population now lives in urban areas. The United Nations estimated that the world's urban population surpassed its rural population in the middle of the 2000s. The global output of agriculture, which reflected the dominant position of the primary sector in the world economy, decelerated sharply in the 1980s, mainly due to both improved productivity and labor migration to urban areas. This structural transformation led to a shift in development policies, with increased focus on the premise that cities are the key drivers of economic growth.

In the era of globalization, rapid urbanization and industrialization in developing countries, including in Asia, have been supported by foreign direct investment (FDI) inflows. This phenomenon is not merely caused by a shortage of domestic financing, but also due to the lack of capacity in recipient countries, particularly with regard to technology. Thus, FDI inflows promote structural reforms, through industrial upgrading, and drive productivity higher in the manufacturing sectors of developing countries. These impacts are expected to be significant in the long run and to support increased international trade.

FDI, globalization, and urbanization remain crucial issues for developing Asia today. In past decades, developing Asia faced major economic crises that constrained FDI inflows and productivity growth, and also potentially impacted the speed of urbanization. Following the 1997/98 Asian financial crisis and an isolated financial crisis in 2002, both FDI and economic growth rebounded in the region and continued their upward trends. However, this was not the case following the global financial crisis (GFC), as productivity growth remained relatively subdued, negatively impacting FDI and potential growth. Globalization was also in retreat after the GFC, which resulted in the stagnation of international trade and FDI. Yet, there is no conclusive evidence that these events have resulted in a declining rate of urbanization in developing Asia, as there is a lack of studies surrounding this issue.

This paper seeks to investigate the extent to which FDI and international trade affected urbanization in 31 developing Asian countries from 1991 to 2019. To the best of the authors' knowledge, empirical analysis of the dynamic between FDI, international trade, and urbanization in developing Asia is still limited. The foremost contribution of this study is the identified impact of the GFC within the region on the relationship between FDI and international trade on one hand and urbanization on the other. In addition, the study observes the impact of structural changes in developing Asian economies following the GFC. The rising trend of deglobalization following the GFC is taken into consideration as a potential impediment to productivity gains, which also affects urbanization.

The findings can support developing Asian economies in overcoming the looming challenge of reduced economic growth and job creation. On the one hand, these trends will reduce some of the negative externalities from urbanization, particularly sustainability issues. However, the economic challenge will be great as developing Asia attempts to refocus its growth strategy to absorb excess labor resulting from the diminishing availability of jobs in urban areas. Automation in manufacturing and digitalization in services have been key factors contributing to these job losses. Weakened economic activities will eventually affect fiscal revenues and constrain the ability of governments to provide basic public services in urban areas. The coronavirus disease (COVID-19) pandemic and its aftermath will also present challenges to optimizing the benefits of urbanization as the productive sectors in the region's cities—the growth engine of developing Asia in recent decades—have been decimated.

The rest of the paper is organized as follows. Section II briefly reviews the associated literature, followed by the documentation of data sources and methodological issues in section III. Empirical findings are discussed in detail in section IV before the paper concludes in the final section.

II. Survey of Literature

Early literature that investigates the impact of FDI on urbanization is generally based on the framework of thinking that the expansion of economic activities in the manufacturing sector drives FDI, thus leading to higher employment and wages and increased migration from rural to urban areas (Todaro 1969). This was certainly the case in many developing countries that depended on international capital flows to industrialize as a means to achieve higher economic growth, job creation, and income through technology adoption. Hence, the study by Zhang (2014) observed that there is a limit in the optimization of technology, particularly in the case of developing countries.

This classical study of push factors from the countryside and pull factors from the city by Todaro (1969) argues that, even though there are many unemployed people in cities, as long as the expected income in cities is higher than that in the countryside, rural surplus labor will move to the urban areas. A desire for city life, access to education, better medical services, and quality infrastructure also attracts rural workers to urban areas. A more recent study by Van der Ploeg and Poelhekke (2008) determined that rapid growth in the urban population is driven by the exploitation of new technologies, such as the Internet and the accompanying revolution in communications technology, in addition to improved urban amenities, greater job opportunities, and wage differentials. As mentioned, FDI inflows are considered to be key for transferring knowledge and technology, thereby increasing productivity growth (Hermes and Lensink 2003).

For developing countries, urbanization cannot be detached from globalization as a component of the new global order. It was not until the 20th century that urbanization began to increase rapidly around the world, particularly in developing Asia, driven by economic growth in the People's Republic of China (PRC) and India. The urbanization process in those two countries was similar in the beginning; however, the rate of urbanization in the PRC surpassed that of India sharply in the 1990s and 2000s, primarily due to rapid industrialization as the PRC experienced faster integration into global supply chains. This emerging global production system has also been referred to as the new international division of labor, with increased participation by foreign capital and transnational corporations in establishing, financing, and managing major urban infrastructure and services (McGee 1997, Sassen 2015).

