

# Australian Conference of Economists (ACE) 2022

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Topic: Exploring the Pull Factors of Foreign Direct Investment in Developing Economies: A Study using a Dynamic Panel Data Model

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# 1.1 Introduction

- Capital inflows are the fundamental ingredient in economic growth since capital is required to finance investment. The movement of capital across borders is sensitive to economic policies and their performance and has implications for macroeconomic policies.
- It is a challenge for the least developed countries (LDCs) and developing countries to attract capital for economic growth to achieve and maintain a higher standard of living for their people.
- FDI is one of the primary sources of capital that developing countries can use to promote economic growth and welfare. Developing economies are continuously striving to attract sufficient private inflows as well as other forms of capital.
- The study analyzes if there is a common set of FDI determinants in developing economies and whether the determinants vary across different periods.



## 1.1 Introduction (contd...)

- According to the Balance of Payments Manual (BPM5) (IMF (1996)), **FDI refers to long-term investment by a resident in one economy to another economy.** The lasting interest of FDI implies that the investor owns a 10% or more equity ownership with an effective voice in the management of the enterprise(s) invested in. FDI consists of three main components:
  - i) acquisition or disposal of equity capital,
  - ii) reinvestment of earnings, not distributed as dividends, and
  - iii) provision of long-term and short-term intra-company loans.
- Conversely, the BMP5 defines **portfolio investment as the economy's financial assets and liabilities.** The instruments of the portfolio investment include equity and debt securities, which are tradable (traded) in the financial markets.
- **Portfolio investment** differs from direct investment in that the former is concerned about **rates of return**, and **funds can be withdrawn quickly, if required.** Portfolio investors have the flexibility to shift capital to any instrument regardless of the instrument's maturity.

# 1.1 Introduction (contd...)

- Dunning and Lundan (2008) identified and described four types of FDI based on multinational enterprises' (MNEs') activity in the host economy.

**a) Market-seeking FDI:** FDI is motivated to supply goods or services in the host markets or promote new markets that were served previously through exports. It takes the advantage of market size and low costs of production & transactions in the host economy.

**b) Efficiency-seeking FDI:** FDI flows to host economies that enjoy endowments in factors of production or in a similar type of economy to achieve economies of scale in production and to serve multiple markets. Therefore, labor force, trade openness, and demographic variables seem to determine such FDI flow in the host economy.

**c) Resource-seeking FDI:** FDI tends to flow to economies that can supply necessary resources and labor forces at a lower cost.

**d) Strategic asset-seeking FDI:** FDI is linked to any of the above motives combined with specific long-term strategic objectives. This may involve the acquisition of foreign assets to sustain or advance their competitive strength in the global market and resembles resource-seeking FDI.

# 1.1 Introduction (contd...)

- This study investigates FDI determinants in developing countries using;  
Model: linear dynamic panel data (DPD) model.  
Estimation technique: Two-step system generalized method of moments (sGMM).  
Time period: 1980 to 2017.
- The sGMM is superior since it addresses the issues of unobserved heterogeneity, omitted variable bias, measurement error, and endogeneity (Bond et al., 2001; Kiviet, 2020).
- Data transformation is done by FoD, which outperforms first-differencing (FD) transformation regarding the standard errors, root mean squared errors, smaller bias in the autoregressive process, and for a finite sample with larger time periods.
- The study will contribute to the empirical literature by revealing a potential set of FDI determinants in developing economies over two consecutive periods, addressing the econometric challenges mentioned above.

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## 1.2 Theoretical Framework

- The theoretical literature presents several different views regarding the driving forces of FDI, some consider FDI to be an exogenous factor, while others incorporate the variable endogenously.
- Empirical literature does not suggest a unique set of FDI determinants: rather, these vary over time, across economies and are assumed to be country specific.
- A brief review of the relevant economic theories and hypotheses explaining the driving forces of FDI in developing economies is discussed below.

### 1.2.1 Neoclassical Growth Theory:

- According to the neoclassical growth model by Solow (1956), **output is produced using labor and capital, and savings equal investment**. A portion of the output (savings) is invested to increase the amount of physical capital.
- In equilibrium, **the model assumes a constant growth rate of variables** (per capita) which is zero at steady state. Permanent growth can only be achieved by increasing the effectiveness of labor through technological advancement and/or growth of labor forces, which are exogenous to the model.
- In addition, **the assumption of diminishing marginal products of input, perfect competition, and positive substitution of inputs** (Sass, 2003), which impose limitations on the growth prospects of FDI.

## 1.2 Theoretical Framework (contd....)

### 1.2.2 Endogenous Growth Theory:

- The notion of **one type of capital in the neoclassical model is extended** with a broader meaning by Rebelo (1991); Romer (1986). This model introduces capital in the form of human capital, R&D, and associated externalities.
- **Foreign capital is considered endogenous** in this model and can play a potential role in the growth process through its impact on human capital and/or R&D.
- **With the assumption of decreasing returns to scale, FDI is growth enhancing through externality effects** such as knowledge leaking into the host economy through organizational forms, improvement of the labor force, and fixed assets.

### 1.2.3 Trade Theory Approach:

- Trade theory states that the **global movement of savings and investments results in an increase or decrease of capital**, and usually, both the trading nations gain from such trade (Krugman et al., 2012).
- A country's **investment opportunities are not restricted by its own savings rate**: there is scope to attract and use foreign funds to generate higher output gains.
- According to this theory, **trade openness is the primary determinant of FDI inflow** in developing economies.



## 1.2 Theoretical Framework (contd....)

### 1.2.4 FDI Determinants in Ownership, Location, Internalization (OLI) Framework:

- Based on the internalization theory and traditional trade theories, Dunning (1977, 1979) propose the eclectic paradigm of FDI to explain the motivation of MNEs' investment abroad. According to the eclectic paradigm or the ownership, location, internalization (OLI) framework by Dunning (1980), MNE's FDI activity in the host economy is encouraged by the availability of three special factors: ownership, location, and internalization advantages.
  - *Ownership advantage ensures a competitive production facility for MNEs over the domestic firms through better technology, branding, and management practices.*
  - *Location-specific motivations include natural endowments, market base and size, infrastructure, political and cultural business environment, favorable tax policies, lower costs of transportation and production, low levels of risk, and access to domestic markets.*
  - *Lastly, internalization advantages include lower transaction costs, minimum technology imitation through quality control, and effective management practices to maintain the firm's branding fame.*
- Dunning (1988) also states that OLI advantages vary depending on whether the economies are developing or developed, small or large, and whether industries are technologically developed or not. For this study, the terms MNEs and MNCs are used interchangeably.

## 1.2 Theoretical Framework (contd....)

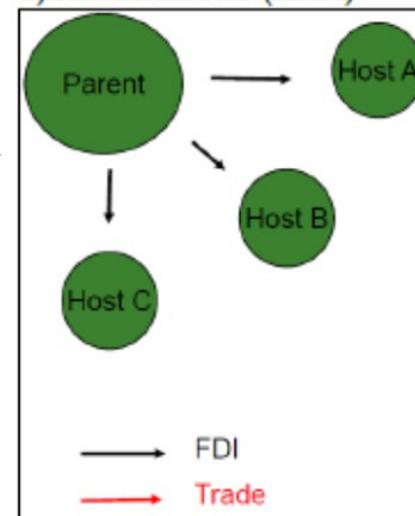
### 1.2.5 Proximity-Concentration Hypothesis, Factor-Proportions Hypothesis, & Knowledge-Capital Model:

- **The proximity-concentration hypothesis** by Krugman (1983) explains HFDI, which relies on a trade-off between production (supplier) proximity and customer proximity to achieve economies of scale. Globerman and Shapiro (2002); Helpman (1948) opine that HFDI is preferred to offset the higher trade costs.
- **The factor-proportions hypothesis** proposed by Helpman (1984, 1985) explains that FDI allows splitting the vertical production processes into several geographic locations to enjoy the advantage of factor endowments.
- **The knowledge-capital model** proposed by Markusen (1997) is the combination of HFDI and VFDI, in which trade costs, market size, and factor endowments determine the FDI flow decision into the host economy.

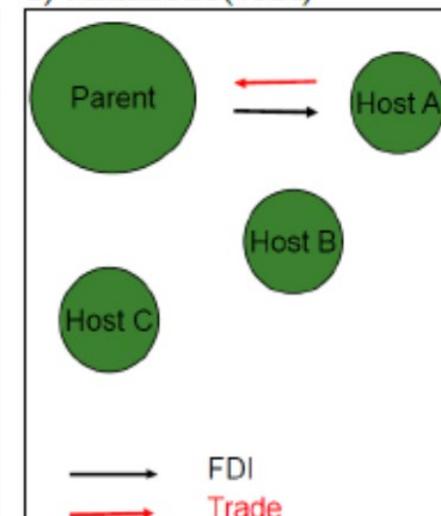
## 1.2 Theoretical Framework (contd....)

- FDI may take different forms of flow;
- **Horizontal FDI (HFDI):** The form of investment from a parent country to their trading partners to replace trade between them and offset the trade costs.
- **Vertical FDI (VFDI):** It is motivated to take the comparative advantages of a larger proportion of unskilled labor force and lower wages in the host country. Parent country export intermediate goods to the host economy and imports back the final products.
- **The Export-Platform FDI:** It is motivated to export back to the home country or other countries and trade blocks with better access, offsetting artificial (tariff) as well as natural (transport cost) barriers to trade (Ekholm et al., 2007). Since export-platform FDI does not face local competition, it tends to benefit the host country through technology spillovers.

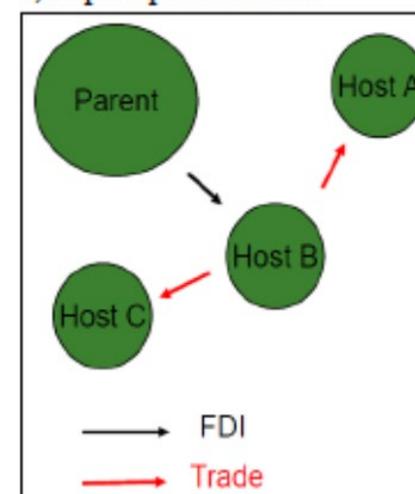
a) Horizontal FDI (HFDI)



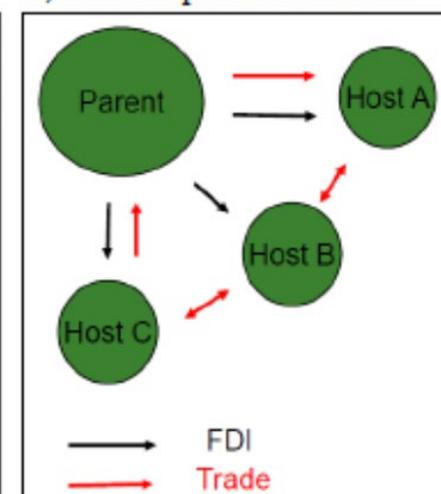
b) Vertical FDI (VFDI)



c) Export-platform FDI



d) Vertical specialization FDI



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- The selection of a particular set of FDI determinants is difficult, given the wide range of factors that can govern the level of FDI a country attracts. FDI determinants vary in different econometric specifications, samples, and over different time periods. Factors that affect foreign capital flow in one country may not be the same for other economies. The significance of each of the FDI determinants may vary along different stages of the development path in the host economy as well as on its level of economic growth. Blonigen and Piger (2014) investigate the inclusion and exclusion probabilities of 56 covariates which are frequently used in the empirical literature to analyze FDI flow decisions.