Among the early literature that discusses the process of capital accumulation and its impact on urbanization and labor structure imbalances in developing countries are Kentor (1981) and Timberlake and Kentor (1983). Utilizing data from 37 developing countries, Kentor (1981) finds that investment dependence (measured by per capita debt on investment income), export partner concentration, and export commodity concentration have a lagged positive effect on urbanization. This study also finds that investment dependence stimulated growth in the tertiary and informal sectors, while it inhibited growth in the industrial sector. Using a similar research framework, Timberlake and Kentor (1983) find that the labor structure and pace of urbanization in developing countries are increasingly dependent on foreign capital. Their other key finding is that over-urbanization causes a relative decline in per capita income, although it does not impede economic growth.

During the late 1980s and 1990s, a number of studies examined the influence of FDI along with international trade on urbanization. These studies focus particularly on developing countries that became more active participants in globalization, mainly

through international trade (Hein 1992). The studies also observe other types of international capital flows and international production that benefit the urbanization process in host countries. Furthermore, international trade has been identified as one of the drivers of FDI. A Granger test for causality in Chiappini (2011) confirmed this phenomenon that international trade further strengthens the process of urbanization.

On the other hand, an adverse effect on urbanization can be observed, especially in developing countries where FDI mainly flowed into the primary sector. On the one hand, it is argued that a change in demand, which comes with economic growth, increases specialization and the output share of less land-intensive sectors such as manufacturing and services (Liu, Su, and Jiang 2015; Zhang 1999). As a result, production activities tend to cluster in metropolitan areas to reduce communication and transportation costs (Deng et al. 2010).

Zhang (2002) showed that the observed difference in the rate of urbanization between coastal and inland regions in the PRC was largely explained by FDI inflows. FDI inflows create employment directly through the hiring policies of multinational corporations, or they can act indirectly through industrial linkages and knowledge spillovers to domestic firms (Dunning 2009). Another study by Zhang and Song (2003) found that in the case of the PRC, interregional migration is driven by the rural–urban income gap. Thus, it seems that the employment channel is particularly important to understand the motives for urbanization in developing countries.

Another negative consequence of FDI and trade—as a proxy of globalization—is observed in developing countries where they can result in greater regional inequality (Zhang and Zhang 2003). Considering this, one study by Chen and Wu (2017) assessed the link between FDI inflows, exports, and urbanization in 262 prefecture cities in the PRC between 2004 and 2013. They found a significant effect of FDI on urbanization in coastal regions but no impact in inland regions.

The United Nations Conference on Trade and Development (2017) described the key challenges associated with the digital economy, which significantly affect firms' strategies in terms of investment and production. One implication of these ongoing changes is that FDI inflows' effects on urbanization may be less visible. In addition, FDI flows are higher in host countries that have good institutions, well-developed financial systems, and sound infrastructure (Van der Ploeg and Poelhekke 2008).

III. Data and Methodology

The empirical exercises in this study utilize annual data on all variables of interest along with control variables collected from the World Bank's

World Development Indicators over the period from 1991 to 2019. FDI inflows, international trade, and urbanization are the three major variables of interest in this analytical study. The benchmark theories and empirics refer to us a few additional variables—including gross domestic product (GDP) growth, domestic capital formation, population growth, employment in nonprimary sectors, and rural poverty—to be controlled for in the estimated models, as they possibly influence urbanization in developing economies. Based on the World Bank classification of countries according to their income levels, the study selects 31 developing countries from Asia: Afghanistan,[1] Armenia, Azerbaijan, Bangladesh, Bhutan, Cambodia, Cyprus, India, Indonesia, Iran, Jordan, Kazakhstan, the Kyrgyz Republic, the Lao People's Democratic Republic, Lebanon, Malaysia, Maldives, Mongolia, Myanmar,[2] Nepal, Pakistan, the Philippines, the PRC, Sri Lanka, Syria, Tajikistan, Thailand, Turkmenistan, Uzbekistan, Viet Nam, and Yemen. The standard measures of the variables are considered to conduct the econometric analyses. The measures and notations of all concerned variables are depicted in Table 1.

Table 1. **Measures and Notations of Variables**

Variable (Notation)	Definition
Urbanization measure 1 (URB1)	Urban population as a percentage of total population
Urbanization measure 2 (URB2)	Urban land area as a percentage of total land area
Foreign direct investment (FDI)	Net inflows of FDI as a percentage of gross domestic product (GDP)
Trade openness (TRO)	Volume of trade (exports + imports) as a percentage of GDP
Gross domestic product growth (GDPG)	Annual percentage growth rate of GDP at market prices
Domestic capital formation (DCF)	Gross domestic capital formation as a percentage of GDP
Population growth (POP)	Annual percentage growth rate of population
Employment in nonprimary sectors (EMP)	Employment in nonprimary sectors as a percentage of total employment
Rural poverty (POV)	Percentage of rural population below the poverty line ($2.15 per day, 2017 purchasing power parity)

Source: Authors' compilation based on database and definitions from the World Bank. World Development Indicators. https://databank.worldbank.org/source/world-development-indicators (accessed 30 May 2020).

[1] ADB placed its regular assistance to Afghanistan on hold effective 15 August 2021.
[2] Effective 1 February 2021, ADB placed a temporary hold on sovereign project disbursements and new contracts in Myanmar.