### 1.3.1 Market Size:

- The market size has been, by far, **the most widely accepted variable to explain FDI flow** into the host economy (Pistorresi, 2000; Sader, 1993; Tsai, 1994; Wheeler and Mody, 1992).
- According to the market size hypothesis, **foreign investors are keener to invest in larger economies and markets and use the host country's resources efficiently to achieve economies of scale in production**. The empirical literature on FDI demonstrates that per capita GDP, GNP per capita, and absolute GDP are commonly used proxies for market size (Chakrabarti, 2001).
- **GDP per capita is considered an significant FDI determinant** in much of the empirical literature (Chakrabarti, 2001; Garibaldi et al., 2001; Lankes and Venables, 1996; Nigh, 1985; Resmini, 2000; Sahoo, 2006).

# 1.3 Literature Review (contd...)

## 1.3.2 Foreign Aid:

- **Foreign aid** is another important source of capital in developing countries and is assumed to be highly volatile. Aid may affect FDI flow through its impact on economic growth or by crowding out FDI.
- Alesina and Dollar (2000) suggest that **aid has no significant effect on growth through foreign investments**. Aid shortfall may result in decreased investment, while an aid windfall may raise government consumption.
- The illustration of FDI and aid in developing countries in Figure 1.3 demonstrates that relatively poor countries (LICs) receive less aid and FDI over time compared to LMICs. LMICs have managed to attract more FDI, subduing the aid. However, the poorer countries are lagging where aid is still dominant and even higher than FDI.

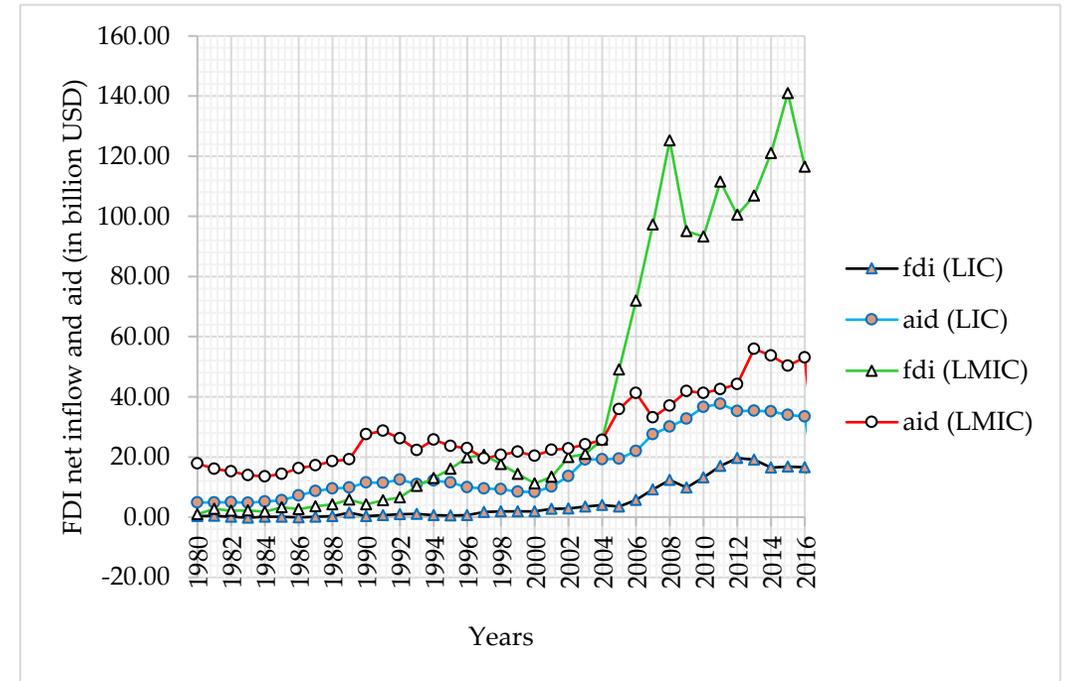


Figure 1.3 Aid and FDI flow (billion USD) in LICs & LMICs

# 1.3 Literature Review (contd...)

## 1.3.3 Domestic Investment: The presence of FDI may crowd in or crowd out domestic investment (DI).

- **The Crowding-in is the complementary effect of FDI on DI**, which means FDI inflow stimulates DI through forward and backward linkages, and spillover effects resulting in a beneficial effect in the economy. The positive or complementary effects of FDI on DI are thought to stem from its contribution in increasing the capital base, introduction of new technology and managerial expertise, spillover effects, and creation of a competitive business environment.
- **The crowding-out effect of FDI on DI** occurs when FDI flow displaces or reduces DI. Crowding out has a negative impact in the economy. The negative impacts are attributed to the superiority of foreign firms (improved technology) and the resulting imperfect competition (because of the technology gap), which may increase the price of local inputs, raise the wage, and reduce employment opportunities in domestic firms. However, the agglomeration effects and differential treatment of foreign firms in accessing credit may eventually dry up or displace local firms in the long run.
- **The proponents of the crowding-in effect of FDI on DI** include Al-Sadig (2013); Borensztein et al. (1998); Ndikumana and Verick (2008); Ramirez (2010); Tang et al. (2008). Some authors opine that FDI does not support domestic investment (Morrissey and Udomkerdmongkol, 2012; Mutenyo et al., 2010; Titarenko, 2005). Others find a mixed effect of FDI or no effect at all (Adams, 2009; Agosin and Machado, 2005; Apergis et al., 2006).
- Moreover, **in presence of information asymmetry**, the domestic investment reflects the business environment in the host economy and gives a positive signal to foreign investors about profitability in the host economy.

# 1.3 Literature Review (contd...)

## 1.3.4 Inflation

- Inflation reflects the monetary discipline of an economy, macroeconomic instability, or risk variable. Central banks and governments attempt to keep inflation low so that it does not act as a tax on returns of capital (Alfaro et al., 2008). Meyer (2001) argues that macroeconomic instability poses a challenge to investors' FDI decisions.
- Inflationary pressure increases risk and uncertainty for a firm's capital investment prospects. High inflation and associated depreciation in the host economy improve its competitiveness internationally. As business facilities become cheaper to foreign investors, the value of their financial flow grows, and higher profitability attracts more FDI.
- However, Trevino et al. (2008) argue that unanticipated depreciation increases the risk of capital outlays, making long-term planning difficult for foreign investors. Therefore, inflationary pressure may reduce FDI inflow. Inflation is found to be negative and significant in developing countries (Kok and Ersoy, 2009; Li and Liu, 2005). Inflation is considered an important determinant of FDI in Asian economies (Asiedu, 2002; Mercereau, 2005), where low inflation seems to promote FDI flow.
- Although low inflation is assumed to reduce the risk and uncertainty, the associated appreciation of the currency in the host economy reverses the situation and dampens the motive of FDI inflow.
- In the empirical literature, inflation is proxied either by Consumer Price Index (CPI) or the GDP deflator. The study adopts GDP deflator as a potential determinant of FDI following Busse and Hefeker (2007); Kok and Ersoy (2009); Sun (2014).

# 1.3 Literature Review (contd...)

## 1.3.5 Real Effective Exchange Rate:

- The real effective exchange rate (RER) is the real value of a country's currency against a basket of currencies of their trading partners. The RER is an important variable that affects the profit of foreign firms (or MNE) in the host economy (Choi and Jeon, 2007).
- Apergis et al. (2012) state that the RER is more important for long-term foreign investors (FDI) than short-term portfolio financing, as the latter group has the scope to mitigate the risk of RER volatility through using derivative markets.
- The effect of RER on FDI depends on the motive of FDI flow: whether it is market-seeking or export-seeking (Caves, 1989).
  - *If FDI is market-seeking, an appreciating currency in the host economy reflects an increase in purchasing power of its consumers for imported goods.*
  - *If FDI can provide substitutes for imported goods, then the appreciating currency in the host economy will attract more FDI.*
  - *However, if FDI is export-seeking, an appreciating currency in the host economy increases the prices of goods exported from it, lowering its demand, and reducing the incentive for FDI.*
- A lower RER in the host economy reduces production costs in terms of the MNE's home currency, increases profit, and hence attracts more FDI (Blonigen, 1997).
- However, long-term depreciation in the host currency increases the risk of inflation and lowers the value of assets held by foreign investors in the host country (Apergis et al., 2000). A depreciating currency also reduces the value of profits once repatriated back to the home country and thus reduces the incentive for FDI.

# 1.3 Literature Review (contd...)

## 1.3.6 Trade Openness:

- Most of the empirical literature has included trade openness as an important determinant of FDI, **measured as a share of trade (exports plus imports) as a percentage of GDP.**
- Trade openness may affect FDI decisions in two ways.
  - **Market-seeking FDI prefers a less open economy** to explore the market in the host country by producing at economies of scale.
  - **Export-seeking FDI prefers an open economy** to offset trade restrictions and avoid higher transaction costs. Greater trade openness also favors resource-seeking FDI.
- Trade openness is considered a positive and significant determinant of FDI in much of the empirical literature (Asiedu, 2002; Holland and Pain, 1998; Lankes and Venables, 1996; Sahoo, 2006; Trevino et al., 2008). Although higher trade barriers and access to larger markets encourage HFDI, it reduces VFDI flow and vice versa.

## 1.3.7 Human Capital:

- **Human capital (HC), like physical capital,** is another important determinant of FDI. Goldin (2016) defines HC as a **set of intangible resources (knowledge, skills, talents, experience, and health)** that are embedded into the labor factor that improves productivity.
- **As a vehicle of technology transfer,** FDI depends on the absorptive capacity in the host country: that is, the current level of human capital.

## 1.3 Literature Review (contd...)

- Noorbakhsh and Paloni (2001) argue that **the quality and quantity of human capital are important for FDI decisions** and their impact on developing countries. The direct effect of HC depends on the level of education attainment. Higher levels of educational attainment mean greater potential for innovation, improved factor productivity, and productive capacity (Benhabib and Spiegel, 1994; Teixeira and Fortuna, 2010).
- In the empirical literature, **human capital is proxied by different variables** such as adult literacy rates, enrolment in primary/secondary/tertiary education, school enrolment ratios, average years of schooling, educational attainment level, individual income, and students' international test scores (Teixeira and Fortuna, 2010).
- However, inspired by the empirical literature, **this study uses gross primary level enrolment** as a proxy for human capital.

### 1.3.8 Infrastructure:

- Infrastructure is a traditional covariate to explain the ability of the host country to attract or deter FDI inflow (Asiedu, 2002; Caves, 1974; Dunning, 1980; Grosse and Trevino, 1996).
- **The quantity and quality of infrastructure represent the absorptive capacity** in the host country and act as an incentive to foreign investors. Better infrastructure results in higher returns on investment by improving the network for the distribution of goods, reducing operating costs and attracting more FDI (Asiedu, 2002; Wheeler and Mody, 1992).
- **Good infrastructure is considered an important FDI determinant** for South Asian countries (Bhavan et al., 2011), in BRICS countries (Vijayakumar et al., 2010), in sub-Saharan African countries (Cleeve et al., 2015), in Eastern European countries (Stack et al., 2017), in Southeast European countries (Estrin and Uvalic, 2014), in Latin American countries (Al Nasser, 2010), and in developed countries (Benáček et al., 2014).

# 1.3 Literature Review (contd...)

- However, Blonigen and Piger (2014); Globerman and Shapiro (2002) find little supporting evidence that host country infrastructure is conducive for FDI and growth.
- This study used two infrastructure variables, number of land lines/100 people and number mobile subscription/100 people
- Based on the empirical literature, **this study considers land telephone lines per 100 people and mobile telephone subscriptions per 100 people** as proxies for the level of infrastructure development in the host economy.
  - *Before the introduction of mobile telephones, the penetration rate for the fixed (land) telephone was higher. However, since the 1990s, the number of mobile telephone users in low-income economies has been outpacing the number of fixed telephone users, as shown in figure. This demonstrate the importance of mobile telephone to attract FDI over land telephone in recent time.*

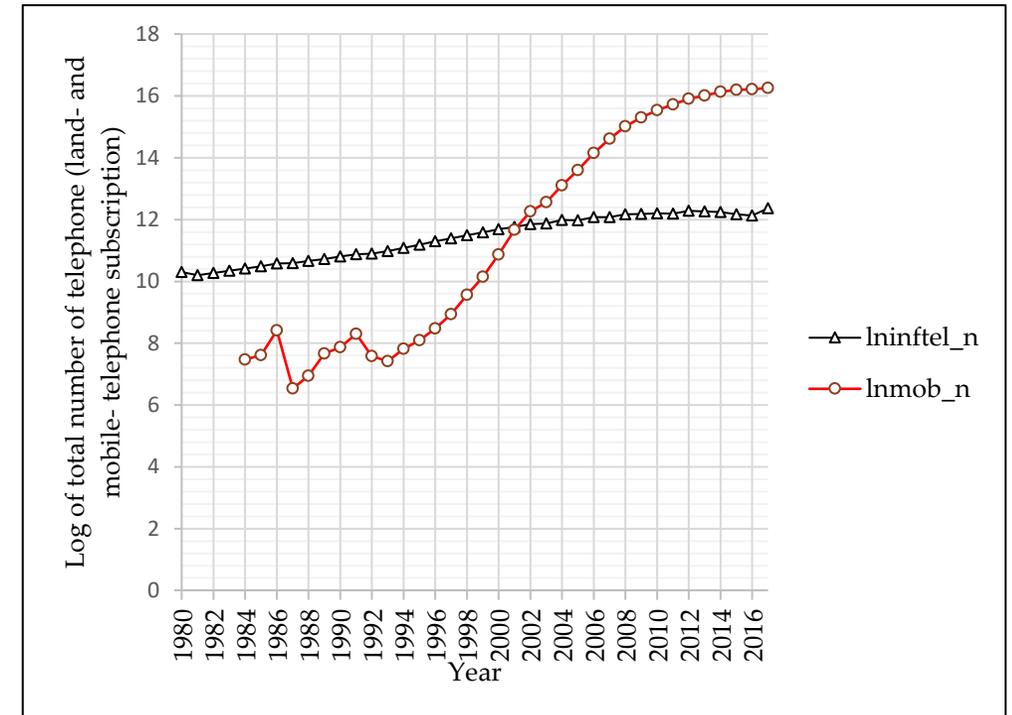


Figure 1.4 Number of land & mobile telephones; 1980 to 2017.

# 1.3 Literature Review (contd...)

## 1.3.9 Financial Development:

- The importance of well-developed financial institutions for capital accumulation, including FDI, technology diffusion, and economic growth, has been recognized since Schumpeter (1911). The extent of development of the financial institutions affects the return of FDI, and subsequently, FDI decisions.
- The **lack of a well-developed financial system** not only increases transaction costs but also limits the potential for foreign entrepreneurs. This study will examine the role of domestic credit markets to attract FDI since it is the host country's banking system through which the majority of FDI must flow in developing economies.
- This study includes four financial development variables related to credit (non-stock capital) market systems.
  - **First, private sector credit (PRC)** that reflects the efficiency of the banking sector in providing credits.
  - **Second, bank credit (BCR)** equals the credit by deposit money banks to the private sector as a share of GDP (it does not include non-BCR to the private sector and may be less comprehensive than PRC for some countries).
  - **Third, commercial-central bank assets (henceforth, CBA)** indicates the degree to which commercial banks versus the central bank allocate society's savings. King and Levine (1993); Levine et al. (2000), and other researchers have used this measure. CBA provides a relative size indicator: that is, the importance of the different financial institutions and sectors relative to each other. However, the variable does not reflect whether the credit is allocated to the public or private sector.
  - **Fourth, liquid liabilities of the financial system (LLY)** that measures the overall size of the financial sector without distinguishing between different financial institutions.

# 1.3 Literature Review (contd...)

## 1.3.10 Institutional Quality:

- There are reasons that FDI may be attracted to countries that have high-quality legal and legislative institutions, as well as reasons that FDI may be attracted to countries with poorer institutions.
- **MNCs may prefer to invest in host economies with minimum institutional distance** from their own developed country. On the other hand, **developed countries often encourage developing countries to adopt and harmonize better institutional quality** to foster economic exchange. For this reason, it is advantageous for host countries to have institutions that are of similar quality to the source economy to attract FDI, a requirement confirmed by several studies (Ali et al., 2010; Buchanan et al., 2012; Busse and Hefeker, 2007; Javorcik and Wei, 2009).
- Javorcik and Wei (2009) suggest that **a weak and bad institutional setup increases transaction costs for MNCs**. According to (Busse and Hefeker, 2007), this brings resource-seeking, low-technology FDI. Moreover, poor institutions increase the cost of FDI (Daude and Stein, 2007), increase its uncertainty and volatility, and encourage inefficient allocation of resources (Cuervo-Cazurra and Genc, 2008; Grosse and Trevino, 1996; Robertson and Watson, 2004), and therefore deter FDI (Büthe and Milner, 2008; Globerman and Shapiro, 2002). Hence, institutional quality seems to be a significant determinant of FDI in the developing countries (Ali et al., 2010).
- According to Bailey (2018); Globerman and Shapiro (2002); Sethi et al. (2003) rule of law, democracy, and political stability attract more FDI, but tax policies, corruption, and cultural gaps have a deterrent effect on FDI. A stable political environment is required for credible and smooth FDI.



## 1.3 Literature Review (contd...)

- Campos and Nugent (2003); Sethi et al. (2003) find a positive effect of political stability, but Globerman and Shapiro (2002); Trevino et al. (2008) find that it does not influence FDI inflow.
- **The rule of law contributes to fair competition and greater return from FDI.** An effective, transparent, impartial, and quality legal system with proper enforcement of laws, including the enactment of property rights, is important to attract foreign capital.
- Corruption is another measure of institutional quality that **causes an inefficient allocation of resources, market distortion, and increased business cost, discouraging FDI flow.** Thus, corruption affects FDI inflow negatively (Cuervo-Cazurra, 2006; Globerman and Shapiro, 2002).
  - *A further argument appearing in the empirical literature is that the recent rise of FDI flow from developing to developing countries promotes corrupt practices in developing countries (Demir and Hu, 2016). This deters the recipient's institutional quality against the FDI from developed economies that requires fixing institutional quality as a prerequisite.*
- **This study considers six indices of institutional quality variables** from World Governance Indicators, such as control of corruption, government effectiveness, the rule of law, political stability and absence of violence/terrorism, regulatory quality, and voice and accountability.

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# 1.4 Empirical Methodology and Data

## 1.4.1 Implementation of Generalized Method of Moments (GMM):

- The purpose of this study is to examine the determinants of FDI using panel data on developing countries. The panel data enables us to control for the unobservable time-invariant confounders & also accounts for the lagged reciprocal relationships/causation (Allison et al., 2017). To that end, important determinants of FDI must be specified in a tractable way and within an econometric framework. This section details the empirical model and estimation technique applied in the study.
- **Static panel data estimation can be conducted using pooled least squares or fixed effects (FE), or random effects (RE) model** to address the biased estimates in OLS because of the correlation between the error term ( $\varepsilon_{it}$ ) and the unobserved error ( $u_i$ ). The FE and RE models are expressed as follows:

$$\text{Fixed effect model: } y_{it} = (\alpha + u_i) + \mathbf{X}_{it}\boldsymbol{\beta} + v_{it} \quad (1.1)$$

$$\text{Random effect model: } y_{it} = \alpha + \mathbf{X}_{it}\boldsymbol{\beta} + (u_i + v_{it}) \quad (1.2)$$

- **The static effect model would yield biased estimates** if the lagged values of the explanatory variables affect the current value of the dependent variable (FDI) as a potential source of endogeneity.
- **Moreover, due to biased estimation in the static model** in presence of past realization/lagged value of the LHS variable along with the present value of the RHS variables, and to address the issues of unobserved heterogeneity and potential endogeneity, the dynamic panel model (DPD) is estimated for this study.
- In econometrics, dynamic panel models are preferably estimated by instrumenting lagged variables with the GMM (see Hansen, 1982). Since it is difficult to find a suitable instrument, conventionally instruments are drawn from within the dataset.
- Dynamic panel estimation involves **Arellano–Bond (AB)/difference GMM** estimation by Arellano and Bond (1991) or **Arellano–Bover/Blundell–Bond (ABB)/system GMM** estimation by Arellano and Bover (1995); Blundell and Bond (1998)

# 1.4 Empirical Methodology and Data (contd...)

## 1.4.1 Implementation of Generalized Method of Moments (GMM):

- The general model for GMM estimators can be written as:

$$y_{it} = \alpha y_{i,t-1} + \mathbf{X}_{it} \boldsymbol{\beta} + \varepsilon_{it} \quad (1.3)$$

$$\varepsilon_{it} = u_i + v_{it} \quad (1.4)$$

$$E(u_i) = E(v_{it}) = E(u_i v_{it}) = 0 \quad (1.5)$$

- The disturbance term ( $\varepsilon_{it}$ ) is composed of two orthogonal elements: the FE ( $u_i$ ) and idiosyncratic shocks/errors ( $v_{it}$ ). Equation 1.3 is also written as below (by subtracting  $y_{i,t-1}$  in both sides and rearranging).

$$\Delta y_{it} = (\alpha - 1)y_{i,t-1} + \mathbf{X}_{it} \boldsymbol{\beta} + \varepsilon_{it} \quad (1.6)$$

- Applying the first-difference transformation for difference GMM (dGMM) estimation, equation 1.3 eliminates fixed effect ( $u_i$ ) and is rewritten as:

$$\Delta y_{it} = \Delta y_{i,t-1} + \Delta \mathbf{X}_{it} \boldsymbol{\beta} + \Delta v_{it} \quad (1.7)$$

- Anderson and Hsiao (1981) suggest that first-differencing (FD) the static model eliminates any individual-specific effect, but the lagged dependent variable remains endogenous. Therefore, they suggest using the two-period lagged difference of dependent variable ( $\Delta y_{i,t-2} = y_{i,t-2} - y_{i,t-3}$ ) as an instrument for the one-period lagged difference dependent variable ( $\Delta y_{i,t-1} = y_{i,t-1} - y_{i,t-2}$ ). This is done because of the possible correlation between the one-period lagged difference dependent variable ( $\Delta y_{i,t-1} = y_{i,t-1} - y_{i,t-2}$ ) with the one-period lagged difference error term ( $\Delta v_{it} = v_{it} - v_{i,t-1}$ ). That is,  $y_{i,t-1}$  is correlated with  $v_{i,t-1}$ .
- Besides, the predetermined variables (not strictly exogenous) may become endogenous, being related to  $v_{i,t-1}$ . Hence, longer period lag regressors may be used as instruments, being orthogonal to the error term.

# 1.4 Empirical Methodology and Data (contd...)

## 1.4.1 Implementation of Generalized Method of Moments (GMM):

- Due to the problems associated with the first-difference transformation, in sGMM, transformation is done based on forward orthogonal deviations (FoD) or orthogonal deviations proposed by Arellano and Bover (1995). In FoD, data transformation is achieved by subtracting the average of all forward/future observations of any variable from its current observation. This computation is applied for all the observations except the last one of each variable: thus, data loss is minimized.
- Since the formula does not contain a lagged value, instruments remain valid. If  $y_{i,t-1}^*$  represents the orthogonal transformation,  $y_{i,t-2}$  is a valid candidate to use as instrument and  $\Delta y_{i,t-2}$  is instrument for the one transformed by first-difference (although  $y_{i,t-2}$  and  $\Delta y_{i,t-2}$  are correlated to  $\Delta y_{i,t-1} = y_{i,t-1} - y_{i,t-2}$ , but not with  $\Delta v_{it} = v_{it} - v_{i,t-1}$ , it is assumed that  $v_{it}$  are not serially correlated). Instrumenting levels estimator with  $y_{i,t-2}$  other than  $\Delta y_{i,t-2}$  ensure maximum sample size.
- The FoD transformation transforms differences (rather than regressors): the instruments to make exogenous to FE. In summary, AB instruments differences with levels, but Blundell–Bond instruments levels with the differences.