The study employs the generalized method of moments (GMM) approach in a dynamic panel structure to control for endogeneity in our regression model. The use of panel data in estimating common relationships across countries is particularly appropriate because it allows for the identification of country-specific effects that control for missing or unobserved variables. Panel model uses more available information, hence more degrees of freedom and efficiency. The model also controls for heterogeneity at the individual level and identifies the effects that cannot be detected in simple time-series or cross-section data.

Panel data unit root tests have become very popular recently for solving the problem of low statistical power of the tests for a single time series. The panel data unit root tests developed by Levin, Lin, and Chu (2002) and Im, Pesaran, and Shin (2003) are employed to explore the time series behaviors of variables. Panel data unit root tests, although similar, are not identical to unit root tests carried out on a single series. In testing panel data unit roots, the basic Augmented Dickey–Fuller specification is presented as follows:

$$\Delta y_{it} = \rho y_{i,t-1} + \sum_{j=1}^{p_i} \eta_{ij} \Delta y_{i,t-j} + X'_{it}\delta + \varepsilon_{it}. \tag{1}$$

In equation (1), Δy_{it} represents the dependent variable, and $\Delta y_{i,t-j}$ and X_{it} are the independent regressors. First, we estimate the regression equation of Δy_{it} on $\Delta y_{i,t-j}$ and X_{it}, and then the process is continued. Following Levin, Lin, and Chu (2002), the test allows the intercepts, time trends, residual variances, and order of autocorrelation to vary freely across the cross-section units. But it requires independently generated time series with a common sample size and all individual AR(1) series to have a common autocorrelation coefficient. The lag order p_i is permitted to vary across individual states. The appropriate lag order is chosen by allowing the maximum lag order and then by using the t-statistics for η_{ij}. The estimate of the autocorrelation coefficient, ρ, is not obtained directly from the estimation of equation (1). By using proxies for Δy_{it} and y_{it} that are standardized and free of autocorrelations and deterministic components, the autocorrelation coefficient can be estimated in the following way. At the first stage, the regression equation of Δy_{it} on $\Delta y_{i,t-j}$ and X_{it} is to be estimated. Similarly, the regression equation of $y_{i,t-1}$ on the same regressors is also estimated. Thereafter, the usual regression coefficients are estimated. Under the null hypothesis, the variable is supposed to have a unit root, whereas the alternative one is trend stationary.

The Levin, Lin, and Chu (2002) test carries some weaknesses—the major one is its implicit assumption that all individual AR(1) series have a common coefficient of autocorrelation. So, under the null hypothesis, each series has a unit root, while under

the alternative hypothesis, each of them is stationary. However, following Im, Pesaran, and Shin (2003), the coefficient of autocorrelation ρ is considered to be different for each cross-section unit even in the case of a heterogeneous panel. In this model, we also test the null hypothesis and corresponding alternative hypothesis. Separate unit root tests have been performed on N time series of the same length, T, by allowing each series to have its own short-run dynamics. After estimating the separate Augmented Dickey–Fuller regressions, the usual test statistics are also calculated.

A frequently used estimator for dynamic panel models with fixed effects in the literature is the GMM estimator (see, for example, Arellano and Bond 1991). In this approach, at first, the fixed effects are eliminated by using first differences in place of the actual level of variables and then an instrumental variable estimation of the differenced equation is performed. Since instruments for the lagged difference of the endogenous variable, or other variables that are correlated with the error term are in differenced form, all lagged levels of the variable in question are used, starting with lag two and potentially going back to the beginning of the sample. The overall validity of the instruments can be checked using Sargan, Hansen, and Wald tests of over-identifying restrictions.

A simple dynamic panel equation with one period lag can usually be expressed as follows:

$$y_{it} = \alpha_i + \theta_t + \beta y_{i,t-1} + x'_{it}\eta + \varepsilon_{it}, \tag{2}$$

where y_{it} is the regressand, α_i denotes the fixed effect, θ_t represents the time dummy, x_{it} indicates a $(k-1)\times 1$ vector of exogenous regressors, and $\varepsilon_{it} \sim N(0,\sigma^2)$ means the random disturbance.

The Hausman specification test makes a comparison between fixed and random effects models under the null hypothesis that individual effects are uncorrelated with any regressor in the equation. If the null hypothesis of no correlation is not violated, the least squares dummy variable and the generalized least squares are consistent, but the former is inefficient; otherwise, the least squares dummy variable is consistent but the generalized least squares is inconsistent and biased. In this study, the Hausman test advocates that the fixed effects model should be more appropriate.

The presence of lagged dependent variables in equation (2) makes the dynamic nature of the regression model. This dynamic fixed-panel growth model can account for the differences in individual effects and make clear a part of the difference in the initial levels of technology across countries. In order to eliminate the unobservable country-specific effects, we difference equation (2), and then it becomes as follows:

$$\Delta y_{it} = \Delta\theta_t + \beta\Delta y_{i,t-1} + \Delta x'_{it}\eta + \Delta\varepsilon_{it}. \tag{3}$$

So, equation (3) specifies a differenced GMM model. The lagged difference of the dependent variable is correlated with the difference of the error term. To remove this kind of endogeneity in equation (3), instrumental variables are to be used. The differenced components of endogenous explanatory variables should be treated cautiously in case of finding the effects of FDI and trade openness on both measures of urbanization included in Table 1. The lagged values of the original regressors are also used with at least two-period lags based on their instruments satisfying the specific moment conditions. The study uses the cross-section dependence test as suggested by Pesaran (2021) to address the cross-section dependence issue, which is a crucial feature in this case.