# 1.4 Empirical Methodology and Data (contd...)

## 1.4.2 Model Specification:

- Based on the discussion in section 1.4.1, an autoregressive distributed lag panel data model (initial model) is formed below in equation 1.8 following Kiviet (2020):

$$y_{it} = \sum_{j=1}^{q_y=1} \lambda_j y_{i,t-j} + \sum_{j=0}^{q_x=0} X'_{i,t-j} \beta_j + (\alpha_i + u_{i,t}) \quad (1.8)$$

Where  $i = 1, \dots, N$  and  $t = 1, \dots, T$  (few time periods),  $(\alpha_i + u_{i,t})$  is the error term ( $e_{i,t}$ ), and the  $y_{i,t}$  is the dependent variable.  $\mathbf{X}_{it}$  represents explanatory covariates, which can either be exogenous (strictly), with the assumption of  $E[u_{it} | \mathbf{X}_{i0}, \mathbf{X}_{i1} \dots \dots, \mathbf{X}_{iT}] = 0$ , or predetermined (weakly exogenous) with the assumption of  $E[u_{it} | \mathbf{X}_{i0}, \mathbf{X}_{i1} \dots \mathbf{X}_{it}] = 0$  or endogenous with the assumption of  $E[u_{it} | \mathbf{X}_{i0}, \mathbf{X}_{i1} \dots \dots, \mathbf{X}_{i,t-1}] = 0$ . The unobserved individual-specific effect ( $\alpha_i$ ) is assumed to be correlated with  $\mathbf{X}_{i,t-j}$ , and by construction, it is also correlated with the lagged dependent variable ( $y_{i,t-j}$ ). The idiosyncratic disturbance ( $u_{it}$ ) is assumed to be serially uncorrelated.

- Through first-differencing, the model is transformed as below.

$$\Delta y_{i,t} = \sum_{j=1}^{q_y} \lambda_j \Delta y_{i,t-j} + \sum_{j=0}^{q_x} \Delta X'_{i,t-j} \beta_j + \Delta u_{i,t} \quad (1.9)$$

- The FoD transformed model is as below:

$$\tilde{\Delta}_t y_{it} = \sum_{j=1}^{q_y} \lambda_j \tilde{\Delta}_t y_{i,t-j} + \sum_{j=0}^{q_x} \tilde{\Delta}_t X'_{i,t-j} \beta_j + \tilde{\Delta}_t u_{i,t} (= \tilde{\Delta}_t e_{i,t}) \quad (1.10)$$

Here,  $\tilde{\Delta}_t u_{i,t} = \sqrt{\frac{T-t+1}{T-t}} (u_{i,t} - \frac{1}{T-t+1} \sum_{s=0}^{T-t} u_{i,t+s})$  and  $corr(\tilde{\Delta}_t u_{i,t}, \tilde{\Delta}_t u_{i,t-1}) = 0$ .

# 1.4 Empirical Methodology and Data (contd...)

## 1.4.2 Model Specification:

- Moreover, it is suggested to add time dummies ( $\delta_t$ ) in the regression to capture the global shocks. Time dummies are assumed to be uncorrelated with  $\alpha_i$  (individual-specific effect) & considered strictly exogenous (instrumented by themselves).

$$\tilde{\Delta}_t y_{it} = \sum_{j=1}^{q_y} \lambda_j \tilde{\Delta}_t y_{i,t-j} + \sum_{j=0}^{q_x} \tilde{\Delta}_t \mathbf{X}'_{i,t-j} \beta_j + \delta_t + \tilde{\Delta}_t u_{i,t} (= \tilde{\Delta}_t e_{i,t}) \quad (1.11)$$

## 1.4.3 Formulation and Selection of Maintained Statistical Model (MSM):

- In system GMM, explanatory variables must be classified as endogenous, predetermined, or exogenous, and whether time dummies should be included or not. The initial model should be specified (with restricted instruments set) in a way so that no regressor is dropped immediately only because of its insignificant coefficient. Avoiding the inclusion of any redundant/invalid instrument or wrongly excluding additional lags of the regressors, their functional forms, and interaction terms is also required.
- The search for an acceptable initial general model forms the necessary part of the analysis (Kiviet, 2020). The selection of explanatory variables (including interaction terms) is retained based on the formulation of a maintained statistical model (MSM), as suggested by Kiviet (2020); Kripfganz (2019).

## 1.4 Empirical Methodology and Data (contd...)

1. The initial MSM is formulated keeping in mind that no relevant variable is omitted, sufficient lags of the variables and time dummies are included, and the issue of over parametrization is considered. Initially, all the regressors ( $X_{i,t}$ ) are treated as endogenous, and the use of all the available instruments (if sample permits) for the FD or FoD model is recommended. If the sample size is small, the instruments can be collapsed and/or curtailed. As a rule of thumb, Kiviet (2020) suggests the following inequalities:  $K + 4 \leq L < \min\left(h_k K, \frac{1}{h_L}(NT - K)\right)$ .

*Here  $4 < h_k < h_L < 10$ , the total number of instruments is represented by  $L$ ,  $K$  is the total number of coefficients,  $T$  is the number of time periods, and  $N$  is the total number of groups/countries.*

2. The initial MSM is then computed using two-step GMM with 'Windmeijer-corrected standard errors' and validity checked with the specification tests. One-step GMM is recommended if there are concerns about the estimation of the optimal weighting matrix. If the initial MSM fails to pass any of the specification tests, MSM must be revised as stated in step 1.

3. In this step, further lags or interaction terms can be added and checked to determine if they improve the model. However, it should be kept in mind that higher-order lags reduce the sample size and are costly when few time periods ( $T$ ) are available.

- The model is sequentially reduced by removing any higher-order lags of the regressors or interaction terms that retain high p-values (in the individual/joint significance test).
- For each of the new MSMs, validity is checked with the specification tests. Kiviet (2020) suggests including the interaction terms first before dropping the higher-order lagged regressors. The robustness of the model is checked using iterated GMM estimation.

## 1.4 Empirical Methodology and Data (contd...)

- The Model and Moment Selection Criteria (MMSC) proposed by Andrews and Lu (2001) are applied to compare the initial MSMs that pass all the specification tests and select the best one. The MMSC computes Akaike (AIC), Bayesian (BIC), and Hannan-Quinn (HQIC) estimation, and the model that retains lower values of AIC, BIC, and HQIC is selected.
4. At this stage, **extra instruments are added sequentially for each of the initially treated endogenous regressors**. The extra instruments are checked for their validity using incremental overidentification tests, whether any of the initially treated endogenous variables is actually predetermined unless theoretical evidence is strong enough to treat that variable as endogenous. The validity of the other specification tests is also monitored.
  5. **Extra instruments are now added sequentially for each of the predetermined regressors (after step 4)**. The extra instruments are checked for validity following the procedure stated in step 4 to check whether any of the predetermined variables are strictly exogenous. The final MSM is then revised based on the categorization of the explanatory variables (endogenous, predetermined, and exogenous) in steps 4 and 5.
  6. **The final MSM is checked again following the procedures discussed in step 3**. Instrument counts can be readjusted so that the MSM follows the inequalities mentioned in step 1. If any variable is of particular interest for the analysis, statistical insignificance itself should not be the only criteria to drop that variable.

## 1.4 Empirical Methodology and Data (contd...)

7. Under the initial conditions assumption, additional instruments (in the level model) are added, and the model is estimated by two-step or iterated system GMM using 'Windmeijer-corrected errors'. The extra instruments ( $\Delta \mathbf{X}_{i,t} / \Delta \mathbf{X}_{i,t-1}$ ) for the level model are added first (and checked for all specifications and validity tests), then extra instruments for  $\Delta y_{i,t-1}$  can be added if the former instruments are valid.
8. If any of the additional instruments added in the level model in step 7 become invalid, non-linear moment conditions by [Ahn and Schmidt \(1995\)](#) can be added, which is valid under the no serial correlation assumption of  $u_{i,t}$ . The model is finally estimated using a two-step/iterated system GMM and validated by specification tests. The validity of the non-linear moment conditions can be checked by the generalized Hausman test. If the final model fails to pass the specification tests, it is suggested to revoke and revisit some considerations made in earlier steps and re-estimate the rectified model by two-step/iterated system GMM.

# 1.4 Empirical Methodology and Data (contd...)

## 1.4.4 Specification Tests:

**a) Arellano–Bond Test for Autocorrelation:** This test is known as the Arellano–Bond test for serial correlation of first-differenced errors. If no serial correlation of  $u_{i,t}$  is assumed, a negative first-order correlation of  $\Delta u_{i,t}$  ( $\text{corr}(\Delta u_{i,t}, \Delta u_{i,t-1}) = -0.5$ ) is evident, but no second- or higher-order autocorrelation is observed. The absence of higher-order autocorrelation is a necessary condition for the validity of the instruments of the lagged dependent variable ( $y_{i,t-2}, y_{i,t-3}, \dots$ ), endogenous, and predetermined variables. Arellano and Bond (1991) suggest the null hypothesis for the test statistic as  $H_0: \text{corr}(\Delta u_{i,t}, \Delta u_{i,t-j}) = 0, j > 0$ . The requirement for the model to pass this specification test is that the null hypothesis is rejected for the first-order ( $j = 1$ ) autocorrelation test but not for second- or higher-order ( $j > 1$ ) tests.

**b) Overidentification (Sargan-Hansen) Test:** If the number of instruments ( $L$ ) is equal to the number of regressors ( $K$ ), the model is just-identified, and the assumption of instrument validity is untested. But if  $L > K$ , the model is overidentified (even strongly overidentified), and the validity of overidentifying restrictions ( $L - K$ ) can be checked. The optimal weighting matrix ( $L \times L$  dimension) is the necessary condition for the overidentified model to estimate an efficient estimator. The requirement for the model to pass this specification test is that the null hypothesis of overidentifying restrictions ( $L - K$ ) are valid is not rejected. However, Kripfganz (2019) argues that the overidentification test is not sufficient for model specification.

**c) Incremental Overidentification (Difference Sargan-Hansen) Test:** This specification test is used to check the validity of the set of individual instruments used in the regression model. Assuming that the difference GMM estimator is correctly specified, the validity of the moment conditions for the level model is checked using the incremental overidentification difference (Sargan-Hansen) test with a  $\chi^2(df_f - df_r)$  distribution. Here  $df_f$  is degrees of freedom of the full model and  $df_r$  is degrees of freedom of the reduced model overidentification test (Eichenbaum et al., 1988). The validity of the incremental overidentification tests depends on the validity of the overidentification test of the reduced model as well.

# 1.4 Empirical Methodology and Data (contd...)

## 1.4.5 Data Sources and Variables

- The explanatory variables of this study are presented in figure 1.5. The financial development and institutional quality variables are transformed into two separate indices constructed from four and six different indicators, respectively. All variables are taken into log form.
- All the data except real exchange rate are obtained from World Development Indicators, Global Financial Development, and Worldwide Governance Indicators databases of the World Bank (2020a, 2020b, 2020c), respectively. The real exchange rate data is extracted from the Bruegel datasets by Darvas (2012).
- The sample economies belong to developing economies (low-income and lower-middle-income), categorized by the World Bank.
- The sample is divided into two time periods. First sample (1980-1996) includes data on 54 countries with 565 observations. The second sample (1997-2017) covers data on 64 countries with 813 observations.

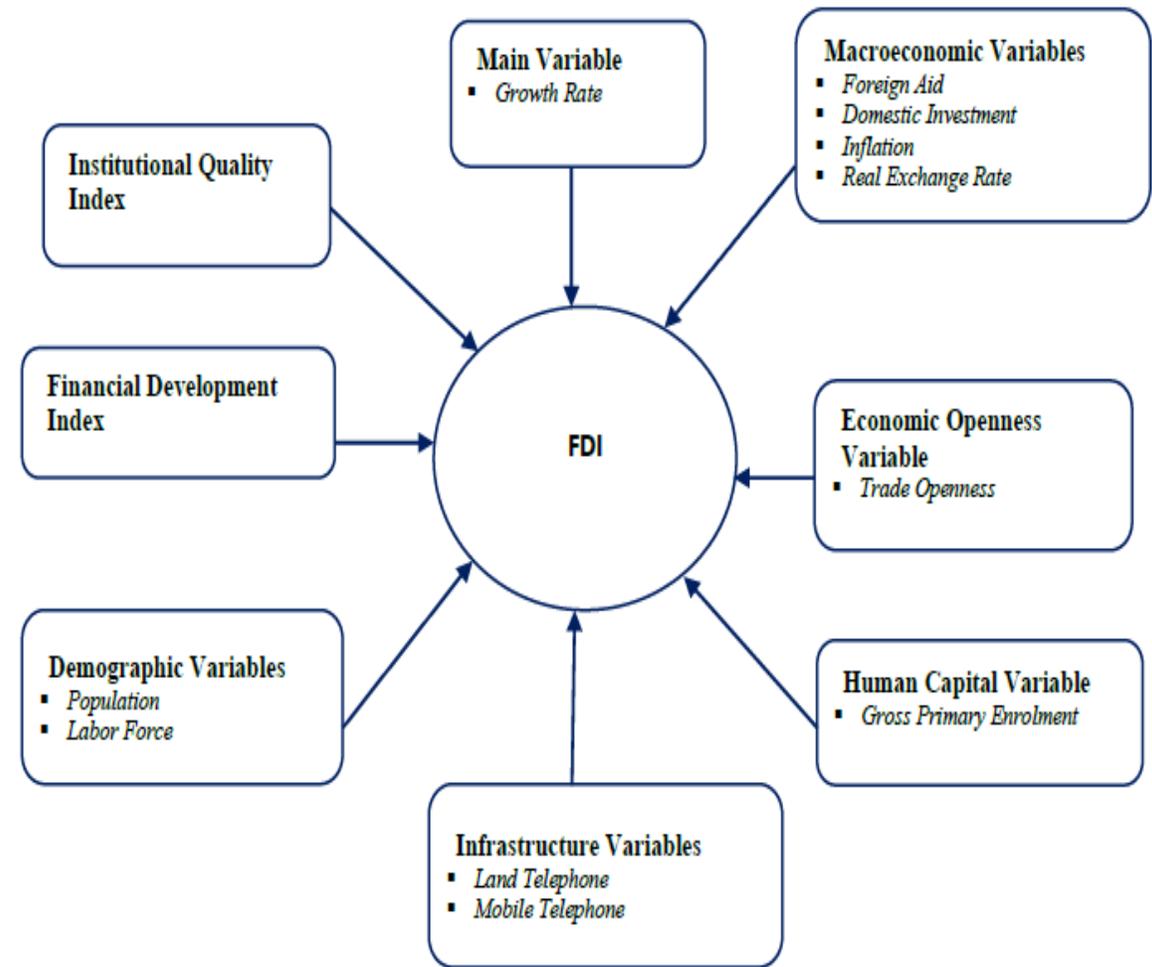


Figure 1.5 Factors affecting FDI inflow

# 1.4 Empirical Methodology and Data (contd...)

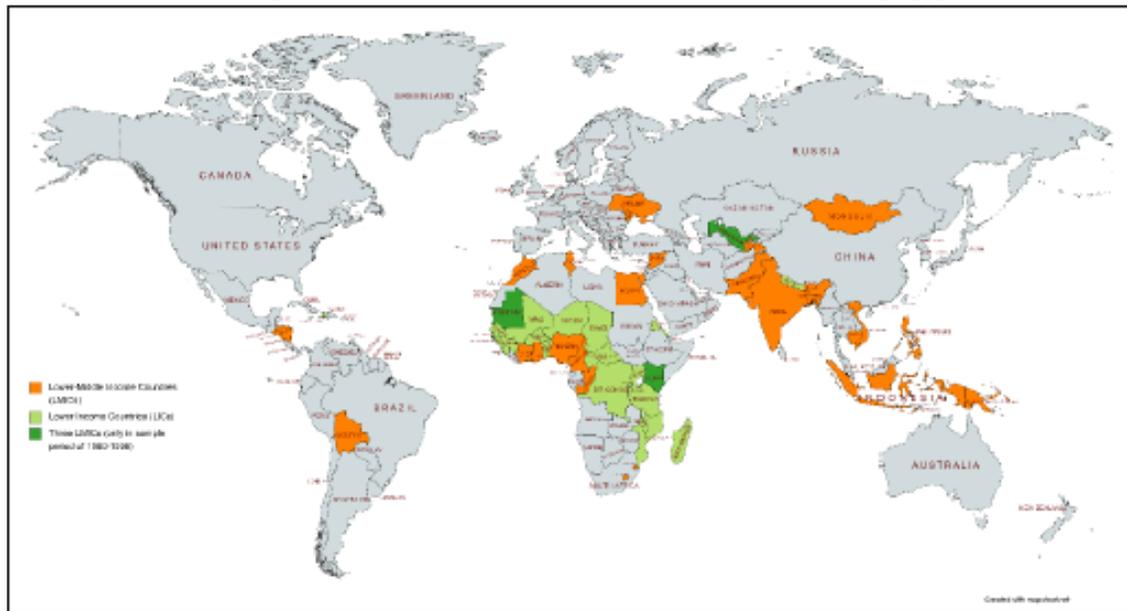


Figure 1.6 Distribution of countries: first sample group, 1980–1996

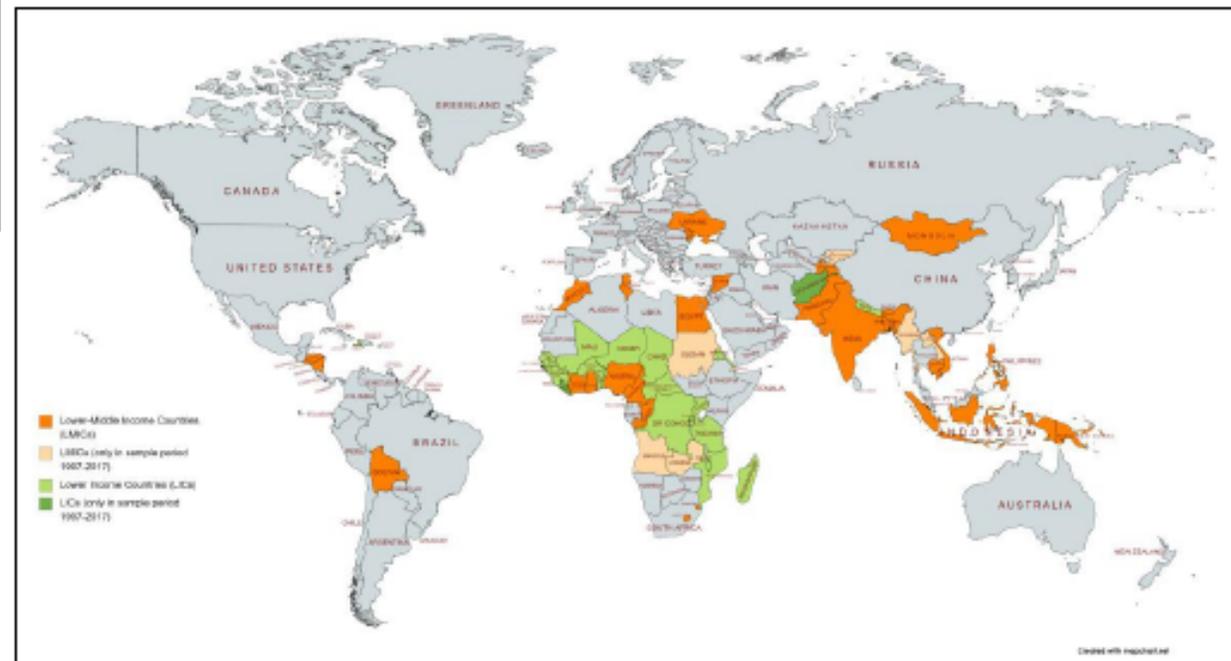


Figure 1.7 Distribution of countries: first sample group, 1997-2017

# Next.....

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# 1.5 Empirical Findings and Discussion

## 1.5.1 Summary Statistics:

Variable	Obs.	Mean	Std. dev.	Min	Max
lnfdis	565	5.448	2.363	-11.513	10.199
grate_mv	565	2.981	5.715	-34.809	28.696
lnaid	565	5.561	1.28	-1.561	8.71
lngcf_n	565	20.618	1.84	17.244	25.714
lninfgdp	565	2.508	1.408	-1.719	10.195
lnesreal_mv	565	4.883	0.59	3.208	10.937
lntrd_n	565	21.574	1.562	17.952	25.501
lnpremr_n	565	15.811	1.766	12.265	20.642
lninfel_n	565	10.886	1.969	6.908	16.496
lnpopl	565	16.076	1.645	12.669	20.705
lnp64	565	15.435	1.671	12.011	20.187
c.lnpremr_n#c.lnp64	565	246.929	54.797	151.102	416.708
No. of countries	54	54	54	54	54

Table 1.1 Summary statistics of the variables: first sample period, 1980-1996

Variable	Obs	Mean	Std. dev.	Min	Max
lnfdis	813	7.667	2.126	1.78	12.671
grate_mv	813	4.913	4.472	-20.599	64.068
lnaid	813	6.086	1.091	2.992	9.344
lngcf_n	813	21.644	1.882	15.758	27.305
lninfgdp	813	1.737	1.054	-2.58	4.725
lnesreal_mv	813	4.644	0.165	3.933	5.468
lntrd_n	813	22.778	1.71	19.002	27.651
lnpremr_n	813	16.395	1.576	12.27	21.14
lninfel_n	813	12.303	2.113	6.69	17.556
lnmob_n	813	14.082	2.846	4.585	20.844
lnpopl	813	16.407	1.562	12.089	21.004
lnp64	813	15.84	1.575	11.485	20.593
lnfd	813	0.422	1.385	-5.526	3.778
lninst	813	0.392	1.559	-5.585	3.603
No. of countries	64	64	64	64	64

Table 1.2 Summary statistics of the variables: first sample period, 1997-2017

- Data on mobile telephone, financial development, and institutional quality variables are only available in the second period (therefore, these variables are not included in the first period).
- The mean of the variables in the second sample group is higher in value, and their standard deviation (std.) is lower (except for domestic investment, trade openness, and land telephone), implying that during the first period (1980–1996) the variables exhibit higher volatility.

## 1.5 Empirical Findings and Discussion (contd...)

- **Developing economies received more FDI flow during the second period** compared to the first period. The same is true for other investment-related variables. The mean of FDI stock in the first (second) period is 5.448 (7.667), growth rate 2.981 (4.913), domestic investment 20.618 (21.644), aid 5.561 (6.086), land telephone 10.886 (12.303), and mobile telephone (14.082).
- **The selected developing economies have received a higher amount of FDI, aid and domestic investment during the second period**, possibly reflecting a better macroeconomic environment in those economies.
- Following the unit root test, **the non-stationary variables are first-differenced** to make them stationary. The correlation matrix and the panel unit root test of the variables are presented in Appendix A (Table A3) and Appendix A (Table A4), respectively.