In this particular empirical investigation, to find the impacts of FDI and trade on both measures of urbanization in developing Asian countries, equation (4) is proposed to be estimated using the panel data as follows:

$$\Delta \mathrm{URB}_{it} = \beta_1 \Delta \mathrm{URB}_{it-1} + \beta_2 \Delta \mathrm{FDI}_{it-1} + \beta_3 \Delta \mathrm{TRO}_{it-1} + \beta_4 \Delta X'_{1it} + \Delta \varepsilon_{it}. \quad (4)$$

In equation (4), X'_{1it} denotes a component matrix of control variables including GDP growth, domestic capital formation, population growth, employment in nonprimary sectors, and rural poverty. We estimate the model (equation 4) separately by using two different measures of urbanization (URB1 and URB2) in order to check the robustness of the empirical outcomes. Equation (4) is to be estimated first without considering X'_{1it}. Then, all respective control variables are incorporated sequentially for testing the robustness of the results.

IV. Empirical Findings

To conduct the econometric analyses of panel data from 31 developing Asian countries from 1991 to 2019 using the aforementioned methods, first we present the descriptive statistics of all underlying variables in Table 2.

All relevant variables' descriptive statistics have been derived from the original yearly time-series data. As a result, some variables have quite large standard deviations with wide ranges. To conduct the empirical exercises, which are described subsequently, the time points of the data series are decreased due to methodological challenges. As a result, numerous statistical dispersion-related issues are removed from the data series. The correlations between each of the concerned variables are shown in Table 3. Simply put, it is seen that there is a strong correlation between the variables and that this correlation is statistically significant.

In order to perform dynamic panel estimation of the impacts of FDI and trade openness on urbanization (both URB1 and URB2), we need to verify the stochastic

Table 2. **Descriptive Statistics of Variables**

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
URB1	49.61	49.89	59.89	39.07	6.63	899
URB2	74.74	74.62	75.53	73.92	0.52	899
FDI	2.22	2.27	3.22	1.41	0.56	899
TRO	58.12	57.26	69.73	46.34	7.41	899
GDPG	4.80	4.76	7.61	0.45	1.51	899
DCF	31.93	31.92	35.70	27.73	2.73	899
POP	0.78	0.74	1.13	0.54	0.14	899
EMP	63.52	63.28	75.22	54.51	7.43	899
POV	19.33	17.60	46.20	1.10	15.47	899

DCF = domestic capital formation, EMP = employment in nonprimary sectors, FDI = foreign direct investment, GDPG = gross domestic product growth, POP = population growth, POV = rural poverty, Std. Dev. = standard deviation, TRO = trade openness, URB1 = urbanization measure 1, URB2 = urbanization measure 2.
Source: Authors' estimates based on the World Bank. World Development Indicators. https://databank.worldbank.org/source/world-development-indicators (accessed 30 May 2020).

Table 3. **Correlation Matrix of Variables**

Variable	URB1	URB2	FDI	TRO	GDPG	DCF	POP	EMP	POV
URB1	1.00***								
URB2	0.89***	1.00***							
FDI	0.61**	0.63**	1.00***						
TRO	0.57**	0.52**	0.67**	1.00***					
GDPG	0.56**	0.54**	0.62**	0.66**	1.00***				
DCF	0.88***	0.79**	0.57**	0.40**	0.31**	1.00***			
POP	0.82**	0.63**	–0.57**	0.55**	–0.46**	–0.50**	1.00***		
EMP	0.92***	0.83***	0.60**	0.28*	0.29**	0.93**	–0.74**	1.00***	
POV	0.79**	0.70**	–0.48*	–0.40*	–0.35*	–0.85**	0.84***	–0.96**	1.00***

DCF = domestic capital formation, EMP = employment in nonprimary sectors, FDI = foreign direct investment, GDPG = gross domestic product growth, POP = population growth, POV = rural poverty, TRO = trade openness, URB1 = urbanization measure 1, URB2 = urbanization measure 2.
Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.
Source: Authors' estimates based on the World Bank. World Development Indicators. https://databank.worldbank.org/source/world-development-indicators (accessed 30 May 2020).

behavior of all variables used in the analysis. We carry out panel unit root tests by applying the methodology developed by Levin, Lin, and Chu (2002) and Im, Pesaran, and Shin (2003). Test statistics for panel unit root are calculated for all underlying panels of World Bank-selected countries. The lag lengths are selected by following minimum Akaike information criterion to estimate the test statistics. We incorporate both individual effects and linear trends as exogenous variables in the estimated equations. The test statistics are shown in Table 4. The results of both the Levin, Lin,

Table 4. **Results of the Panel Unit Root Tests of Variables, 1991–2019**

	Levin, Lin, and Chu (2002) Test (with constant and trend)		Im, Pesaran, and Shin (2003) Test (with constant and trend)	
Variable	**Level**	**First Difference**	**Level**	**First Difference**
URB1	2.19	–5.33***	–0.77	–4.48**
URB2	–1.32	–5.04**	1.93	–6.46***
FDI	1.65	–7.51***	0.92	–7.99***
TRO	1.96	–6.87**	2.21	–5.02**
GDPG	2.51	–8.98***	–3.06	–10.09***
DCF	–1.94	–5.82**	–2.02	–7.41***
POP	0.68	–6.67***	–0.53	–4.59**
EMP	1.70	–5.88***	1.66	–6.13***
POV	0.74	–4.81**	2.02	–5.89***

DCF = domestic capital formation, EMP = employment in nonprimary sectors, FDI = foreign direct investment, GDPG = gross domestic product growth, POP = population growth, POV = rural poverty, TRO = trade openness, URB1 = urbanization measure 1, URB2 = urbanization measure 2.
Note: *** and ** indicate significance at the 1% and 5% levels, respectively.
Source: Authors' estimates based on the World Bank. World Development Indicators. https://databank.worldbank.org/source/world-development-indicators (accessed 30 May 2020).

and Chu (2002) and Im, Pesaran, and Shin (2003) tests imply that all variables have a unit root problem at levels, but their first differences are found to be stationary.

The study uses the first differenced GMM developed by Arellano and Bond (1991) to control the unobserved heterogeneity involved in the estimated relationship. The estimated dynamic panel equations use both measures of urbanization (URB1 or URB2) as the dependent variables and FDI and trade openness as the focused independent variables. The presence of lagged dependent variable in the estimated equation captures the dynamics of urbanization in developing Asian countries. Table 5 presents estimated coefficients of the effects of FDI and trade openness on URB1 in a dynamic panel framework. The dynamic panel equations in Table 5 follow the two-step difference GMM estimation process, exploring four models sequentially to ensure the robustness of the results. Model 1 specifies the initial regression equation followed by the chronological inclusions of earlier mentioned control variables captured by Model 2 and Model 3, respectively. Finally, Model 4 captures this estimation procedure of robustness checking by including all explanatory variables together in a single regression equation.

Estimated results reveal that the urban population as a share of the total population is directly and significantly influenced by its own lag value, FDI, trade openness, GDP growth, domestic capital formation, population growth, and employment in nonprimary sectors at first-differenced forms. However, rural poverty does not have any impact on urban population as a share of total population,

Table 5. **Results of the Dynamic Panel Generalized Method of Moments Estimation with Urbanization Measure 1, 1991–2019**

Dependent Variable: $\Delta URB1_{it}$				
Method: Panel GMM				
Variable	**Model 1**	**Model 2**	**Model 3**	**Model 4**
$\Delta URB1_{it-1}$	0.2966***	0.2821***	0.3110***	0.2055***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔFDI_{it}	0.0412**	0.0410**	0.04087**	0.0391**
	(0.02)	(0.01)	(0.02)	(0.01)
ΔTRO_{it}	0.0611**	0.0579***	0.0542**	0.0527**
	(0.01)	(0.00)	(0.03)	(0.02)
$\Delta GDPG_{it}$		0.0624***		0.0581***
		(0.00)		(0.00)
ΔDCF_{it}		0.0113**		0.0099**
		(0.02)		(0.01)
ΔPOP_{it}			0.0661***	0.0329**
			(0.00)	(0.01)
ΔEMP_{it}			0.0052**	0.0069**
			(0.03)	(0.04)
ΔPOV_{it}			0.0023	0.0019
			(0.16)	(0.12)
Observations	868	868	868	868
Number of instruments	8	9	10	19
Arellano–Bond Test for AR(2)	0.24	0.27	0.21	0.23
Sargan Test *p*-value	0.19	0.22	0.23	0.22
Hansen Test *p*-value	0.20	0.31	0.33	0.25
Wald Test *p*-value	0.00	0.00	0.00	0.00
Pesaran CD Test *p*-value	0.00	0.00	0.00	0.00

CD = cross-section dependence, DCF = domestic capital formation, EMP = employment in nonprimary sectors, FDI = foreign direct investment, GDPG = gross domestic product growth, GMM = generalized method of moments, POP = population growth, POV = rural poverty, TRO = trade openness, URB1 = urbanization measure 1.

Note: *** and ** indicate significance at the 1% and 5% levels, respectively.

Source: Authors' estimates based on the World Bank. World Development Indicators. https://databank.worldbank.org/source/world-development-indicators (accessed 30 May 2020).

as Table 5 depicts. This finding indicates the importance of FDI and trade openness as sources of urbanization, particularly in the creation of new jobs with all supporting public infrastructure. It is observed that a 1% increase in FDI is associated with, on average, a 0.04% increase in the degree of urbanization (measured by population). Compared to the study of Grekou and Owoundi (2020) on African countries from 1979 to 2016, the comparable coefficient was around 0.03%. The larger impact observed for developing Asian countries may be associated with the extent of industrial agglomeration in the region in the 1990s. This agglomeration was typically located adjacent to urban areas to ensure the availability of workers and logistics facilities.