# 1.5 Empirical Findings and Discussion (contd...)

## 1.5.2 Dynamic Panel Model (sGMM) Estimation

### Results: First Sample Group (1980-1996)

- The sGMM results of the first sample period (1980–1996) are presented in Table 1.1a (column 8) below. The results reveal that the lag of FDI stock, growth rate, trade openness, infrastructure (land telephone), and population are positive and significant determinants of FDI in the selected economies.
- The real exchange rate and labor force are negative and significant. The coefficients of lag of FDI stock, land telephone, and real exchange rate are significant at the 1% level. The coefficients of growth rate, trade openness, population, and labor force are significant at a 10% level of significance.
- The lag of FDI accounts for the continuous effect of the explanatory regressors in the past. The long-run multiplier (1/0.141) is 7.09, which implies that in the long run, the effect of each of the regressors on FDI growth is 7.09 times more than their short-run effect, ceteris paribus.

Table 1.1 FDI determinants in two-step system GMM estimation: first sample group, (1980 – 1996)

	Main variable	Macroeconomic variables	Economic openness	Human capital	Infrastructure	Demography	Final model (sGMM)	
	1	2	3	4	5	6	7	8
l.lnfdis	0.872*** (0.105)	0.892*** (0.0381)	0.874*** (0.0398)	0.946*** (0.0452)	0.962*** (0.0478)	0.872*** (0.0468)	0.859*** (0.0366)	
grate_mx	0.000158 (0.0329)	-0.00430 (0.0135)	-0.0127 (0.0122)	-0.0103 (0.0152)	0.00949 (0.0124)	0.0170 (0.0119)	0.0204* (0.0106)	
lnaid		0.00568 (0.0249)	-0.00116 (0.0278)	-0.0170 (0.0309)	-0.00404 (0.0258)	0.00740 (0.0216)	0.0177 (0.0240)	
lngcf_n		0.195* (0.0849)	0.0403 (0.129)	0.0831 (0.168)	0.0369 (0.161)	0.0515 (0.0962)	-0.0133 (0.0639)	
lninfgdp		0.0199 (0.0285)	0.00774 (0.0281)	0.0135 (0.0253)	0.0207 (0.0160)	0.0284 (0.0209)	0.0276 (0.0201)	
lnexreal_mx		-0.101 (0.0540)	-0.122* (0.0572)	-0.0906 (0.0543)	-0.0548 (0.0338)	-0.0828*** (0.0232)	-0.0695*** (0.0200)	
lntrd_n			0.256 (0.160)	0.273 (0.176)	0.0946 (0.158)	0.0867 (0.119)	0.136* (0.0751)	
lnprenr_n				-0.291 (0.181)	-0.296* (0.156)	-0.551 (0.350)	-0.454 (0.436)	
lninfel_n					0.188* (0.104)	0.242* (0.136)	0.294*** (0.106)	
lnpop1						3.460* (1.821)	3.388* (1.723)	
lnp64						-3.032* (1.597)	-3.029* (1.782)	
c.lnprenr_n#							-0.00377 (0.0199)	
Constant	5.349 (6.222)	-3.106 (2.615)	-6.582 (3.301)	-2.861 (2.323)	1.511 (2.925)	-2.160 (2.837)	-2.451 (4.556)	
No of observations	565	565	565	565	565	565	565	
No. of instruments	23	37	40	43	45	50	54	
No. of countries	55	55	55	55	55	55	55	
AR2 test (p-value)	0.9336	0.3527	0.2974	0.5333	0.6716	0.8004	0.9425	
Sargan-Hansen test (p-value)	11.0529 (0.0260)	15.8364 (0.3235)	14.0552 (0.5946)	19.2926 (0.3740)	17.3228 (0.5680)	15.7233 (0.8294)	19.6520 (0.7648)	

Note: (a) Dependent variable is log of FDI stock (lnfdis); (b) Robust Standard errors in parentheses; (c) \*, \*\*, and \*\*\* represent respectively, statistical significance at 10%, 5%, and 1% levels; and (d) Time-specific dummies included but not reported in the table.

## 1.5 Empirical Findings and Discussion (contd...)

### *Dynamic Panel Model (sGMM) Estimation Results: Second Sample Group (1997–2017)*

- The system GMM estimation results of the second sample group (1997 to 2017) are presented in Table 1.2 (column 9). The results of sGMM reveal that the lag of FDI stock, growth rate, domestic investment, and infrastructure (mobile telephone) is positive and significant determinants of FDI flow in the selected developing countries.
- **The coefficient of lag FDI (0.988) is positive and significant** at a 1% level of significance. Hence, the implied convergence rate is  $(1-0.988 = 0.012)$  1.2%. In the long run, the effect of each of the regressors (long-run multiplier) causes FDI flow to increase by 83.33 times more than their short-run effect.
- **The coefficient of growth rate (0.0211) is significant at a 1% level** of significance, suggesting that a one percentage point change in growth rate causes FDI to increase in the short run (long run) by 0.0211% (1.76%), ceteris paribus.
- The coefficient of domestic investment (0.276) is positive and significant at a 1% level: that is, a 1% increase in domestic investment increases FDI flow in the short run (long run) by 0.276% (23%), ceteris paribus. This indicates that during the second period, FDI and domestic investment are complementary to each other.
- The coefficient of the land telephone (-0.0514) is negative (insignificant), and that of **mobile telephone (0.0449) is positive (significant) at a 10% level** of significance. Therefore, land telephone, which is a positive and significant determinant of FDI in the first period, becomes insignificant in the second period, in which the mobile telephone is included.

Table 1.2 FDI determinants in two-step system GMM estimation: second sample group, (1997 – 2017)

	Main variable	Macroeconomic variables	Economic openness	Human capital	Infrastructure	Demography	Financial development	Final model (2-step sGMM)	Final model (iGMM)
1	2	3	4	5	6	7	8	9	10
l.lnfdis	0.988*** (0.0534)	0.989*** (0.0752)	0.971*** (0.0749)	0.984*** (0.0660)	0.963*** (0.0523)	0.995*** (0.0469)	0.994*** (0.0381)	0.988*** (0.0384)	0.989*** (0.0592)
grate_mlx	0.00985 (0.0134)	0.00877 (0.00987)	0.0174 (0.0105)	0.0220** (0.00936)	0.0234*** (0.00879)	0.0214*** (0.00795)	0.0226*** (0.00681)	0.0211*** (0.00746)	0.0160** (0.00732)
lnaid		-0.0324 (0.0393)	-0.0198 (0.0322)	-0.00109 (0.0395)	0.00236 (0.0378)	-0.0154 (0.0387)	-0.0148 (0.0360)	-0.0170 (0.0324)	-0.0411 (0.0424)
lngcf_n		0.135* (0.0733)	0.161* (0.0897)	0.241** (0.115)	0.240** (0.0910)	0.247** (0.0972)	0.280*** (0.101)	0.276*** (0.101)	0.430*** (0.151)
lninfgdp		0.0277 (0.0228)	0.0296 (0.0241)	0.0360 (0.0234)	0.0424 (0.0263)	0.0371* (0.0218)	0.0452* (0.0240)	0.0408 (0.0248)	0.0524* (0.0264)
lnexreal_mlx		-0.143 (0.310)	-0.241 (0.275)	-0.434 (0.266)	-0.350 (0.240)	-0.296 (0.266)	-0.319 (0.308)	-0.360 (0.236)	-0.332 (0.296)
lntrd_n			-0.117 (0.107)	-0.119 (0.124)	-0.0987 (0.0890)	-0.163* (0.0820)	-0.122 (0.0759)	-0.0966 (0.0836)	-0.198 (0.128)
lnprenr_n				-0.190 (0.118)	-0.252** (0.121)	-0.0933 (0.272)	-0.0898 (0.270)	0.00549 (0.297)	0.196 (0.337)
lninfel_n					-0.0229 (0.0486)	-0.0384 (0.0481)	-0.0343 (0.0381)	-0.0514 (0.0544)	-0.0329 (0.0566)
lnmob_n					0.0647* (0.0325)	0.0279 (0.0233)	0.0524** (0.0248)	0.0449* (0.0228)	0.0351 (0.0334)
lnpopl						-0.147 (0.562)	-0.577 (0.649)	-0.785 (0.791)	-1.199 (0.813)
lnp64						0.169 (0.560)	0.483 (0.573)	0.615 (0.675)	0.783 (0.815)
lnfd							-0.101* (0.0534)	-0.0812 (0.0538)	-0.118** (0.0475)
lninst								-0.0301 (0.0514)	-0.0115 (0.0539)
Constant	0.176 (0.401)	-1.905 (2.401)	0.660 (2.357)	2.781 (2.950)	2.743 (1.704)	1.356 (1.568)	1.575 (1.622)	1.439 (1.460)	1.262 (1.918)
No of observations	813	813	813	813	813	813	813	813	813
No. of instruments	26	37	41	46	53	59	61	63	63
No. of countries	64	64	64	64	64	64	64	64	64
AR2 test (p-value)	0.8193	0.8400	0.7333	0.6882	0.8417	0.6474	0.7810	0.8452	0.8751
Sargan-Hansen test (p-value)	12.9420 (0.0116)	10.6584 (0.4723)	17.6183 (0.2247)	18.4956 (0.4235)	15.4629 (0.8773)	25.4403 (0.5498)	22.0539 (0.7788)	23.6578 (0.7456)	20.9184 (0.8621)

Note: (a) Dependent variable is the log of FDI stock, (b) Robust Standard errors in parentheses, (c) \*, \*\*, and \*\*\* represent respectively, statistical significance at 10%, 5%, and 1% levels, and (d) Time-specific dummies included but not reported in the table.

## 1.5 Empirical Findings and Discussion (contd...)

### *Dynamic Panel Model (sGMM) Estimation Results: Second Sample Group (1997–2017), contd..*

- In the second period, **the mobile telephone becomes a positive and significant determinant of FDI**, possibly because the land telephone is not enough to capture the effect of infrastructure in the second period. The remaining variables are insignificant.
- The p-value of AR(2) and **overidentifying restrictions of the sGMM estimation confirm the absence of autocorrelation** of order two and the validity of the overidentifying restrictions.

### *Dynamic Panel Model Estimation: Iterated GMM Results (Robustness Check)*

- Although the two-step system GMM gives asymptotically efficient estimation in the finite sample, **there remains a problem in the estimation of the optimal weighting matrix in relation to the initial weighting matrix**. The undesirable consequences (that the coefficient estimates and overidentification tests lack robustness) arise due to the choice of the initial weighting matrix.
- **To address the problem, Hansen and Lee (2019) suggest applying iterated GMM, which ignores the arbitrariness in choosing the initial weighting matrix**. Therefore, both the coefficient estimates, and weighting matrix are updated until convergence.
- Hence, iterated GMM is used for the final model estimation and as a robustness check for our estimation. The first sample group does not give iterated GMM estimation results due to the sporadic data.

## 1.5 Empirical Findings and Discussion (contd...)

- In the first period, lag of FDI, growth rate, trade openness, infrastructure (land telephone) and population are the key determinants of FDI.
- While in the second period, lag of FDI, growth rate, domestic investment, and inflation are the key determinants. Although the coefficient of the labor force is significant, it does not favor foreign capital flow in the first period (1980 to 1996), and the same is true for the financial development index in the second period (1997 to 2017). The results are discussed below;

### Lag of FDI

- The lag of FDI is a positive and significant determinant of FDI in both periods. In the second period, the coefficient of lag FDI (0.989) is positive and significant at a 1% level of significance.
  - *The convergence rate is 14.1% and 1.20% in the first and second periods, respectively.*
  - *The long run multiplier effect is 7.09 and 83.33 times in the first and second periods, respectively.*
  - *In the second period, the long-run contribution of the explanatory variables is greater than their short-run effect.*
- The positive association between FDI and growth rate suggests that FDI flow in developing countries is market-seeking.
- The stronger long-run multiplier in the second period also suggests the overall importance of improvements in the host country's economic condition to attract FDI and contribute to economic growth.