It is noteworthy that both trade openness and GDP growth promote urbanization in developing Asia. The impact of these two variables is relatively stronger than that of FDI, which aligns with the findings of Rauch (1989) that trade liberalization encourages urban concentration and drives FDI along with economic growth. The driver of such development is the fact that international trade changes the output structure of an economy and its urban fabric (Henderson 1996). Hence, the impact of trade liberalization on urbanization primarily depends on the geographical conditions. The impact typically varies between coastal and inland cities within a country. Coastal cities typically experience a higher degree of urbanization due to better accessibility to foreign markets and, therefore, this facilitates labor migration from inland cities to coastal or border cities (Rauch 1991).

The Arellano–Bond-referred, second-order, autocorrelation test confirms the accurate specifications of the models. The reported *p*-values of the Sargan, Hansen, and Wald tests validate that the instruments are exogenous, as reported in the lower part of Table 5. The number of instruments is found to be lesser than the number of cross-section units (i.e., countries) in each model, which is also satisfactory. So, it can be argued that there is no problem of endogeneity in regression outcomes derived from the Arellano and Bond-specified GMM estimation on panel data structure, as stated earlier. The study also performs robustness checking, and the results ensure the consistency of the overall findings of our analysis.

We conduct the same econometric exercise using an alternative measure of urbanization, urban land area as a percentage of total land area (URB2), as the dependent variable. The outcomes are presented in Table 6. Our target is to verify the robustness of the findings depicted in Table 5 and, fortunately, the data presented in Table 6 with this different measure of urbanization confirm the robustness of the results illustrated in Table 5, which used the usual measure of urbanization—urban population as a share of total population (URB1).

Tables 7 and 8 demonstrate the results of two periods of observations between 1991 and 2019 to investigate the impact of the GFC. The first observation is the pre-GFC period from 1991 to 2008, and the second one is the post-GFC period from 2009 to 2019. Similar patterns of unit root test results for different panel data sets in two different periods (i.e., 1991–2008 and 2009–2019) are observed in comparison to the full panel data set from 1991 to 2019 (see Table 4). In both cases, first, we estimate the proposed dynamic panel GMM model (equation 4) using URB1 as the basic measure of urbanization; thereafter, the robustness of the findings is checked by using URB2 as an alternative measure of urbanization, as in the previous cases (see Tables 5 and 6).[3]

[3] Results for URB2 are available upon request.

Table 6. **Results of the Dynamic Panel Generalized Method of Moments Estimation with Urbanization Measure 2, 1991–2019**

Dependent Variable: $\Delta URB2_{it}$				
Method: Panel GMM				
Variable	**Model 1**	**Model 2**	**Model 3**	**Model 4**
$\Delta URB2_{it-1}$	0.3011***	0.2866***	0.2955***	0.2671***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔFDI_{it}	0.0409**	0.0397**	0.0413**	0.04001**
	(0.03)	(0.01)	(0.01)	(0.02)
ΔTRO_{it}	0.0592***	0.0601***	0.0577**	0.0499**
	(0.000)	(0.00)	(0.01)	(0.02)
$\Delta GDPG_{it}$		0.0607***		0.0556**
		(0.00)		(0.01)
ΔDCF_{it}		0.0140**		0.0100**
		(0.03)		(0.02)
ΔPOP_{it}			0.0591***	0.0344**
			(0.00)	(0.01)
ΔEMP_{it}			0.0067**	0.0053**
			(0.02)	(0.02)
ΔPOV_{it}			0.0088	0.0011
			(0.21)	(0.19)
Observations	868	868	868	868
Number of instruments	10	8	9	9
Arellano–Bond Test for AR(2)	0.18	0.21	0.26	0.31
Sargan Test *p*-value	0.22	0.24	0.29	0.17
Hansen Test *p*-value	0.34	0.20	0.16	0.20
Wald Test *p*-value	0.00	0.00	0.00	0.00
Pesaran CD Test *p*-value	0.00	0.00	0.00	0.00

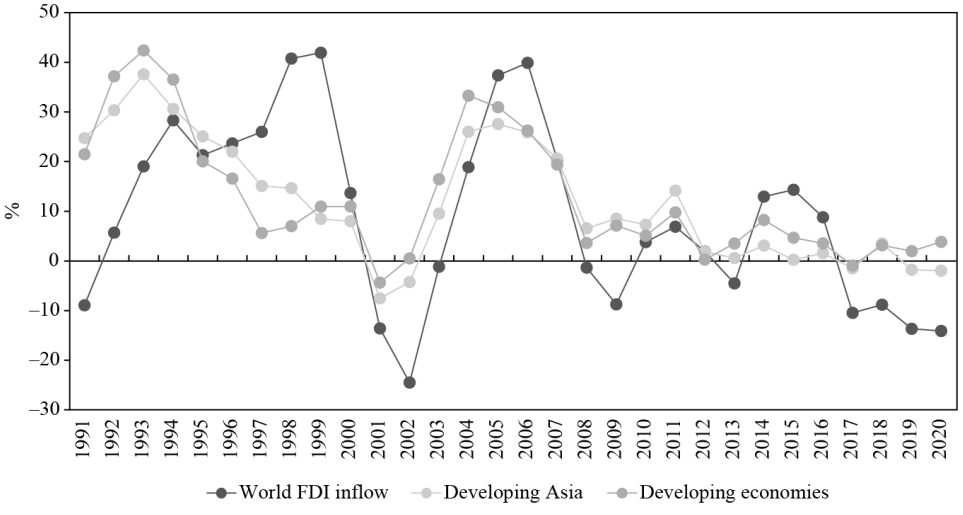
CD = cross-section dependence, DCF = domestic capital formation, EMP = employment in nonprimary sectors, FDI = foreign direct investment, GDPG = gross domestic product growth, GMM = generalized method of moments, POP = population growth, POV = rural poverty, TRO = trade openness, URB2 = urbanization measure 2.

Note: *** and ** indicate significance at the 1% and 5% levels, respectively.

Source: Authors' estimates based on the World Bank. World Development Indicators. https://databank.worldbank.org/source/world-development-indicators (accessed 30 May 2020).

The estimated outcomes with URB2 as the alternative measure of urbanization in two different models for two different periods (i.e., 1991–2008 and 2009–2019) also confirm the robustness of the results with URB1 as the basic measure of urbanization in those two periods. The results show that the impact of FDI on urbanization in developing Asia is only significant in the post-GFC period. This finding is not as expected initially. Looking at the historical FDI growth data in developing Asia shown in the figure below, a declining trend is observed from the beginning of the observation period in 1991 until the 1997/98 Asian financial crisis. The lowest growth rate in FDI occurs in 1998, which provides evidence of the severity of this financial crisis. FDI grows at a much more stable rate during the period after the GFC. However, the

Global Foreign Direct Investment Inflows (3-Year Moving Average)



FDI = foreign direct investment.
Source: Authors' estimates based on the World Bank. World Development Indicators. https://databank.worldbank.org/source/world-development-indicators (accessed 30 May 2020).

average FDI growth rate following the GFC is 4.2%, compared with 18.6% before the GFC. The observed outcomes during the post-GFC period are more likely to be linked to increased FDI, mainly driven by advanced technologies, financial market development, economic development, and improved macroeconomic fundamentals in developing Asian countries.

The insignificant impact of FDI on urbanization prior to the GFC may have been caused by the type of FDI inflows to developing Asia. Studies by Zhang (2002) and Liu, Su, and Jiang (2015) indicate the adverse effect of FDI on urbanization when such investment mainly flows into the primary sector. The figure above highlights this phenomenon with a timeline of the commodity boom from the middle of the 1990s until 2011.

Further investigation confirms that structural changes in the economy were the primary factors behind this finding. Exports from developing Asia from four major sectors of the economy grew from the middle of the 1990s to the end of the commodity boom in 2011 (Shepherd 2019). Exports from the manufacturing and service sectors accelerated rapidly during this period, particularly after the GFC. Despite a weakened global economy in general and the ending of the commodity boom after the GFC, demand for manufacturing remained strong. Among other factors, this has been due to growing domestic consumption by the middle class in developing Asian countries as they acquire more purchasing power with higher disposable incomes. On the supply

Table 7. **Results of Dynamic Panel Generalized Method of Moments Estimation with Urbanization Measure 1, 1991–2008**

Dependent Variable: $\Delta URB1_{it}$				
Method: Panel GMM				
Variable	**Model 1**	**Model 2**	**Model 3**	**Model 4**
$\Delta URB1_{it-1}$	0.2549***	0.2221***	0.2074***	0.2008***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔFDI_{it}	0.0067	0.0009	0.0018	0.0091
	(0.16)	(0.23)	(0.18)	(0.32)
ΔTRO_{it}	0.0611**	0.0579***	0.0542**	0.0527**
	(0.01)	(0.00)	(0.03)	(0.02)
$\Delta GDPG_{it}$		0.0602***		0.0553**
		(0.00)		(0.01)
ΔDCF_{it}		0.0122**		0.0089***
		(0.03)		(0.00)
ΔPOP_{it}			0.0466**	0.0351***
			(0.01)	(0.00)
ΔEMP_{it}			0.0084**	0.0079**
			(0.02)	(0.02)
ΔPOV_{it}			0.0116**	0.0101**
			(0.02)	(0.03)
Observations	527	527	527	527
Number of instruments	7	6	8	7
Arellano–Bond Test for AR(2)	0.17	0.15	0.22	0.20
Sargan Test *p*-value	0.29	0.24	0.21	0.18
Hansen Test *p*-value	0.22	0.21	0.23	0.19
Wald Test *p*-value	0.00	0.00	0.00	0.00
Pesaran CD Test *p*-value	0.00	0.00	0.00	0.00

CD = cross-section dependence, DCF = domestic capital formation, EMP = employment in nonprimary sectors, FDI = foreign direct investment, GDPG = gross domestic product growth, GMM = generalized method of moments, POP = population growth, POV = rural poverty, TRO = trade openness, URB1 = urbanization measure 1.