## 1.5 Empirical Findings and Discussion (contd...)

### Growth Rate

- The growth rate is a positive and significant determinant of FDI in both periods, with a greater effect in the first period compared to the second period.
- The coefficients of growth rate are 0.0204 and 0.0160 in the first and second periods, respectively. In the first period, the growth rate has a short-run (long-run) effect on FDI inflow of 0.0204% (0.145 times).
- In the second period, a one percentage point change in growth rate causes FDI to increase in the short run (long run) by 0.016% (1.45 times).
- This finding is consistent with the empirical literature (Aziz and Mishra, 2016; Kariuki, 2015; Saini and Singhania, 2018).

### Domestic Investment

- Domestic investment, proxied by GFCF, is a significant determinant of FDI in the second period but not in the first period. In the second period, the coefficient of domestic investment is 0.43, which implies that a 1% increase in domestic investment increases FDI flow in the short run (long run) by 0.43% (39.09 times) at a 1% level of significance, ceteris paribus.
- Our findings suggest that FDI and DI are complementary to each other in the current period. The positive (significant) impact of DI on FDI reflects the potential of foreign investors' valuable resources in developing economies. Therefore, a crowding-in effect of FDI on DI is evident in the second period.

## 1.5 Empirical Findings and Discussion (contd...)

- This also reflects the potential of the host market size and local business environment to the foreign investors, as well as the opportunity of positive externalities in the host economy (Apergis et al., 2006).
- The insignificance of domestic investment in the first period may suggest that the presence of foreign firms could initially push out the inefficient domestic firms with a short-run negative impact on investment. However, the significance of trade openness, infrastructure, and population variables all suggest a supportive environment for foreign capital movement in the first period.
- In the second period, domestic investment may favor FDI through several channels. The positive effect of DI reflects a better business environment for the local investors, and their actions will provide a positive signal to the foreign investors, making FDI more profitable. Since growth is an important determinant of FDI in both periods, the domestic Investment may also attract FDI through its impact on growth.

### *Inflation*

- Inflation is an important determinant of FDI in the second period. The coefficient of inflation (0.0524) is positive and significant at a 5% level of significance, implying that inflation favors FDI flow in the recent period. A 1% increase in inflation causes FDI stock to increase by 0.0524%, ceteris paribus.
- A depreciated currency is favorable for FDI, and host economies can attract significant FDI by depreciating their currency in the first period, 1980 to 1996.

## 1.5 Empirical Findings and Discussion (contd...)

- Higher inflation creates risk and uncertainty in business activity, but the resulting currency depreciation supports FDI flow. The depreciation of currency improves the competitiveness in the host economy, which makes business activities more profitable, attracting FDI.
- However, increased FDI flow causes currency appreciation, reduces inflation with reduced risk and uncertainty of business activity, while low inflation and associated currency appreciation dampen the profitability of FDI flow.
- Therefore, although inflation reduces capital movement, a low level of inflation favors capital flow in developing economies.

### *Real Effective Exchange Rate*

- Our findings suggest that appreciation of the real exchange rate is not favorable for FDI flow in the first period. The coefficient of the real exchange rate is  $-0.0695$ , which implies that a 1% increase in the real exchange rate (appreciation) decreases FDI flow by 0.0695% in the short run, ceteris paribus.
- A stronger currency in the source country (Blonigen, 1997; Klein and Rosengren, 1994; Sazanami et al., 2003) and a weaker currency in the host economy (Barrell and Pain, 1998; Froot and Stein, 1991; Goldberg and Klein, 1998) favor foreign capital movement to the host economy.

## 1.5 Empirical Findings and Discussion (contd...)

- The negative impact of currency appreciation suggests that if FDI is export-seeking (with a positive coefficient of trade openness), currency appreciation reduces the attractiveness of FDI in the host economy by increasing the price of tradable goods and lowering demand.

### *Trade Openness*

- **The effect of trade openness is positive and significant** to FDI inflow in the first sample period. The findings of our study suggest that economies that have more open trade favor a significant increase in FDI stock during the first period but not in the second period.
- The general belief is that less open economies are protected from competition and favor market-seeking FDI, but more open economies favor export-seeking FDI. The significant positive relationship of trade openness with FDI suggests that FDI flow seems to be **export-seeking and vertical in nature** (expanding their production facilities) during the first period.
- In addition, the significant positive effect of the population variable indicates that FDI is market-seeking. This is consistent with the findings in empirical studies (Asiedu, 2002; Balasubramanyam et al., 1996; Holland and Pain, 1998; Jadhav, 2012; Lankes and Venables, 1996; Sahoo, 2006; Trevino et al., 2008).
- International trade is thought to influence economic growth through capital accumulation via FDI and industrialization by facilitating technology diffusion as well as institutional development.

## 1.5 Empirical Findings and Discussion (contd...)

- The positive and significant effect of trade openness is confirmed by Asiedu (2002); Bengoa and Sanchez-Robles (2003); Jadhav (2012); Kumari and Sharma (2017); Sahoo (2006).
- Since both open trade and growth promote FDI, trade openness may attract more FDI through its effect on economic growth.

### *Infrastructure*

- The land telephone variable is a positive and significant determinant of FDI in the first period. However, when the mobile telephone is included along with the land telephone variable in the second period, neither of the variables is significant (in iGMM), while in sGMM, the mobile telephone is a positive and significant determinant of FDI in the second period.
- In the first period, the coefficient of the land telephone (0.294) is positive and significant at a 1% level of significance. This implies that a 1% increase in land telephone subscription increases FDI by 0.294%, ceteris paribus. In the second period, a 1% increase in mobile telephone subscription increases FDI by 0.0449% at a 1% level of significance, ceteris paribus.
- Availability of efficient infrastructure reduces entry and setup costs in the host economy and thus may encourage more FDI.

## 1.5 Empirical Findings and Discussion (contd...)

- The mobile telephone variable is included in the second period and shows an increasing trend, especially after the 1990s. Our findings suggest that land telephone is a significant determinant of FDI in the first period. However, it becomes negative (insignificant) when the mobile telephone variable is included in the second period, which itself is positive and insignificant.
- This may be because the variables are poor representative of infrastructure to capture its effect to attract FDI. The importance of infrastructure in attracting FDI has been documented in articles by Root and Ahmed (1979); Wheeler and Mody (1992).

### *Population*

- Our findings suggest that population is a significant determinant of FDI in the first period. The coefficient of the population (3.388) is positive and significant at a 1% level of significance. This implies that a 1% increase in population increases FDI in the short run (long run) by 3.388% (24.02 times), ceteris paribus.
- The population variable is considered a proxy for market size in the host economy. According to the market size hypothesis, **foreign investors are keener to invest in larger markets to achieve economies of scale in production.**

## 1.5 Empirical Findings and Discussion (contd...)

- In general, **the intention of foreign firms to invest abroad is to seek new markets for their products** (Resmini, 2000). The size and growth of the national and regional markets are assumed to motivate the decision of potential investors. Therefore, larger markets offer more opportunities to foreign investors.
- The coefficient of the population variable (3.38) is greater than one, reflecting a broader customer base in developing economies that may attract more foreign investment. Our findings of a positive and significant effect of the population variable suggest that **FDI seems to be market-seeking in developing economies** in the first period.

### **Labor Force**

- The labor force variable significantly reduces FDI flow in the developing countries in the first period.
- The coefficient of the variable ( $-3.029$ ) is negative and significant at a 1% level of significance, which implies that every 1% increase in the supply of labor decreases FDI flow in the short run (long run) by 3.029% (21.476 times), *ceteris paribus*.
- Labor force influence on attracting FDI depends both on its quantity and quality. Labor force quality reflects the essential skills, talents, experience, and health of the available labor force to adopt the knowledge and technology brought by foreign investors. Unless the available labor force has the required skills or qualifications to make investments more productive, its quantity or growth alone is not enough to attract FDI (Hailu, 2010).

## 1.5 Empirical Findings and Discussion (contd...)

- The negative effect of the labor force on FDI in the first period may be attributed to the **inelastic supply of skilled labor** and the time required to train them (Hale and Long, 2011). If the skilled labor supply is inelastic, FDI may bring skill-complementary technology, which causes an accumulation of poor-quality labor in the domestic firms leading to the poor absorptive capacity of FDI spillovers. This may lead to a decline in FDI even with an increase in labor supply.
- **If FDI introduces labor-saving technology, this will reduce the demand for labor** and the wage in the host economy leading to job destruction (Jude and Silaghi, 2016). This effect is thought to be exacerbated if there is a wider technology gap between foreign-invested and domestic firms in developing economies. **The positive employment effect of FDI is strongly biased towards the skilled labor force in foreign-invested firms.** Therefore, the growth in the supply of the unskilled labor force may attract less FDI in developing countries.
- All these factors discussed above may contribute to the significant negative effect of the labor force in developing countries.

## 1.5 Empirical Findings and Discussion (contd...)

### *Financial Development*

- The findings of our study suggest that the financial development index significantly reduces FDI flow in developing countries in the second period. The coefficient of financial development ( $-0.118$ ) is negative and significant at a 5% level of significance. This implies that a 1% increase of the index reduces FDI in the short run (long run) by 0.118% (9.83 times), ceteris paribus.
- Alfaro et al. (2004) argue that a well-developed financial system is required to satisfy the demand for additional financing and absorb the skills and technology wrapped in FDI. **However, our results do not support the requirement of financial development in the host country to attract FDI.**
- The **positive and significant effect of economic growth** and the insignificant effect of human capital and labor force in the second period suggest that the spillover effects of FDI seem to be minimal. Financial development appears to be less important to generate the positive impact of FDI in developing economies.
- Moreover, **the negative findings suggest a lack of threshold level of financial development** in the developing economies to attract FDI.
- Therefore, extended research is expected to determine the threshold level of financial development to induce foreign capital movement in developing economies.

## 1.5 Empirical Findings and Discussion (contd...)

- The p-value of the AR(2) test and Sargan-Hansen test of overidentifying restrictions of the iGMM estimation are 0.8751 and 0.8621, respectively, implying no problem of autocorrelation and validity of the overidentifying restrictions.
- The model passes the incremental Hansen tests for each set of instruments used in the estimation. Thus, the models are exactly identified, and all the instruments are valid.
- The difference-in-Hansen test statistics for each instrument subset for the endogenous variables are also valid.
- The determinants of FDI in two time periods are summarized below;

	1980-1996 (sGMM)	1997-2017 (sGMM)	1997-2017 (iGMM)
Determinants of FDI in Developing Countries	Lag of FDI***	Lag of FDI***	Lag of FDI
	Growth rate***	Growth rate***	Growth rate
	Real ex. rate (-)***	Dom. inv***	Dom. inv***
	Trade openness*		Inflation*
	Land telephone***	Mobile Telephone*	Financial dev (-)**
	Population*		
	Labor force (-)*		

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## 1.6 Limitations of the Study

- There are several limitations to the present study that arise due to the lack of available data and missing values.
  - **First**, out of the 79 developing countries (LICs and LMICs in the World Bank categorization), our study is confined to a maximum of 69 developing countries. The set of economies are also not the same in the two time periods: the number of observations and the time periods in the two samples is different.
  - **Second**, the **human capital and infrastructure variables may not truly capture** their relevance to attract FDI and fail to display their positive and significant impact, despite strong evidence in the empirical literature.
  - **Third**, this study **does not compare the FDI determinants based on regions and income status** of the economies separately, which could reveal a set of determinants for economies sharing common characteristics. Future research should consider the source of foreign capital to identify the region-specific set of FDI determinants in developing countries.
  - **Finally**, the study of FDI determinants should be cautiously focused on the perspectives of developing economies only and should not be mingled or biased towards the points of view of advanced economies.

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## 1.7 Conclusion

- The empirical findings do not suggest a unique set of FDI determinants: rather, a different set of FDI determinants in the two time periods that are appropriate for the development status of economies in the respective time periods.
- The variables behave differently in each period.
  - In the first period, the lag of FDI, market size (population), growth rate, trade openness, infrastructure (land telephone), and currency depreciation are significant determinants of foreign capital flow.
  - In the second period, lag of FDI, growth rate, domestic investment, and inflation is found to support FDI inflow positively and significantly, but financial development has a significant negative effect on FDI inflow.
  - FDI and domestic investment are complementary to each other, and a crowding-in effect is evident. To some extent, this may reflect an improvement in the macroeconomic environment in recent periods.
  - The coefficient of growth rate is larger in the first period, but it has a greater significance in the second period. Domestic investment reflects the business environment in the host economy but contributes to significant increases in FDI flow only in the second period.

## 1.7 Conclusion (contd..)

### ○ The findings suggest that

- **Sample economies represent a bigger market for MNCs** (especially, *South Asian and sub-Saharan African economies*), which supports the view of market-seeking and horizontal FDI. Conversely, the available labor force does not support FDI flow in the first period, which may be because of its poor quality.
- **Foreign investors put greater emphasis on the historical information of FDI flow** to make a new investment decision in the host economy.
- **FDI tends to be more attracted to the growing economies** since growth may indicate some improvement of economic characteristics in the host country.
- Since access to reliable information is limited in developing countries, the **accumulation of domestic capital stock in the recent period helps to overcome the information asymmetry** to the foreign investors and encourages them to invest.
- The significance of trade openness, infrastructure, and population reveals **the requirement of absorptive capacities** in the host economy to attract FDI in the first period.
- The positive coefficient of trade openness suggests **FDI is export-platform**, and the positive coefficient of population suggests that **FDI tends to flow to serve the host market**.

## 1.7 Conclusion (contd..)

- The findings suggest that
  - The coefficient of the population is much bigger (25 times) than that of trade openness, implying that FDI is largely market-seeking and horizontal to avoid transaction costs during the early periods.
  - Infrastructure proxied by land telephone is a significant determinant of FDI in the first period. While land telephone is insignificant but mobile telephone is significant (in sGMM) in the second period. Therefore, infrastructure is a significant determinant of FDI. The significance of mobile telephone to attract FDI is linked to its rapid expansion and diffusion and declining or constant growth of land telephone subscription in the second period.
  - Although high inflation damages capital flow, the smaller but significant coefficient of the variable suggests that a low level of inflation favors FDI flow in our sample economies.
  - The significant negative effect of the financial development index and insignificant effect of institutional quality variables in the second period reflect the occurrence of poor-quality governance in attracting FDI. This may represent the lack of a minimum level of these variables to exert their positive impact on capital inflow.

## 1.7 Conclusion (contd..)

- The findings suggest that
  - Government policy variables are found less important for developing economies to attract FDI, as suggested in Cuervo-Cazurra (2006); Cuervo-Cazurra and Genc (2008), and reflects that FDI flowing into the developing countries may originate from a similar type of economy where underdeveloped financial and institutional institutions are prevailing.
  - The insignificant coefficient of human capital across the periods also reflects the availability of an unskilled labor force, and it seems that poor-quality FDI flows into the developing countries. However, although insignificant, the coefficients of both human capital and labor force become positive in the second period, which may suggest a gradual improvement of absorptive capacity in the host economy to attract better quality FDI in recent times.
- Overall, the findings of the study have policy implications.
  - FDI into the developing countries seems to be largely market-seeking and horizontal. Policymakers in developing economies should secure basic macroeconomic policies to maintain positive growth and attractiveness of the economy (including a depreciated currency), increase trade openness possibly through bilateral and multilateral trade agreements, and reduced trade barriers.

## 1.7 Conclusion (contd..)

- The change of insignificant negative sign of human capital variable to insignificant positive sign indicates the qualitative changes of labor forces in the host economy to attract FDI. **Human capital development policies should be emphasized** to ensure the labor force is skilled and competitive to attract higher quality FDI.
- **Finally**, policymakers should attend to improving the governance indicators and **maintain economic justice** to secure qualitative and quantitative improvements in FDI.

# Appendix

Table A1 Description of the variables

Variables	Description
lnfdis	Log of FDI stock (million USD)
grate_mx	Annual growth rate (annual %)
lnaid	Log of net official development assistance received (current million USD)
lngcf_n	Log of gross capital formation (USD)
lninfgdp	Log of inflation, GDP deflator (annual %)
lnexreal_mx	Log of real effective exchange rate index
lntrd_n	Log of trade openness, number
lnprenr_n	Log of enrolment total, (primary).
lninftel_n	Log of land telephone, (total number).
lnmob_n	Log of mobile telephone, (total number).
lnpopl	Log of population, (total number).
lnp64	Log of population, (age between 15 to 64 years).
lnfd	Log of financial development indicator matrix
lninst	Log of institutional quality matrix

# Appendix

Table A2 Different maintained statistical model (MSMs): first sample period 1980–1996

Dependent variable	MSM 1	MSM 2	MSM 3	1 <sup>st</sup> revised model
	lnfdis	lnfdis	lnfdis	lnfdis
1.lnfdis	0.885*** (0.0478)	0.883*** (0.0506)	0.894*** (0.0490)	0.860*** (0.0383)
grate_mx	0.0169 (0.0123)	0.00772 (0.0146)	0.0130 (0.0113)	0.0162 (0.0125)
lnaid	0.0233 (0.0291)	-0.000307 (0.0277)	0.0145 (0.0302)	0.0250 (0.0276)
lngcf_n	-0.0127 (0.113)	0.0922 (0.103)	0.0358 (0.107)	-0.0205 (0.0830)
lninfgdp	0.0581 (0.0411)	0.0334 (0.0375)	0.0494 (0.0416)	0.0248 (0.0257)
lnexreal_mx	-0.0768 (0.0614)	-0.0738 (0.0549)	-0.0929* (0.0529)	-0.0970** (0.0370)
lntrd_n	0.134 (0.132)	0.125 (0.141)	0.136 (0.130)	0.202* (0.120)
lnprenr_n	-0.471 (0.435)	-0.647 (0.466)	-0.572 (0.466)	-0.400 (0.445)
lninftel_n	0.249** (0.123)	0.174 (0.158)	0.216 (0.135)	0.250* (0.135)
lnpopl	3.177** (1.513)	3.742* (1.877)	3.244** (1.424)	3.217* (1.793)
lnp64	-3.101** (1.486)	-3.178** (1.541)	-3.202** (1.394)	-2.956 (1.775)
c.lnprenr_n#c.lnp64	0.00633 (0.0275)	-	0.0101 (0.0270)	-0.00254 (0.0183)
Constant	1.564 (8.073)	-5.369 (4.503)	1.525 (7.392)	-1.940 (4.477)
No of observations	565	565	565	565
No. of instruments	47	45	46	52
No. of countries	55	55	55	55
AR2 test result (p-value)	0.8008	0.4485	0.6542	0.8652
Sargan-Hansen test (p-value)	14.4229 (0.7011)	12.0660 (0.7961)	13.2070 (0.7222)	17.6069 (0.7784)
IH Test	all passed	all passed	all passed	all passed

Note: (a) Robust standard errors in parentheses; (b) \*, \*\* and \*\*\* represent, respectively, statistical significance at 10, 5, and 1 percent levels; (c) Time-specific dummies included but not reported in the table; and (d) MSM 1 selected.

Model	ngroups	J	nmom	npar	MMSC-AIC	MMSC-BIC	MMSC-HQIC
MSM 1	55	14.4229	47	29	-21.5771	-57.7091	-36.0493
MSM 2	55	12.0660	45	28	-21.9340	-56.0587	-35.6022
MSM 3	55	13.2070	46	29	-20.7930	-54.9177	-34.4612

Note: a) ngroups- number of groups; b) nmom- number of instruments/moment conditions; c) npar- number parameter in the model; and d) MMSC-model and moment selection criteria, AIC- Akaike information criteria, BIC- Bayesian information criterion, and HQIC- Hannan and Quinn information criterion.

Table A3 Andrews-Lu model and moment selection criteria: first sample period, 1980–1996

# Appendix



Table A4 Different maintained statistical model (MSMs): second sample period 1997–217

Dep var (lnfdis)	MSM 1	MSM 2	MSM 3	1 <sup>st</sup> revised model
	lnfdis	lnfdis	lnfdis	lnfdis
l.lnfdis	0.965*** (0.0550)	0.965*** (0.0537)	0.964*** (0.0546)	0.980*** (0.0551)
grate_mx	0.0152** (0.00738)	0.0151** (0.00746)	0.0152** (0.00732)	0.0216*** (0.00702)
lnaid	-0.0252 (0.0687)	-0.0253 (0.0683)	-0.0271 (0.0621)	-0.0152 (0.0354)
lngcf_n	0.312** (0.129)	0.310** (0.134)	0.306** (0.138)	0.281*** (0.105)
lninfgdp	0.106 (0.0897)	0.105 (0.0883)	0.103 (0.0844)	0.0384 (0.0263)
lnexreal_mx	-0.159 (0.265)	-0.155 (0.276)	-0.162 (0.274)	-0.272 (0.264)
lntrd_n	-0.101 (0.147)	-0.100 (0.149)	-0.0994 (0.145)	-0.0569 (0.146)
lnprenr_n	0.0573 (0.420)	0.0552 (0.422)	0.0554 (0.422)	-0.0911 (0.405)
lninfel_n	-0.0748 (0.0610)	-0.0731 (0.0622)	-0.0689 (0.0464)	-0.0596 (0.0583)
lnmob_n	0.0452 (0.0619)	0.0449 (0.0622)	0.0439 (0.0601)	0.0414 (0.0554)
lnpopl	-0.848 (1.274)	-0.826 (1.288)	-0.790 (1.078)	-0.612 (1.178)
lnp64	0.663 (1.222)	0.643 (1.237)	0.608 (1.041)	0.530 (1.090)
lnfd	-0.0509 (0.0575)	-0.0502 (0.0583)	-0.0517 (0.0585)	-0.0772 (0.0597)
lninst	-0.0316 (0.0714)	-0.0320 (0.0709)	-0.0277 (0.0565)	-0.0186 (0.0756)
Constant	-0.365 (3.141)	-0.375 (3.164)	-0.351 (3.205)	0.273 (3.425)
No of observations	813	813	813	813
No. of instruments	54	53	54	60
No. of groups	64	64	64	64
AR2 test (p-value)	0.9349	0.9320	0.9230	0.8631
Sargan-Hansen test (p-value)	19.6925 (0.4773)	19.6635 (0.4151)	19.7129 (0.4760)	23.4112 (0.6096)
IH Test	all passed	all passed	all passed	all passed

Note: (a) Robust standard errors in parentheses; (b) \*, \*\* and \*\*\* represent, respectively, statistical significance at 10, 5, and 1 percent levels; (c) Time-specific dummies included but not reported in the table; and (d) MSM 1 selected.

Model	ngroups	J	Nmom	npar	MMSC-AIC	MMSC-BIC	MMSC-HQIC
MSM 1	64	19.6925	54	34	-20.3075	-63.4851	-37.8874
MSM 2	64	19.6635	53	34	-18.3365	-59.3552	-35.0374
MSM 3	64	19.7129	54	34	-20.2871	-63.4647	-37.8670

Note: a) ngroups-number of groups; b) nmom-number of instruments/moment conditions; c) npar-number parameter in the model; and d) MMSC is model and moment selection criteria, AIC- Akaike information criteria, BIC- Bayesian information criterion, and HQIC- Hannan and Quinn information criterion

Table A5 Andrews-Lu model and moment selection criteria: second sample period, 1997-2017



# Thank You

# Q & A