Note: *** and ** indicate significance at the 1% and 5% levels, respectively.

Source: Authors' estimates based on the World Bank. World Development Indicators. https://databank.worldbank.org/source/world-development-indicators (accessed 30 May 2020).

side, the development of more sophisticated industries and participation in higher levels of global supply chains has also driven FDI.

Transformation in the service sector has also played a role in attracting FDI. The acceleration of growth in service industries is facilitated by increased tradable activities, particularly manufacturing, as global supply chains expand. Technology has become the key factor in this development that focuses on digitalization and automation. Further, technological developments have not put constraints on labor utilization, as has sometimes occurred in developed countries. This allows for an increase in the labor absorption capacity of the service sectors and, thus, induces urbanization.

Table 8. **Results of Dynamic Panel Generalized Method of Moments Estimation with Urbanization Measure 1, 2009–2019**

Dependent Variable: $\Delta URB1_{it}$				
Method: Panel GMM				
Variable	**Model 1**	**Model 2**	**Model 3**	**Model 4**
$\Delta URB1_{it-1}$	0.2988***	0.3050***	0.2994***	0.2916***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔFDI_{it}	0.0312**	0.0336**	0.0277**	0.0322**
	(0.01)	(0.01)	(0.02)	(0.01)
ΔTRO_{it}	0.0646***	0.0599**	0.0601**	0.0633***
	(0.00)	(0.02)	(0.01)	(0.00)
$\Delta GDPG_{it}$		0.0712***		0.0684**
		(0.00)		(0.01)
ΔDCF_{it}		0.0157**		0.0111**
		(0.02)		(0.01)
ΔPOP_{it}			0.0302**	0.0296**
			(0.02)	(0.01)
ΔEMP_{it}			0.0101**	0.0095**
			(0.01)	(0.02)
ΔPOV_{it}			0.0007	0.0041
			(0.18)	(0.22)
Observations	310	310	310	310
Number of instruments	6	7	5	6
Arellano–Bond Test for AR(2)	0.24	0.22	0.25	0.41
Sargan Test *p*-value	0.19	0.37	0.21	0.15
Hansen Test *p*-value	0.25	0.20	0.20	0.30
Wald Test *p*-value	0.00	0.00	0.00	0.00
Pesaran CD Test *p*-value	0.00	0.00	0.00	0.00

CD = cross-section dependence, DCF = domestic capital formation, EMP = employment in nonprimary sectors, FDI = foreign direct investment, GDPG = gross domestic product growth, GMM = generalized method of moments, POP = population growth, POV = rural poverty, TRO = trade openness, URB1 = urbanization measure 1.

Note: *** and ** indicate significance at the 1% and 5% levels, respectively.

Source: Authors' estimates based on the World Bank. World Development Indicators. https://databank.worldbank.org/source/world-development-indicators (accessed 30 May 2020).

The impacts from trade openness and GDP growth are also higher in the post-GFC period than in the pre-GFC period, despite the deglobalization trend. The more obvious difference is the comparison of coefficients of trade openness between those two periods. The degree of impact from trade openness is twice as high in the post-GFC period. However, the coefficients of trade openness are larger than FDI in both periods. Among other factors, this was caused by the rapid expansion of global supply chains into developing Asia, which is the key reason for rising FDI, particularly in high-tech manufacturing industries. Another determinant factor has been structural changes in the economies of developing Asia, including more efficient supply chains

and logistics infrastructure. Following the GFC, infrastructure development has been the key economic reform policy used to overcome the low-growth phenomenon.

V. Concluding Remarks

The empirical exercise in this paper provides evidence of the significant impacts of FDI inflows and international trade on urbanization in developing Asia, as measured by the size of the urban population relative to the total population. The impact was more significant after the GFC due to structural changes in the region's economies, including the rapid growth of exports in the manufacturing sector and further development of the service sector. Rising middle-class incomes and technological development also contributed to the upward growth trends in the manufacturing and service industries, which are primarily located in urban areas.

Globalization, as represented by trade openness, also has a significant impact on urbanization. The impacts from global trade activities on urbanization are larger than those from FDI. Further, in the post-GFC period, the impact from trade openness is two times higher than in the pre-GFC period. More efficient supply chains and logistics infrastructure, leading to an expansion in connectivity, are among the drivers. This also indicates that FDI can be further advanced through trade liberalization since FDI tends to follow trade activities.

In light of these findings, developing Asia should restrategize and properly manage policies related to urbanization. With the continued expansion of the middle class, projections of rapid growth in domestic consumption are a near certainty. However, excessive urbanization can eventually hinder the benefits of FDI as a source of capital accumulation and economic growth. In the midst of the recent deglobalization trend and the COVID-19 pandemic, a growth strategy for urban areas should prioritize overcoming rising inequality and creating quality jobs. In addition, structural reforms focusing on technology, infrastructure, and human resources should be pursued. Such policies will be critical factors in attracting stable FDI flows and sustaining future economic growth in developing Asia.

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